Environmental Impact Assessment (EIA)

Armenia

North-South Road Corridor Investment Program

Tranche 3: Talin-Gyumri Road

August 2012

egis International

Abbreviations

ADB	Asian Development Bank
AARM	ADB Armenian Resident Mission
CO2	Carbon dioxide
EA	Executing Agency
EARF	Environmental Assessmentand Review Framework
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
NGO	Non Government Organization
NO2	Nitrogendioxide
NO	Nitrogenoxide
MPC	Maximum Permissible Concentration
NPE	Nature Protection Expertise
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
SO2	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)
km2	square kilometer(s)
M	meter(s)
mg/m3	milligram(s) per cubic meter
µg/m3	microgram(s) per cubic meter

Glossary

Marz	province
marzpet	provincial governor
tuff	volcanic rock

Note

In this report, "$"refers to US dollars

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A. Executive Summary

The Project

1. It may be reiterated here that the previously approved Environmental Impact Assessment (EIA) Document for the North-South Road Corridor Investment Program (NSRCIP) Tranches 2 and 3(EIA Document, August 2010) remains valid and serves as the basis for updating the EIA and EMP Documents for Tranche 2 and 3.

2. The updates to the EIA and Environmental Management Plan (EMP) incorporate the new assessment based on the existing and new road alignments starting at Talin from Km 71+500 km to end in Gyumri at Km 117+067. Most of the alignment parallels the existing road but some parts are separated by as much as 330 m. 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 posted on the ADB website for at least 120 days prior to Board Consideration. This project is environment category "A".

3. As a mandatory requirement applicable to all the tranches and sub-projects of the NSRCP to be funded under the Multi-Tranche Financing Facility (MFF), the updates to the EIA Document and to the EMP of Tranche 3 Project are written here in conformity with the prescribed Environmental Assessment and Review Framework (EARF) previously agreed upon by the Ministry of Transport and Communication (MOTC) and the Asian Development Bank (ADB). The EARF was formulated consistent with the requirements of the Ministry of Nature Protection (MNP) and the ADB.

Executive Agency and Implementing Agency

4. The Ministry of Transport and Communication (MOTC) is the Executing Agency (EA). For its Implementing Agency (IA), the EA has decided to combine the customary PPMU and PIU (Program Preparatory and Management Unit and Project Implementation Unit) into one PMU, a Project Management Unit.

The Environmental Impact Assessment

5. Due to time constraints and the EA's and PMU's relative inexperience with ADB's safeguard requirements, an EIA team funded by ADB was fielded on 4 May 2010. The team consisted of one international ADB staff consultant (environmental engineer) and nine national specialists (environmentalist, botanist, zoologist, ornithologist, wetland expert, archaeologist, GIS expert, and two GIS surveyors).

6. International and local environmental specialists from Egis International's team (Consultant's Services for construction Supervision and Preparation of Tranche 2 and 3 projects) have updated the EIA report for Tranche 3 according to detailed design.

Ecology

7. This EIA has determined that 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).

8. 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.

9. Incremental CO2 emissions are estimated at 140 t/year; i.e., significantly less than the SPS (2009) threshold of 100,000 t/year.

Archaeology

10. 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. In order to safeguard the 10 archelogical sites, this report and the EMP contains several types of responses ranging from realignment to chance-find procedures. The establishment of an Advisory Group is recommended, comprising representatives from the Ministry of Transport PMU, the Ministry of Culture, the Supervising Engineer, the Contractor and other stakeholders, to monitor archaeological excavations and to ensure efficient management of chance-find procedures.

Baseline data

11. Due to the fact that relevant air and water quality and ambient noise data were not available, local institutes were engaged to produce air quality and noise ambient data in 7 communities that are located within 250 m of the pre-design alignment and water quality data in 2 watercourses, one of which feed cattle watering reservoirs.

Conclusion / Recommendation

12. The updates include the additional mitigation and enhancement measures. It also recommended some new road alignment deemed necessary to avoid direct potential impacts to the bio-physical environment, archeological/historical, natural, and cultural resources occurring along the immediate vicinities of the pre-existing road alignment. The recommendations generated during the public consultations undertaken for Tranches 3 of the NSRCIP were considered and incorporated.

13. It has been assessed that most of the potential impacts of Tranche 3 Project will be during the Construction Stage; these will be temporary in nature and can be managed effectively with the updated mitigation measures.

14. The EMP and monitoring program will be implemented by the Contractor during the construction period. Moreover, appropriate clauses will be included in civil works contracts to ensure the implementation of the EMP.

15. The EMP, including Environmental Monitoring Plan, will be incorporated into the bid documents and contract for civil works.

B. Policy, Legal, Institutional and Administrative Framework

B. 1 Armenian Laws Governing Environmental Management and Assessment

16. 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).

(i) 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 Protectioncan initiate a review of environmental impact when it considers it necessary to do so. The EIA Law specifies notification, documentation, public consultations, and appealprocedures and requirements (Articles 6-11).

17. 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.

(ii) Law on the Protection and Use of Fixed Cultural and HistoricMonuments 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.Chapter1 - 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.

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

18. The Republic of Armenia has signed and ratified International Conventions, starting in 1993 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.

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, Eutrophication and Ground-level Ozone Formation	01 Dec 99	
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		04 Dec 01

Title, place and date adopted	Signed	Ratified by National Assembly
of Environmental Modification Techniques (Geneva, 1976)		
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 InternationalLakes (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 the Conservation of European Wildlife and Natural Habitats (Bern, 1979)	2006	
Convention on International Trade in Endangered Species of Wild Fauna and Flora	1979	27 Nov 2010

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

B. 3 National Institutional Framework

19. 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

20. 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.

21. 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

22. 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.

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

Ministry of Nature Protection

24. 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.

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

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

26. 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.

27. 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 Culture

28. 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

29. 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

30. State Hygienic and Anti-epidemiological Surveyof 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

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

State Committee on Water Systems

The State Committee on Water Systems is a structural body in the Ministry of Territorial Administration is authorized body of management of water structures.

State Committee of the Real Estate Cadastre

32. 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.

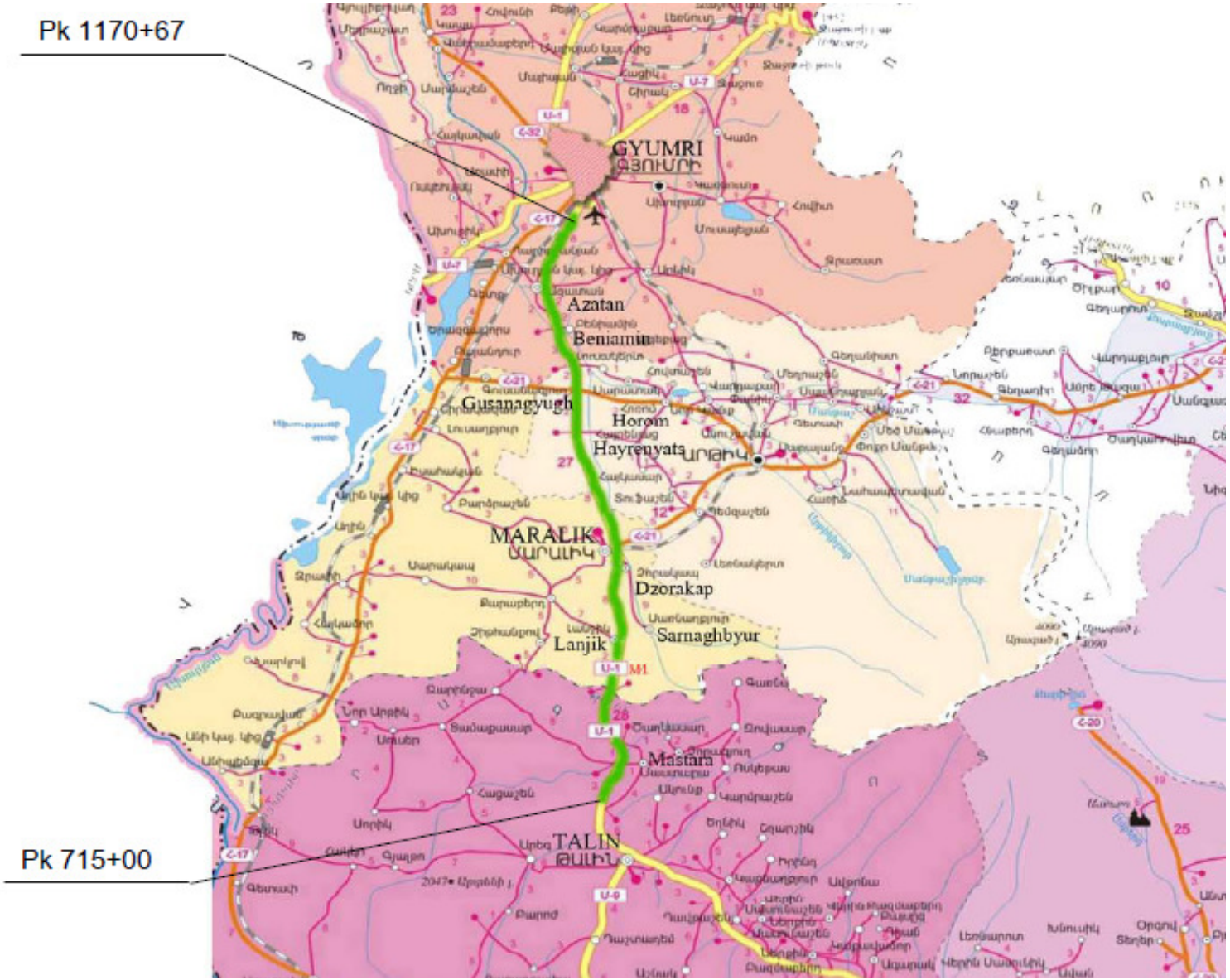
C. Description of the Tranche 3 Project

C. 1 Project Scope

33. The project road is located North-West of Yerevan, the capital of Armenia. Map 1 below presents the Project's general location. Tranche 3 comprises the upgrading to Four-lane Dual Carriageway of the M1 between Talin and Gyumri, Km 71+500 to Km 117+067, of the North-South Road Corridor.

34. The NSRCP is aimed at the improvement of the transportation links of Armenia with its neighbor countries Iran and Georgia to international standards. The Project is envisaged to bolster the economic growth of Armenia.

Map 1 A: Republic of Armenia showing Tranche 3 Project Area



Map 1 B: Tranche 3 Project, Talin – Gyumri

C. 2 Major Components

35. The total length of the Contract is 45.719km which comprises:

- reconstruction of the existing two-lane road and
- construction of a second carriageway alongside.

36. 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.

37. There will be a total of

- 10 new grade-separated interchanges, nine of which are overpasses and one an underpass. Each of the overpasses utilize standard 18m long normally reinforced beams, all with conventional reinforced concrete decks.
- A total of 16 t-junctions will be constructed to provide connection to local roads/communities.

38. Other reinforced concrete structures comprise

- 6 agricultural overpasses for machinery, pedestrians and animals;
- 10 agricultural underpasses - 6 for machinery and 4 for animals and pedestrians;
- 3 river bridges and one road-over-rail bridge and
- A total of 132 culverts for surface water and irrigation systems.

39. The principle quantities of the works to be implemented include:

- Excavation: 3,000,000 cubic metres.
- Embankments: 3,300,000 cubic metres.
- Concrete Pavement: 950,000 sq. metres
- Safety Guardrail: 136,000 linear metres.
- Landscaping/grassing after construction: 400,000 sq. metres.

40. A typical cross-section through the existing and new road beds are shown in Figure 1 below.

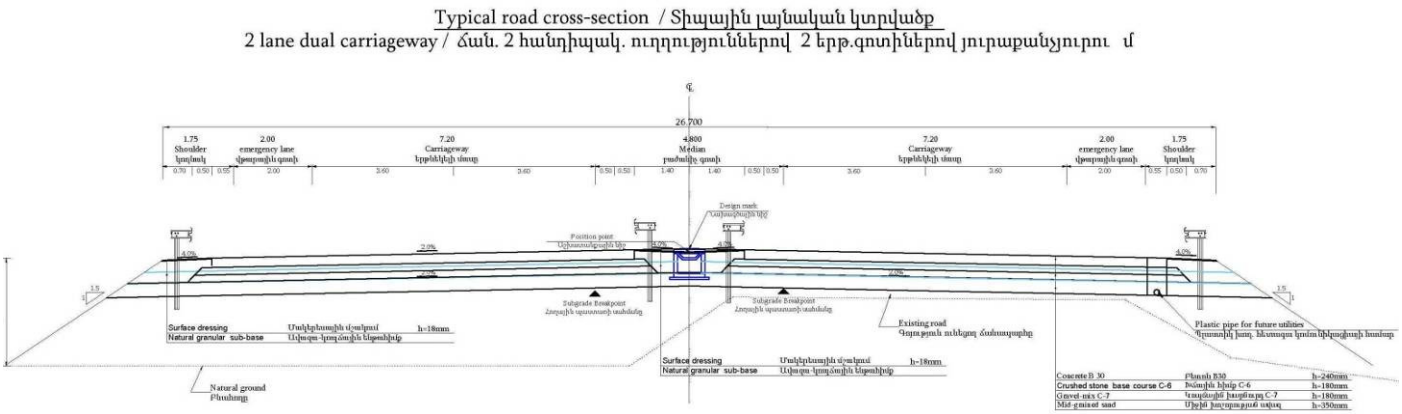
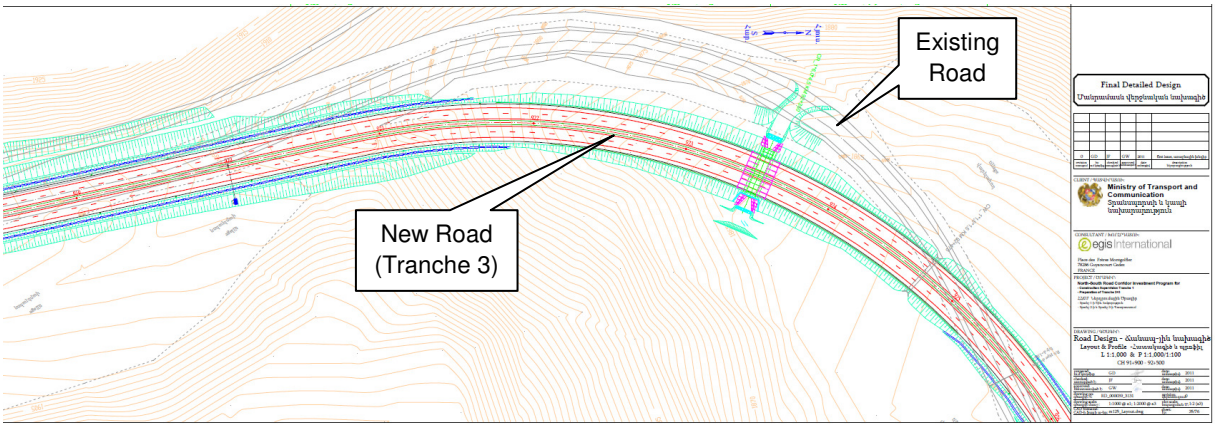


Figure 1. Typical road cross-section

41. The road pavement will comprise 35cm thickness of granular capping layer, 18cm of granular sub-base, and 18 cm of crushed rock base course and 24 cm of cement concrete pavement. Shoulders and median will be covered with double seal surface dressing.

42. The road has been designed in accordance with (i) Bridge Design Building Code SNIP 2.05.03.84 and (ii) Construction Norm of Republic of Armenia IV11.05.02-99. The structural elements of the project have been designed with consideration to the high risk of seismic activity and flooding in the region. This will enhance the sustainability of the project.

43. There are 6 sections where the road geometry has been improved by designing curves which comply with Category 1 Design Standards to eliminate sharp bends on the existing road, as illustrated in the following extract from the Design Drawings :



These various realignments are at the following locations:

i) Km.73+000 to km.73+500

ii) Km 74+700 to km.75+600

iii) Km.77+500 to km.83+500

This realignment of the road at Mastara is discussed in detail in Sections D, E and F of this EIA.

iv) Km.84+450 to km.87+100

v) Km.91+950 to km.95+000

Areas (i) to (v) are within zones identified as being of archaeological significance and which are identified elsewhere in this EIA as areas where archaeological excavation will be required, in advance of the Works. Consequently, these local realignments to improve curves will not create any additional archaeological impact.

The “chance find” procedure will also be applied during works implementation

vi) Km 114+700 to km 117+000

At this area, the northbound and southbound carriageways are divided to provide a 10m wide central reserve (median) in order to allow the preservation of a row of existing trees withing this median. The trees line both sides of the existing road on the approach to Gyumri.

44. Other activities associated with construction include:

- Identification and protection or relocation of existing utilities including irrigation systems and communication lines;
- Selection of suitable locations for construction camps; facilities and offices; and storage of materials and machinery;
- Installation of gated security fence saround the camps;
- Removal of existing waste material dumped along the route;
- Storage and distribution of surplus top soil;
- Utilization of existing borrow pits; and
- Reinstatement and landscaping of the shoulders and adjacent tareasand medians following construction.

45. The preliminary and detailed engineering design for this project has been completed and the construction period will be 36 months.

46. 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 in agreement with local Heads of Communities.

C. 3 Highlights of EIA Updates

47. The updates to the Environmental Impact Assessment and Environmental Management Plan (EIA and EMP) were prepared by the environmental team from Egis International composed of 2 national specialists (Environmental Specialist and Senior Archeologist) and an International Environment Specialist. The team conducted the revalidation and reassessment of the different impacts of Tranche 3 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 December 2010 and in February-March 2011 to consider the changes and new decisions made for Tranche 3 Project.

48. The updates to this environmental impact assessment has been undertaken to meet both the ADB and RA requirements with regard to environmental protection and management. The EIA update was written in compliance to the Asian Development Bank’s Safeguard Policy Statement (SPS) of

2009, in particular the Safeguard Requirements on Environment Protection, Environmental Impact Assessment and the Special Requirements for Different Finance Modalities specified in Appendices 1 and 4 respectively.

49. The document is to be reviewed for non-objection by the government in order for the ADB to post the English version and for posting on the websites of the Ministry of Transport and Communication (MOTC) and of the Ministry of Nature Protection (MNP).

50. The following tasks were undertaken:

- Updates to the EIA document went through the process of field evaluation and reassessment of the impacts of Tranche 3 Project and within the context of EIA procedures for the Project the following desk and field activities were performed:
- Review of the EIA Document (Aug. 2010), detail design, progress reports and relevant project documents
- Identification of environmental values along the Tranche 3 road alignment
- Assessment of the potential impacts, issues and constraints of road construction works on the environment and on the Physical Cultural Resources (PCR)
- Update of the Environmental Management Plan (EMP) and Monitoring Plan

51. Field surveys and site inspections included driving the route of the existing road and walk through the sites/areas of environmental, archaeological, historical, natural and cultural monuments to confirm, evaluate and assessment of the potential impacts of Tranche 3 Project.

52. 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.

53. Meetings were held with the PMU to discuss relevant environmental and archaeological aspects of the project and other specific concerns.

C. 4 Project Context and Environmental Category

54. Every sub-project of this MFF program was screened to determine its environmental category based on the ADB's Rapid Environmental Assessment Checklist (REA).

55. 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.

56. The sub-project / Tranche 3 Project has been classified as category "A" for the main following reasons:

- most of the additional new construction will be located in a new right-of-way;

- several significant archaeological sites, a protected natural monument and environmentally important area will be adversely affected and will require mitigation measures to minimize the impacts.

D. Description of the Environment (Baseline Data)

D. 1 Ecology

57. This EIA update has determined that the Project will have no severe negative impact on the existing flora and fauna along the Talin-Gyumri Highway. However, due to the recorded occurrence of some protected species of migratory birds, protection measures are given in the Environmental Management and Monitoring Plan (EMP), both for the migratory birds and for the Red Book species that may be encountered in the project area.

58. There are, however, areas in which endangered and critically endangered Red Book species of Flora have been recorded in the vicinities of Talin, Mastara, Maralik and Lanjik. Those species will receive special attention to satisfy Armenia's Law on Flora (1999) and the requirements of the Red Book.

59. Incremental CO2 emissions are estimated at 140 t/year; i.e., significantly less than the SPS (2009) threshold of 100,000 t/year.

D. 2 Archaeology

60. Armenia's territory is rich in antiquity remains – the EIA therefore also determined that the impact on archaeological, historical, natural and cultural monuments along the pre-existing Talin-Gyumri Highway requires special consideration. A desk study indicated about 30 areas of interest. The field survey verified those areas and confirmed 22 sites of interest. The EIA team also confirmed 4 recently identified or 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). In order to safeguard the most important sites, this update and the EMP contains several types of responses ranging from relocation, realignment and excavations to chance-find procedures.

61. The procedures to be followed are clearly defined in the "Law on the Protection and Use of Fixed Cultural and Historic Monuments and Historic Environment (1998)" as described in Section B1 of this EIA "Armenian Laws Governing Environmental Management and Assessment".

D. 3 Geographical Location and Relief

62. The Talin - Gyumri highway is partly located in Aragatsotn and Shirak and passes along dry steppe and steppe landscape zones. It runs through flat and rolling terrain. Within 5 km from Talin the elevation increases from 900 m above sea level (asl) as the alignment enters Mastara to Sarnagbyur the altitude ranges between 1,400 and 1,800m above mean sea level.

D. 4 Geology and Seismology

63. Much of the Tranche 3 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. 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.

64. 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.

D. 5 Climate, Air Quality, and Noise

65. Baseline conditions, against which any change is measured for the components of the environment likely affected by the 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.

D. 6 Climate

66. The Tranche 3 Road Project is located in Aragatsotn and Shirak marzes. The Talin to Lanjik segment of the highway is on Aragatsotn marz and an area of Lanjik to Gyumri is Shirak marz.

67. A dry continental climate is typical for the highway section in Aragatsotn marz. In July, the average air temperature varies between 20° and 24°C. The maximum summer temperature reaches up to 40°C. The number of days with temperatures of over 10°C is 180-200. The average air temperature in January varies between -4° and -6°C. The minimum temperature is as low as -34°C. The duration of stable snow cover is 1-3 months on average. The number of non-frosty days varies between 200 and 240.

68. 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.

69. In Shirak marz, typical climate includes warm summers and cold and long winters.

70. In July, the average air temperature varies between 16° and 20°C. The maximum summer temperature reaches 34°C. The number of days with temperatures of over 10°C is 150-180.The average air temperature in January varies between -8° and -12°C. The minimum temperature is as low as –40°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.

71. 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. In order to reduce such build-up, it has been suggested to install movable wind deflectors that were reportedly successful.

D. 7 Air Quality

72. 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.

73. 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.

74. Sulphur dioxide (SO2) and nitrogen dioxide (NO2) concentrations were measured in receptors close to the highway in Talin, Mastara, Lanjik, Maralik, Lusakert, Benjamin and Azatan. 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.

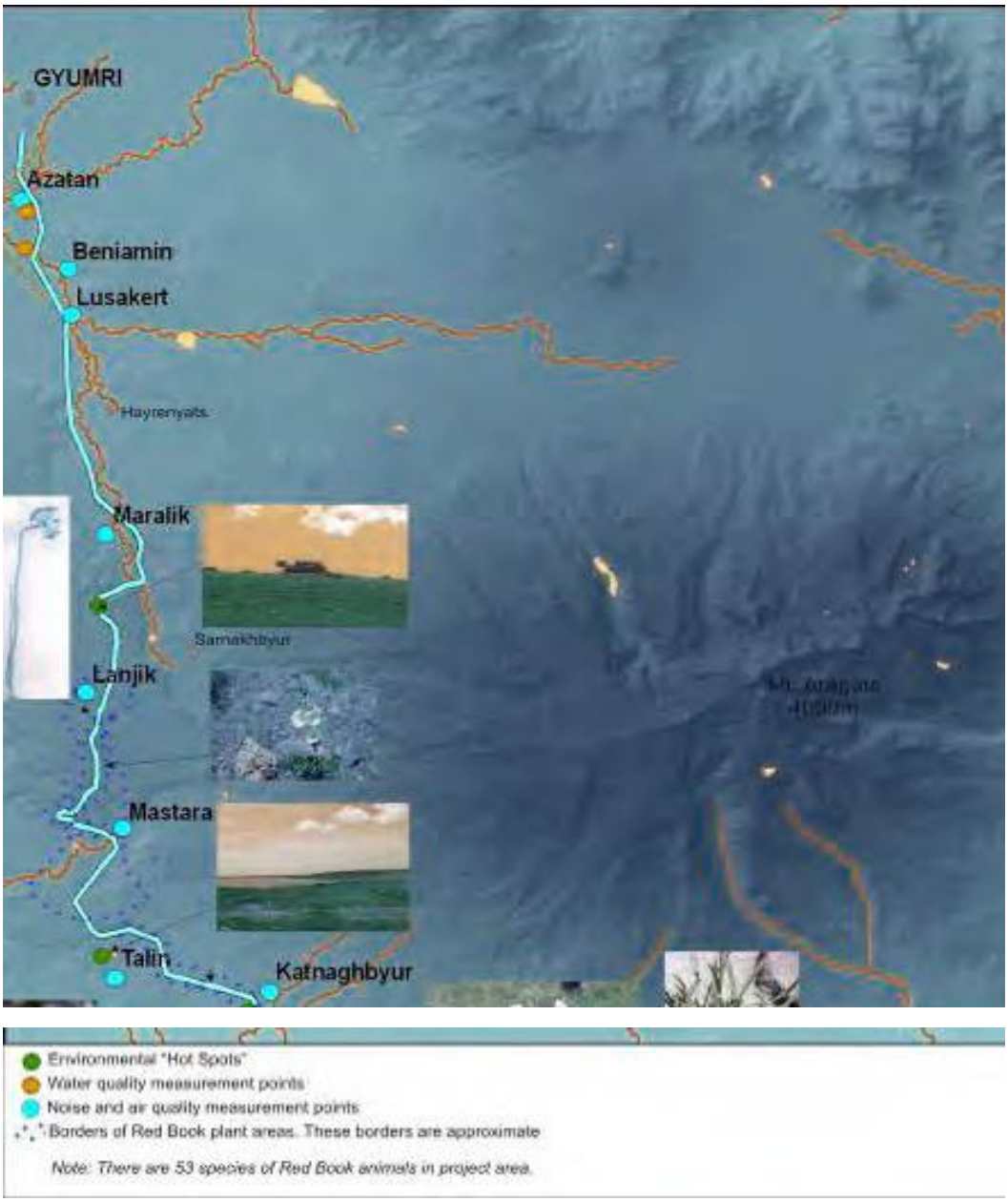
75. Table 2 summarizes the measurements. The table compares the maximum permissible concentration (MPC) of air pollutants based on the Armenian standard Maximum Permissible Concentration (MPC) for Ambient Air in Human Settlements. The table indicates that the daily average concentrations are consistently 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 2 shows the locations of the monitoring positions.

Community	**Measured Parameters at road (mg/m3)**	
	SO2	NO2
Talin	0.0048	0.0035
Mastara	0.0056	0.0060
Lanjik	0.0040	0.0070
Maralik	0.0072	0.0043
Lusakert	0.0064	N/Aa
Benjamin	0.0096	0.0085
MPC (mg/m3)b	Parameters measured at receptor (mg/m3)	

	SO2	NO2
Single event	0.50	0.085
Daily average	0.05	0.040

a The NO2 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.

Table 2: Measured Air Quality Parameters



Map 2: Monitoring Locations & Environmental Areas of Interest

D. 8 Greenhouse Gas Emissions

76. The project (Tranches 3) will add significantly less CO2 per year than the SPS (2009) threshold of 100,000t/year. Based on actual and projected traffic counts and the assumptions presented in Table 3, the estimated increase in CO2 emissions due to increased traffic is less than 140t/year.

		Talin ~Gyumri
Average annual traffic counta	PCU	3,762
Projected 2032 traffic count a	PCU	11.280
Percent gas powered	%	40%
Distance	km	44.8
Gas efficiency	L/100km	10
Diesel efficiency	L/100km	7
CO2 emission gas	kg/L	2.32
	kg/L	2.67

a TA7208-ARM Preparing the North-South Road CorridorDevelopment Project, Final Report, Vol. III, PADECO Co., Ltd.

Table 3: Data and Factors for CO2 Emission Calculation

D. 9 Noise

77. Map 2 shows the locations of the survey positions – same as for air quality monitoring. A summary of the measurements is given in Table 4 below.

78.

Community	Average Daytime Noise Level at road		Average Daytime Noise Level 20 m from source	
	dB LAeq15min	dB LAmax15min	dB LAeq15min	dB LAmax15min
Talin	71	94	67	84
Mastara	67	85	64	81
Lanjik	66	83	65	80
Maralik	66	83	64	78
Lusakert	65	78	63	75
Beniamin	65	81	63	76
Azatan	69	87	66	84

Receptor	Time (hours)	Maximum Permissible Noise Levelsa	
		dB LAeq15min	dB LAmax15min
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"

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

79. 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.

80. 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 expressed the opinion that noise levels at the receptors would be above the limits for all of the 7. According to them, 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.

81. All receptors are at present likely subjected to noise levels above those permitted by the Government Order N2-III-11.3.

D. 10 Hydrology and Water Quality

Rivers

82. The main river system in the project area is Karkachun that is crossed by the highway. There are also some brooks which are mostly dry during summer.The highway crosses 3 river systems. There are other small seasonal rivers and brooks as well. Tables 5 and 6 show some physical characteristics of the Karkachun River.

Name of river	Flows into	Source m	Outlet elev.m	Length km	Grade % (avg.)	Area km2
Karkachun	Akhuryan R.	3480	1454	44	3.7	1020

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

Table 5: Some Indicators of Water Course Crossing the Talin-Gyumri Highway

River / Observation station	Area (Km2)	Ave. annual Discharge	Probability of River Discharge (m3/s)				

		(m3/s)	5%	25%	50%	75%	95%
Karkachun / Gharibjanyan	1020	1.59	2.47	1.89	1.35	1.12	0.95

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

Table 6: KarkachunRiver - Average Annual and Probable Discharges

Ponds, Reservoirs and Ground Water

83. There are no lakes near 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 of Talin and Maralik. The water reservoir North of Talin is about 140 m from the highway and thus, could be impacted by the project.

Maralik pond

84. The pond North of Maralik is man-made and serves to store water forcattle watering. There is no sign of wetland vegetation or fauna although in the future, the area may develop into wetland. The pond is classified as a 'Man Made Wetland Type 2' according to the Ramsar classification.

Water reservoir north of Talin

85. The reservoir is situated on the left site of the highway. It is used for watering of cattle and is therefore important to the local population. It is about 140 m from the highway, which means that it may be impacted during construction. No change to the pre-design alignment is proposed; however, the environmental management and monitoring plan (EMP) sub-plan 16 includes provisions to protect the reservoir from construction-related impacts.

Groundwater

86. In Aragatson marz, groundwater along the alignment is at depths of 120 to 150 m; in Shirak marz, it is at depths of 50 to 60 m.(Source: EMP for Rehabilitation of Talin Main Canal, MCA-Armenia Program to facilitate Poverty Reduction through Economic Growth).

Water Quality

87. Water quality in Armenia is also monitored by Armecomonitoring, with monitoring stations on Karkachun River (Station N 38, 1 km downstream from Kharibjanyan community, approximately 4.1 km from the highway).

88. 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 Karkachun River station registered exceedences for BOD5, COD, DO, DDE, DDD, DDT, heptachlor, NH4 +1, NH4+1(N), NO3-1, NO3-1(N), NO2-1, NO2-1(N), Ca, Cu, Fe, Mg, Na, SO4-2, Zn, and TSS. Table 12 shows the maximum exceedences. A dash indicates that there was no exceedence of the parameter during the period.

Parameter	**MPC**[11]	**Unit**	**KarkachunRiver (**1 km downstream from Kharibjanyan community)

BOD5	3	mg/L	25/03/09	6.4
COD	30	mg/L	02/07/08	44
DO	>6	mg/L	10/06/08	1.32
DDD	0.01	µg/l	21/05/09	0.012
DDE	0.01	µg/l	25/03/09	0.015
DDT	0.01	µg/l	10/07/09	0.033
Heptachlor	0.01	µg/l	11/03/08	0.038
Ca	180	mg/L	18/09/07	188.255
Cu	0.001	mg/L	12/04/07	0.017
Fe	0.5	mg/L	12/04/07	2.947
Mg	40	mg/L	18/09/07	118.988
Na	120	mg/L	26/08/08	189.297
SO4-2	100	mg/L	02/07/08	248.6
Zn	0.01	mg/L	8/11/08	0.058
NH4+1	0.5	mg/L	18/11/08	6.276
NH4+1(N)	0.39	mg/L	18/11/08	4.883
NO3-1	40	mg/L	22/03/07	47.714
NO3-1(N)	9	mg/L	22/03/07	10.865
NO2-1	0.080	mg/L	20/04/09	1.817
NO2-1(N)	0.024	mg/L	20/04/09	0.552
TSS	30	mg/L	11/03/08	273.5
pH	6.5-8.5	-log10[H+]	-	-

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.

Table 7: MPC Exceedences in Karkachun River

89. Specialists from Armecomonitoring were engaged to obtain and analyze physical chemical and biological water quality samples of all 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 rivers and streams are Karkachun River and the Karmraqar brook.

90. Sampling showed that vanadium concentrations in all watercourses exceeded MPCs. Concentrations of total suspended solids are high in Karkachun and Karmraqar. Dissolved oxygen is less than the standard in Karmraqar, nitrite ions and manganese are high in Karkachun and Karmraqar, ammonium ion, BOD5, chromium and nickel are high in Karmraqar. Boron concentration exceeded MPC in Karmraqar. Table 8 shows all occurrences of MPC exceedence.

Name Of Water-course	Date Of Sam-ple	TSS	DO	NO2 -1	NO2 -1 (N)	NH4 +1	NH4 +1 (N)	BO D5	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
Karka-chun	06/09/10	81.1		0.242	0.074					0.099	0.005		0.027		0.002
Karm-raqar	06/09/10	114	3.13	3.775	1.148	11.393	8.864	23.50	0.385	0.273	0.013	0.002	0.065	0.011	0.008

Table 8: MPC Exeedences in Sampled Watercourses

91. 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.

92. 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 this element into consideration.

D. 11 Soils and Land Contamination

93. 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 to be found between the start and Mastara. They have the following, typical properties:

- average humus content of about 3%;
- contain rock debris;
- show a clearly developed, partially cemented eluvial-carbonate layer;

- 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.

Black soils:

These soils are generally found between Mastara and the end point ofproject at Gyumri. They have the following, typical properties:

- humus content (3.5 -12%);
- higher than average absorption properties (35 – 55 mg-eq/100 g soil);
- mainly neutral,sometimes weakly acidic or weakly alkaline (pH 6.8 – 8.2); and
- best properties with regards to composition and hydro-geologic properties. These are the most fertile soils in Armenia.

There are no available data on land contamination in the project area.

D. 12 Biodiversity

Flora

94. 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.

Iranian-turanian phryganas

95. 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).

Mountain steppes

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

- (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 someplaces, 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.

Tragacanths

97. 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.

Steppe bushes

98. 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.

Steppe meadow

99. 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.

Hydrophilous vegetation

100. 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.

Forest vegetation

101. 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.*

Red Book species

102. The following three species that are registered in the Armenian Red Book can be found in the Tranche 3 project area:

- Allium oltense Grossh - 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: Mastara, Lanjik.

  Limiting factors: Limited territory for living and spreading, loss of habitat and degradation as a result of land cultivation and grazing.

- Merendera greuteri Gabrielianis 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. Its habitats are near Talin and Katnakhbyur.

  Limiting factors: Limited territory for living and spreading, loss of habitat and degradation as a result of land cultivation and grazing.

- Alcea sophoraliin- 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: Maralik, Talin, Mastara.

  Limiting factors: Limited territory for living and spreading, loss of habitat and degradation as a result of land cultivation and irregular grazing.

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.

Map 3: Locations of Red Book Flora Species along the Project Alignment

Fauna

103. 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.

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

105. According to the zoologist's report, 5 insect, 4 reptile, 7 bird, and 4 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.

D. 13 Environment, Protected Areas and Natural Monuments

106. 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

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

Protected Red Book Species of Flora and Fauna

108. 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.

Trees along the Highway

109. 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.Tree cutting will be done mainly on the right side of the existing road. Approximately, 600-800 trees will be removed. The following sections have been identified:

- about 30 m in the km 81+300
- about 1.2 km rare trees line in Maralik community from km 99+150 till km 100+350
- about 1 km thick trees line from km 111+500 till km 112+500
- two group of trees in the km 113+600 and from km 116+450 till km 116+500
- about 1.8 km thick trees line near Gyumri from km 116+750 till km 118+500).

110. The EMP contains a replanting scheme and recommendations to delimit and refrain from unnecessary cutting or removal of trees along the Project alignment.

Natural Monument "Turtle"Rock

111. Natural monuments are rare in Shirak marz so that this "sculpture" has become one of the loveliest places for locals and visitors alike to gather and contemplate a legend ascribed to it.

112. This natural rock monument is included in the MNP's list of Natural Monuments of Armenia, which the Governmental Decision 967 N, 14 Aug 2008. As such, it is meant to be protected from various impacts, including the potential for rock and landslide due to the pre-design alignment and vibrations caused by excavator compaction machinery. There are two feasible ways to protect the site:

- Switch to the right side for 500 or 600 m and construct the new road on substantial fill possibly in a marshy area and on farm land; or
- Maintain the pre-design alignment but build a retaining wall in the cut section to preserve the natural slope, the realignment option is favored.

Quarries and Gravel pits

113. Contractors obtain their aggregates from existing quarries that they either own themselves or are owned by other contractors. All quarries are given permits and are monitored by MNP. In the event 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.

114. Details of the licenced quarries in the project area are included in the Works Contract Documents and are attached as Annex 8 to this EIA. The Works Contractor will decide which of these quarries he will use, if any. However, his use of any quarry will be controlled by the existing legislation and regulations which have been established by the MNP to control the operations of these quarries from the commencement of their operations. Access to these quarries is via existing public roads which are subject to existing legislation regarding load restrictions and safe usage. In addition, the Contractor must obtain the approval of the Supervising Engineer before using any such source of materials for the Works. This approval will only be given when the Engineer is satisfied that all Contract requirements, including EMP and Environmental Impact mitigation requirements, have been fully satisfied.

Archaeology, Historical, Natural and Cultural Monuments

115. Aragatsotn and Shirak marzs where Tranche 3 Project is situated are well known for their rich historical-cultural monuments, as well as ecotourism attractions such as the Church of Talin. The Project's road alignment is passing across or closely alongside archeological/historical sites and cultural monumentsof different periods. Some of the sites are adjacent to the existing road while others are located in the general vicinity.The alignment does not pass through or near any cultural heritage or archaeological sites designated by UNESCO or the MOC.

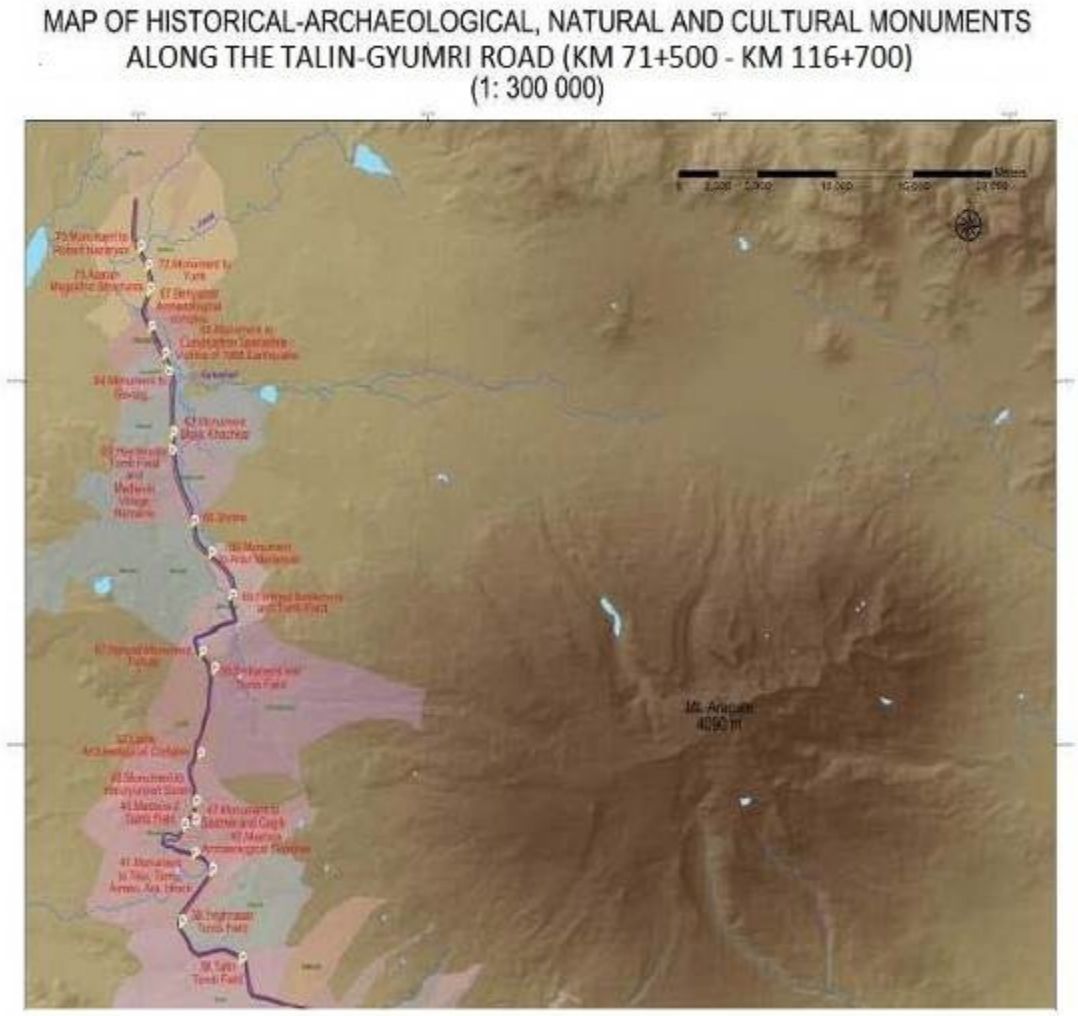
116. During the field assessment activities a total of 22 sites were counted and tallied. Of the 22 sites, 11 will be directly affected by the design alignment. Of these, 10 arearchaeological sites, and 1 natural monument will be directly affected. Sites indirectly affected by the project will include 1 archaeological site and 10 Cultural (Memorial) monuments.

117. Five of the archaeological and historical siteswere 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, historical sites and cultural monumentsof RA.

118. Their identifying names and representative period are presented in Tables 9 and 10 respectively. Map 4 presents the location and distribution of archaeological/historical sites and cultural monuments along the Tranche 3 Project.

Map Number	No	Type	Name	Community	Direct Impact	Indirect Impact
	38-1	Archaeological site	Talin tomb field	Talin	✓	
	39-2	Archaeological site	Yeghnasar tomb field	Talin-Akunk-Mastara	✓	
	41-3	Cultural monument	Tiko, Tomo, Armen, Ara, Hrach	Mastara	✓	✓
	42-4	Archaeological monument	Mastara archaeological complex	Mastara	✓	
	45-5	Archaeological monument	Mastara-2 tomb field	Mastara	✓	
	47-6	Cultural monument	Siraznik, Gagik	Mastara		✓
	48-7	Cultural monument	Harutyunyan Suren	Mastara		✓
	50-8	Archaeological monument	Fortified settlement and tomb field	Mastara		✓
	52-9	Archaeological monument	Lanjik archaeological complex	Mastara-Lanjik-Sarnaghbyur	✓	
Map 6 56+400 65+800 Shirak Marz	56-10	Archaeological monument	Bronze age settlement remains	Lanjik-Sarnaghbyur		✓
	57-11	Natural Monument	Turtle rock	Lanjik	✓	
Map 7 65+800 74+300 Shirak marz	58-12	Archaeological monument	Fortified settlement and tomb field	Dzorakap	✓	
	59-13	Cultural monument	Artur Manasyan	Maralik		✓
	60-14	Cultural monument	Memorial Shrine	Maralik		✓
	62-15	Archaeological monument	Tomb field and Medieval village remains	Hayrenyats - Horom	✓	
Map 8 74+300 82+300 Shirak marz	63-16	Cultural monument	“Black Khachkar”	Horom		✓
	64-17	Cultural monument	Gevorg	Lusakert		✓
	65-18	Cultural monument	To the construction specialists - victims of 1998 earthquake	Lusakert		✓
	67-19	Archaeological monument	Benyamin archaeological complex	Benyamin	✓	
	70-20	Archaeological monument	Azatan Megalithic structures	Azatan	✓	
	72-21	Cultural monument	Yurik Memorial	Azatan		✓
	73-22	Cultural monument	Robert Nazaryan	Azatan		✓

Table 9: Archaeological/Historical Sites and Cultural Monuments along Tranche 3



Map 4: Archaeological/historical Sites and CulturalMonuments

119. 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.

120. Eleven of the 22 sites and monuments will be directly affected by the Project. These include 10 archaeological sites, 1 natural monument and the indirectly affected will include 10 Cultural (Memorial) objects and 1 newly discovered archaeological site. The 11 cultural monuments and the archaeological site although will not be directly impacted will also be protected under the provisions of the EMP. The 10 sites and the Turtle Rock that will be directly affected have specific mitigation measures provided in the EMP and can also be protected by the recommendations included in the contractors' contract.

121. The recommended mitigations provided in the Environmental Management Plan are aimed to minimize if not eliminate the impacts and enhance the historical and cultural values of the sites.

122. The main recommendations can be listed as follows:

- Changes in the engineering design have been implemented where possible to mitigate adverse impacts on archaeological sites.
- Archaeological test-excavations will be required at all affected sites including Talin Tomb Field, Yeghnasar Tomb Field, Mastara Archaeological Complex, Tomb Field and Medieval Village, Hayrenyats Village, Beniamin Archaeological Complex, Azatan Megalithic Structures. and Fortified Settlement and Tomb Field of Dzorakap. The chance-find regulations issued by the Ministry of Culture shall be strictly observed in all of the sites as discovery of archaeological finds during soil removal process is possible.
- Mitigation measures are also recommended for the rest of the physical cultural resources - historical-archaeological and cultural monuments recorded along the Talin-Gyumri Highway which are not directly affected by the construction activities.
- Relocation of historical or cultural monuments is recommended for the preservation of their cultural-historical value.
- Strengthening (reinforcement) of the constructions of historical-cultural sites and monuments alongside the road is recommended to protect these objects from shaking and vibrations during the process of construction and permanent vibration when the road is operational.
- It is also strongly recommended that PMU open a position for an archaeologist in charge of dealing with this large amount of protection procedures, controling over the activities of the contractors and regulating the relations between the teams of archaeologists and construction bodies. The task of the mentioned expert must include the chance-find regulations in the construction areas along the Talin-Gyumri Road Project. It is also recommended that an Advisory Group be established, comprising representatives from the Ministry of Transport PMU, the Ministry of Culture, the Supervising Engineer, the Contractor and other stakeholders, to monitor archaeological excavations and to ensure efficient management of chance-find procedures.
- If any item of cultural heritage or archaeological artifact is uncovered during excavation activities, works must stop and the MOC has to be 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.

E. Anticipated Environmental Impacts and Mitigation Measures

123. The review of the environmental and archaeological impact assessment studies were undertaken and subsequently followed by field validations and reassessment of impacts of the proposed changes in road alignment and technical design vis-a-vis the archaeological sites, historical and cultural monuments located along and adjacent to the vicinities of the Tranche 3 road alignment.

124. The anticipated environmental impacts and the impacts to the archaeological/historical sites, natural monuments and cultural (memorial) objects were assessed in relation to the engineering design for the Talin-Gyumri highway together with its new alignments and in consideration of the recommendations proposed in the original EIA document.

* *

125. All anticipated impacts of the Tranche 3 project on the environment and on archaeological, historical, and cultural sites and monuments will 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).

126. 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.

* *

127. The major trans-boundary 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 minority population in the region is unlikely to be affected differently from the whole population, if at all.The positive socio-economic impact expected is that the upgraded highway will play a positive role in enhancing economic growth of the region and the country.

* *

128. 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, 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.

* *

129. 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.

* *

130. 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 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.

Project activities	Major potential impacts Issues & constraints	Feasible mitigation measures
Detail Design:		
• **Widening of the highway along the Mastara Archaeological Complex** • **Location/position of the "cloverleaf" at Tomb Field and Medieval Village Remains of Hayrenyats** • **Location/position of the "cloverleaf" and design/alignment of the highway at Benyamin archaeological complex** • **Design of the road 'turn' at Azatan Megalithic Structures**	• Encroachment and destruction of archaeological historical & Cultural sites	➲ Widening of the highway at Mastara Archaeological Complex shall be on the right side of the existing road alignment. ➲ Change the location of the cloverleaf to the right side of the highway at Hayrenyats' Tomb Field and Medieval Village Remains. ➲ At Benyamin archaeological complex change in the location of the cloverleaf and redesign the highway to the right side closer to the Benyamin village. ➲ Redesign the road turn to the South in Azatan megalithic structures. ➲ Undertake archeological excavations prior to road construction.
Construction:		
• **Identification of appropriate construction camps, field office, warehouse/equipment storeroom** • **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**	**Physical:** • Disruption of traffic flow • 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	➲ Good traffic management & promotion of public awareness ➲ Ensure dust suppression by water sprinklers, ➲ 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

Project activities	Major potential impacts Issues & constraints	Feasible mitigation measures
of borrow and surplus materials • **Inadequate supervision of construction works** • **Hauling and transport of construction and quarry materials**	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 **Biological:** • Disturbance to the water reservoir of Talin • Disturbance and displacement of Red Book migratory species of birds • Unnecessary cutting/removal of trees along the highway and ground vegetation **Archaeological, Natural & Cultural:** • Impairment of Talin tomb field and Yeghnasar tomb field • Destruction of historical and culturalresource of Mastara archaeological complex, fortified settlement and tomb field of Dzorakap, Tomb field and Medieval village remains of Hayrenyats andAzatan megalithic structures • Infringement of archaeological historical and cultural sites along the alignment: • Lanjik archaeological complex, Settlement and tomb field, and Benyamin archaeological complex • Destruction of Turtle Rock	fruiting trees ➲ Identify appropriate dumpsite ➲ Adequate monitoring and supervision and management of the construction and work sites ➲ 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 RedBook species ➲ Tree planting of appropriate species ➲ contractors to maintain trees until they are viable ➲ 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. ➲ Strengthen 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

Project activities	Major potential impacts Issues & constraints	Feasible mitigation measures
	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

Table 10: Potential impacts and mitigation/enhancement measures

131. In order to ensure the proper implementation of the Environmental Management Plan all contractors' contracts 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. 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.

132. To ensure that the responsibilities of the contractors in relation to the environmental 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.

133. 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.

E. 1 Impacts due to Location

134. The project will be located partially within the right-of-way that was established during the 1980'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. The approximate count of Affected Properties is 980. Resettlement and compensation plans are detailed in the Land Acquisition and Resettlement Plan (LARP) for the Tranche 3 of the NSRCP.

135. 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 contains 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 has been proposed. Based on this, the project will not adversely impact any ecologically sensitive areas.

Flora and Fauna

136. The Tranche 3 Project from Talin to Gyumri passes through steppe and dry steppe landscape zones. Almost both sides of the highway are cultivated lands interspersed with big and small communities/villages and only small areas of natural environment are along the road.

137. During investigations it was clarified 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

138. There are three Red Book species near the highway these are:

- Allium oltense Grossh; *habitat*: Mastara, Lanjik.
- Merendera greuteri Gabrielian; *habitat*: between Katnaghbyur and Talin communities.
- Alcea sophora Iiin; *habitat*: Maralik, Talin, Mastara.

See details in D. Description of the Environment; D.12. Biodiversity.

139. The Special mitigation measures have been 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

140. There are several sections where trees and bushes are growing along the highway. The location and kilometric readings of the distribution of trees along the highway are noted in the following locations:

- Km. 81+300 the line of tree extends to about 30 m.
- Maralik community from km 99+150 to km 100+350, rare trees line in about 1.2 km.
- Km. 111+500 to km 112+500, about 1 km thick trees line from
- Km. 113+600 and from km 116+450 till km 116+500, two group of trees
- Near Gyumri at km 116+750 to km 118+500 about 1.8 km line of trees

141. Tree cutting will be done mainly on the right side of the existing road. Approximately, 600-800 trees will be removed.

142. Among these trees are 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.*

143. The EMP contains the replanting scheme and the recommendation to delimit and refrain from unnecessary cutting or removal of trees along the Project alignment. 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

144. 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 (M. subterraneus), 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 categories1	Note
Invertebrates				
Insects				
1	Van Brike Bluet	Coenagrion vanbrinkae Lohmann, 1993	VU B1a+B2a	
2	Armenian Grasshopper	Gomphocerus armeniacus (Uvarov, 1931)	VU B 1a+B 2a	AE2
3	Dutch Alcon Blue	Maculinea alcon monticola (Staudinger, 1901)	VU B 1a+B2a	
4		Lithurge fuscipenne Lepeletier, 1841	VU B 1a+B 2a	
5	Daghestan bumblebee	Bombus daghestanicus Radoszkowsky, 1888	VU B1a+B2a	
Reptiles				
6	Dwarf Lizard	Parvilacerta parva Boulenger, 1887	CR A2ac	
7	Dahli Lizard	Darevskia dahli (Darevsky, 1957)	EN B1a+2a	
8	Unisexual Lizard	Darevskia unisexualis (Darevsky, 1966)	VU B1a	
9	Armenian Steppe Viper	Vipera (Pelias) eriwanensis (Reuss, 1933)	VU B1ab(iii, v)	CE
Birds				
1	Egyptian vulture	Neophron percnopterus Linnaeus, 1758	A2bcde+3bcde +4bcde	EN
2	Eurasian Griffon Vulture	Gyps fulvus (Hablizl, 1783)	VU D1	
3	Greater spotted eagle	Aquila clanga Pallas, 1811	VU C2a(ii)	
4	Steppe eagle	Aquila nipalensis orientalis Hodgson, 1833	VU C2a(i); D1	
5	Golden eagle	Aquila chrysaetos (Linnaeus, 1758)	VU D0	
6	Eurasian eagle – owl	Bubo bubo (Linnaeus, 1758)	VU B1a; C2a(i); D1	
7	Eurasian roller	Coracias garrulus (Linnaeus, 1758)	VU B1ab(iii)	
Mammals				
1	Asia Minor Ground Squirrel	Spermophilus xanthoprymnus Bennet 1835	EN B2ab (ii, iii, iv)	
2	Schidlovsky Pine Vole3	Microtus (Sumeriomys) schidlovskii Argyropulo, 1933	EN B1ab (ii, iii, v)	
3	European Marbled Polecat	Vormela peregusna (Guldenstaedt, 1770)	VU A2c+B1 b(iii)	
4	Old World Otter	Lutra lutra meridionalis	EN D	

Table 11: List of Red Book Protected Species of Fauna Likely to Occur Along Tranche 3

[1]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.
[2]AE-Armenian Endemic, BC- Included in Bern Convention's Annex II, CE – Caucasus endemic.
[3] Endemic subtype

145. 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.

146. During field visits the locations of possible migration routes were investigated. About 12 possible areas for animal migration passages installation for crossing the road were revealed (km 74+500, 79+200 (livestock passageway), 80+800, 81+500, 82+200, 83+300, 85+100, 87+300 (livestock passageway), 89+500, 92+500, 102+300, 110+700).

147. The chainage of some elements of drainage system (culverts, box culverts) coincides with possible locations of migration passages (km 71+832, 80+310, 94+025, 102+282, etc.), so the drainage system to be installed in that areas will also serve as passage to ensure safe migration, hunting, nesting, etc. of animals.

148. 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, the information should be provided to PMU environmental specialist and MNP for appropriate future actions;
- during construction temporary protective walls should be erected on the sections where animals often appear;
- using equipment with low noise, vibration and with less exhaustions;
- in the case of an injured animal is found the MNP should be notified;
- avoiding construction and blasting works (if any) in the evening and night time, during animal's breeding season, etc.
- protection measures are included in the EMP to avoid negative impact on Red Book protected species of fauna existing in the area.

Reservoir North of Talin

149. A water reservoir is situated on the left site of the Talin – Gyumri highway, just after Talin city. The reservoir is used for watering of cattle and is therefore important to the local population. It is about 140 m from the highway. The new alignment passes through the right side of the existing road. It may be impacted during construction. The EMP includes special mitigation measures to protect the reservoir from construction-related impacts.

150. Access to the reservoir will be provided via an Agricultural Underpass to be constructed at Km 71+190

Pond near Town Maralik (Shirak Province)

151. This artificial water storage pond for cattle watering with approximate size 40m x 80m is situated near the highway, close to the Town of Maralik in ShirakProvince. No submerged and floating

aquatic vegetation was found and no conditions for waterfowl were evident. The provisions contained in the EMP will also protect the pond near Maralik.

152. Access to the storage pond will be provided via an Agricultural Overpass to be constructed at Km 101+760

Archaeological/Historical Sites, Natural and Cultural (Memorial) Monuments

153. Aragatsotn and Shirak marzs where Tranche 3 Project is situated are well known for their rich historical-cultural monuments, as well as ecotourism attractions such as the Church of Talin. 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.

154. During the field assessment activities a total of 22 sites and monuments were counted and tallied. Of the 22 sites and monuments, 11 will be directly affected by the design alignment, of these, 10 are archaeological sites and 1 natural monument. Their identifying names are presented in Table 12 and Table 13 list the 10 directly affected sites with their representative periods respectively.

155. Five of the archaeological and historical sites were previously unknown. The five newly discovered archaeological sites are the following:

- Yeghnasar tomb field (# 39 in GM and Map 12)
- Mastara archaeological complex (#42 in GM, Map 13 and 14)
- Mastara-2 tomb field (# 45 in GM and Map 15)
- Settlement and tomb field in Lanjik (# 56 in GM and Map 17)
- Tomb field and Medieval village remains of Hayrenyats (# 62 in GM and Map 19)

156. The above mentioned sites were 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 provides for the protection and preservation of archaeological sites, historical and cultural monuments of the RA.

Map Number	No	Type	Name	Community	Direct Impact	Indirect Impact
	38-1	Archaeological Site	Talin tomb field	Talin	✓	
	39-2	Archaeological Site	Yeghnasar tomb field	Talin-Akunk-Mastara	✓	
	41-3	Cultural monument	Tiko, Tomo, Armen, Ara, Hrach	Mastara	✓	✓
	42-4	Archaeological monument	Mastara archaeological complex	Mastara	✓	
	45-5	Archaeological monument	Mastara-2 tomb field	Mastara	✓	
	47-6	Cultural monument	Siraznik, Gagik	Mastara		✓
	48-7	Cultural monument	Harutyunyan Suren	Mastara		✓
	50-8	Archaeological monument	Fortified settlement and tomb field	Mastara		✓

Map Number	No	Type	Name	Community	Direct Impact	Indirect Impact
	52-9	Archaeological monument	Lanjik archaeological complex	Mastara-Lanjik-Sarnaghbyur	✓	
Map 6 56+400 65+800 Shirak Marz	56-10	Archaeological monument	Bronze age settlement remains	Lanjik-Sarnaghbyur		✓
	57-11	Natural Monument	Turtle rock	Lanjik	✓	
Map 7 65+800 74+300 Shirak marz	58-12	Archaeological monument	Fortified settlement and tomb field	Dzorakap	✓	
	59-13	Cultural monument	Artur Manasyan	Maralik		✓
	60-14	Cultural monument	Memorial Shrine	Maralik		✓
	62-15	Archaeological monument	Tomb field and Medieval village remains	Hayrenyats - Horom	✓	
Map 8 74+300 82+300 Shirak marz	63-16	Cultural monument	“Black Khachkar”	Horom		✓
	64-17	Cultural monument	Gevorg	Lusakert		✓
	65-18	Cultural monument	To the construction specialists - victims of 1998 earthquake	Lusakert		✓
	67-19	Archaeological monument	Benyamin archaeological complex	Benyamin	✓	
	70-20	Archaeological monument	Azatan Megalithic structures	Azatan	✓	
	72-21	Cultural monument	Yurik Memorial	Azatan		✓
	73-22	Cultural monument	Robert Nazaryan	Azatan		✓

Table 12: Archaeological/Historical Sites, Natural and Cultural Monuments along Tranche 3

157. Eleven of the 22 sites will be indirectly affected by the Project. These include 10 Cultural (Memorial) objects and 1 archaeological site.

158. 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 and accordingly, in order to avoid public criticism these monuments should be carefully relocated under the direction of the relevant marzpet and in coordination with the families or friends of the victims.

159. The recommended mitigations provided in the Environmental Management Plan are aimed to minimize if not eliminate the impacts and enhance the historical and cultural values of the sites. The main recommendations include the following:

- Archaeological test-excavations will be required in Talin Tomb Field, Yeghnasar Tomb Field, Mastara-2 Tomb Field, and Fortified Settlement and Tomb Field of Dzorakap. The chance-find regulations issued by the Ministry of Culture shall be strictly observed in all of the sites as discovery of archaeological finds during soil removal process are possible.

- The rest of the physical cultural resources - historical-archaeological and cultural monuments recorded along the Talin-Gyumri Highway which are not directly affected by the construction activities mitigation measure are recommended as well.
- Relocation of historical or cultural monuments for the preservation of their cultural-historical value.
- Strengthening (reinforcement) of the constructions of historical-cultural sites and monuments alongside the road to protect these objects from shaking and vibrations during the process of construction and permanent vibration when the road is operational.
- It is also strongly recommended that PMU open a position for an archaeologist in charge of dealing with this large amount of protection procedures, controling over the activities of the contractors, and regulating the relations between the teams of archaeologists and construction bodies. The task of the mentioned expert must include the chance-find regulations in the construction areas along the Talin-Gyumri Road Project.

No.	Site	Period
1	Talin Tomb Field	Early Bronze Age and Late Bronze - Early Iron Ages (IV – I Millennia B.C.)
2	Yeghnasar Tomb Field	Bronze - Iron Age
3	Mastara Archaeological Complex	III Millennium B.C. (Early Bronze Age) Classical period (VI century B.C – IV century A.D.),
4	Mastara-2 Tomb Field	Early Bronze Age and Hellenistic period, III-I Millennia B.C
5	Lanjik Archaeological Complex	III - I Millennia B.C. 5-17 centuries A.D., Early Bronze Age and Iron Age, Classical and Medieval periods
6	Settlement and Tomb Field in Lanjik	Early Bronze Age (IV-III Millennia B.C.
7	Fortified Settlement and Tomb Field of Dzorakap	II – I Millennia B.C.
8	Tomb Field and Medieval Village Remains of Hayrenyats	Bronze through Iron Age (II – I Millennia B.C., 13-14 centuries
9	Benyamin Archaeological Complex	VI century B.C. to III century A.D.
10	Azatan Megalithic Structures	Bronze - Iron Age periods

Table 13: List of Directly Affected Archaeological/Historical Sites along Tranche 3

160. The 10 archeological/historical sites summarized in Table 5 above that will be directly impacted by the project are listed below.The ‘Left’ and ‘Right’ indications refer to orientation in the direction of Gyumri. Also, the mentions of right and left sides of the road refer to East and West orientation. All maps are orientated such that Yerevan direction is on the left and Gyumri direction is on the right.

161. Issues and concerns were assessed for each site. The corresponding mitigation measures are proposed as follows:

Talin Tomb Field (# 38 in GM and Map 10) *(see Annex 3)*

- 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.

162. The site is represented by a large tomb field (necropolis), occupying an area from the N-NE suburbs of Talin and then continuing eastward along the Talin-Gyumri Road. The burials are concentrated by separate groups between the ameliorated agricultural fields. Most of the tomb structures belong to the Early Bronze Age and Late Bronze - Early Iron Ages (IV – I Millennia B.C.), with outstanding remains of the specific material culture. They are mostly visible on the both sides of the existing Talin-Gyumri Road.

Issues/Concerns

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

Mitigation Measures:

- Conduct excavations of these tombs at km. 69+900 - 71+100 – 75+730 prior to the construction activities.
- The unexcavated area of the site in the area of constructional activities must be protected by the following:
    - No dumping and disposal of waste, garbage and construction debris inside the protection.
    - Inside or within the protection area of the Preserve the following shall not be allowed:
        - Parking of heavy construction equipment,
        - Storing/piling of construction materials,
        - Construction camps, office and warehouse,
        - Use of local soil for construction and disposal of waste.

Yeghnasar Tomb Field- newly discovered site (# 39 in GM and Map 12) *(see Annex 3)*

- Aragatsotn marz, Talin-Akounk-Mastara communities
- Distance in correspondence to the "0 point" of the road: 45.650 – 46.600 km
- GPS coordinates: N 40°, 25', 02, 0''; E 43°, 51', 26, 8"

164. The site is represented by groups of burials located along the both sides of the existing Talin-Gyumri Road, between the agricultural fields. The site of Yeghnasar is a continuation to the North of the Talin tomb field and has not been studied yet.

Issues/Concerns:

165. The only object which is directly endangered is a large and well preserved Bronze - Iron Age burial mound on the left side of the existing highway.

Mitigation Measures:

166. The protection of the cultural and historical significance of the tomb field (burial) will include:

- Undertake excavations at km. 75+730 to km. 76+700 covering an area of 15 hectares.
- Excavated archaeological and architectural materials representing important characteristics should be removed and reconstructed at the other place closer to the highway.
- Chance-find regulations issued by the Ministry of Culture shall be strictly observed and a qualified Archaeologist should be in charge of ensuring that proper chance find procedures are implemented.

Mastara Archaeological Complex- newly discovered site (#42 in GM, Map 13 and 14) *(see Annex 3)*

- Aragatsotn marz, Mastara community
- Distance in correspondence to the "0 point" of the road: 50.000 – 51.900 km
- GPS coordinates: N 40°, 26', 53, 8''; E 43°, 51', 53, 8"

167. This newly discovered site consists of series of settlements and tomb fields dating back to the III Millennium B.C. (Early Bronze Age), as well as the fortification structures and dwellings of the Classical period (VI century B.C – IV century A.D.), continuing on the distance of 4,5 km,. The cultural remains collected from the surface of the site are extremely rich for both periods, and even include an Early Bronze Age clay figurine. The Classical remnants (architecture, pottery etc.) are characteristic for an urban type of settlement. The Early Bronze Age complex also seems to be an important settlement for this period, with the dwelling areas, temples and burials.

Issues/Concerns:

168. The suggested design of the highway is strongly affecting the best preserved part of the site belonging to the Early Bronze Age period.

Mitigation Measures:

- Protecting the site from damage will require both excavations and the redesign of this part of the road.
- Undertaking a 32.2 hectare excavation at km. 79+900 – 82+000.
- The widening of the highway shall be on the right side of the existing road, to the extent possible. This will reduce to the minimum the excavations to be conducted in the area and the damage to the cultural remains.
- The following are forbidden inside the protection area:
    - using the area of the site for parking of the heavy construction equipments;
    - storing construction materials;
    - using of local soil for construction purposes.

Mastara-2 Tomb Field- newly discovered site (# 45 in GM and Map 15) *(see Annex 3)*

- Aragatsotn marz, Mastara community
- Distance in correspondence to the "0 point" of the road: 51.950 – 54.150 km
- GPS coordinates: N 40°, 27', 40, 3''; E 43°, 51', 34, 6"

169. The site is represented by groups of burials spreading further to the North, which might be the continuation of the Mastara archaeological complex i.e. the cemeteries of inhabitants of the Early Bronze Age and Hellenistic periods described above (see # 34). Some concentrations of III-I Millennia B.C. burial mounds are visible attached to the existing Road, as well in the areas of the suggested design of the new Highway.

170. The protection of the cultural and historical value for this site is extremely important, because it will contain lots of information about the local populations of the mentioned periods and yield information about their social structure, ethnicity, burial and religious customs etc.

Issues/Concerns:

171. The design of the road is directly affecting the tomb field.

Mitigation Measures:

- Series of excavations shall be carried out where the new highway will be constructed at km. 82+000 to km. 84+230
- The unexcavated portions of the site must be protected by the following mitigation measures:
    - No dumping and disposal of waste, garbage and construction debris inside the protection.
    - Inside or within the protection area of the Preserve the following shall not be allowed:
        - Parking of heavy construction equipment,
        - Storing/piling of construction materials,
        - Construction camps, office and warehouse,
        - Use of local soil for construction and disposal of waste.
- Chance-find regulations issued by the Ministry of Culture shall be strictly observed,
- Construction contract should include provision of a suitably qualified archaeologist to ensure that proper chance-find procedures are implemented.

Lanjik Archaeological Complex (# 52 in GM and Map 16) *(see Annex 3)*

- Aragatsotn and Shirak marzes, territory of Mastara – Lanjik - Sarnaghbyur communities
- Distance in correspondence to the "0 point" of the road: 56.500 – 60.400 km
- GPS coordinates: N 40°, 29', 38, 3''; E 43°, 52', 05, 4"
- State List of Historical-Archaeological Monuments:# 7.44.1-3

172. The site of Lanjik is one of the biggest archeological complexes. It consists of series of Prehistoric fortresses and fortified settlements (III - I Millennia B.C.); tomb fields of Classical through

Medieval periods, circular structures, medieval village remains (5-17 centuries A.D.) spread around 4 kilometers in length. Small scale excavations conducted here in 1992 discovered cultural remains of Early Bronze Age and Iron Age periods. In 1998 the cultural remains of Classical and Medieval periods were collected from the surface as well.

Issues/Concerns:

173. The new design of the highway willpass through the Lanjik Archaeological Complex and most likely lead to the destruction of the single courgans (burial mounds) and the medieval boundary stone (or mile stone).

Mitigation Measures:

- Undertaking detailed archaeological investigations of burial mounds located closer to the new line of the Highway.
- Re-establishing the medieval boundary stone on the closest and safest point under the control of an archaeologist, or relocating the mile stone to the Shirak Regional Museum.
- During road construction activities chance-find regulations issued by the Ministry of Culture on the openings or discoveries of tombs during soil removal shall be strictly observed. The construction contract should include the provision of a qualified archaeologist to ensure that proper chance-find procedures are implemented.
- The whole area of the site must be protected by the following mitigation measures:
    - No dumping and disposal of waste, garbage and construction debris inside the protection.
    - Inside or within the protection area of the Preserve the following shall not be allowed:
        - Parking of heavy construction equipment,
        - Storing/piling of construction materials,
        - Construction camps, office and warehouse,
        - Use of local soil for construction and disposal of waste.

Settlement and Tomb Field in Lanjik- newly discovered site (# 56 in GM and Map 17) *(see Annex 3)*

- Shirak marz, Lanjik - Sarnaghbyur communities
- Distance in correspondence to the “0 point” of the road: 61.600 – 62.400 km
- GPS coordinates: N 40°, 31’, 57, 8’’; E 43°, 52’, 34, 6”

174. The site is represented by a settlement and tomb field dating back to the Early Bronze Age (IV-III Millennia B.C.). Small scale excavations at the site in 1992 opened a tomb belonging to the mentioned period. Field investigations carried out in this area showed that the site is heavily damaged by the existing Talin-Gyumri Road, which divided the site into two parts. The site is also damaged by intensive agricultural activities. The edges of the site overlooking both sides of the highway lost their scientific and cultural value. Therefore no special archeological excavations are required to protect the site from the direct influence of the future constructional activities.

Issues/Concerns:

175. The design of the new highway will directly impact the left portion of the complex.

Mitigation Measures:

- During construction the chance-find regulations issued by the Ministry of Culture shall be strictly observed.
- The construction contract should include the provision of a suitably qualified archaeologist to ensure that proper chance-find procedures are implemented.
- The unexcavated portions of the site must be protected by the following mitigation measures:
    - No dumping and disposal of waste, garbage and construction debris inside the protection.
    - Inside or within the protection area of the Preserve the following shall not be allowed:
        - Parking of heavy construction equipment,
        - Storing/piling of construction materials,
        - Construction camps, office and warehouse,
        - Use of local soil for construction and disposal of waste.

Fortified Settlement and Tomb Field of Dzorakap (# 58 in GM and Map 18) *(see Annex 3)*

- Shirak marz, Dzorakap community
- Distance in correspondence to the "0 point" of the road: 66.700 – 67.050 km
- GPS coordinates: N 40°, 34', 01, 6''; E 43°, 53', 09, 5"
- State List of Historical-Archaeological Monuments: # 7.73.7

176. The site consists of a II – I Millennia B.C. fortified settlement together with its tomb field and medieval village remains. The Talin-Gyumri Road passing though this area caused serious damage to the site. On the right side of the road, traces of partly destroyed tombs and wall constructions are visible. Pottery fragments and bones documented along the sections of the existing Road show the presence of the archaeological deposits all along the protected area of the site. The left side of the Road is completely destroyed by a powerful soil base, filled for the highway construction.

Issues/Concerns:

177. The suggested design of the highway is directly affecting the tombs spread on the right side of the existing highway.

Mitigation Measures:

- Archaeological excavations of 34.8 hectares along the existing highway on the full length of the site at km. 93+600 to km. 96+100(around 400 meters) are required.
- The unexcavated portions of the site must be protected by the following mitigation measures:
    - No dumping and disposal of waste, garbage and construction debris inside the protection.
    - Inside or within the protection area of the Preserve the following shall not be allowed:
        - Parking of heavy construction equipment,

- Storing/piling of construction materials,
- Construction camps, office and warehouse,
- Use of local soil for construction and disposal of waste.

HayrenyatsTombField & MedievalVillage Remains -newly discovered (# 62 in GM and Map 19) *(see Annex 3)*

- Shirak marz, territory of Hayrenyats and Horom communities
- Distance in correspondence to the "0 point" of the road: 75.000 – 75.900 km
- GPS coordinates: N 40°, 38', 16, 8''; E 43°, 51', 06, 6"

178. The site is represented by series of Bronze through Iron Age (II – I Millennia B.C.) tombs and remains of medieval village (13-14 centuries) occupying almost the same area. It is located one left side of the existing Talin-Gyumri Road, in front (West) of the Hayrenyats community. Thick bases of the accurately built walls and other constructions are visible at the place.

Issues/Concerns:

179. The suggested design and location of the "cloverleaf" to connect the highway with the Hayrenyats community will cause direct damage to the site.

Mitigation Measures:

- Change the position of the "cloverleaf" to the right side of the highway;
- Archaeological excavations of 30.8 hectares along the existing highway;
- The whole area of the site must be protected by the following mitigation measures:
  - No dumping and disposal of waste, garbage and construction debris inside the protection area.
  - Inside or within the protection area of the Preserve the following shall not be allowed:
    - Parking of heavy construction equipment,
    - Storing/piling of construction materials,
    - Construction camps, office and warehouse,
    - Use of local soil for construction and disposal of waste.

Benyamin Archaeological Complex (# 67 in GM, Map 20 and 21) *(see Annex 3)*

- Shirak marz, Benyamin community
- Distance in correspondence to the "0 point" of the road: 80.800 – 81.800 km
- GPS coordinates: N 40°, 41', 22, 3''; E 43°, 50', 24, 2"
- State List of Historical-Archaeological Monuments: # 7.27.9.

180. The site of Benyamin occupies an area of more than 100 hectares dating back to a period running from the VI century B.C. to the III century A.D. The site was discovered in 1989 by the joint

archaeological expedition of the Institute of Archaeology and Ethnography of the NAS, RA and the Shirak Regional Museum. During the Classical period it has been a royal residence and it is considered to be the famous town of Draskhanakert (according Dr. F. Ter-Martirosov). The unearthed architectural structures and rich archaeological materials illustrate the commonalities of the development of Classical culture in Shirak region of Armenia, the cultural and economic ties with the Achaemenid, Hellenistic and Roman cultures of the Near East and Mediterranean, as well as with nomads of the North Caucasus area.

Issues/Concerns:

181. The suggested design of the road will directly affect the site by cutting through the protection area of the complex. The proposed location of the "cloverleaf" will cause damage to the most preserved part of the site.

Mitigation Measures:

- Changing/moving the location of the "cloverleaf" outside the protection area to the south at Km109+950 along the existing road alignment. This will minimize the damage caused to the site, while only the construction area will be subjected to excavations.
- Redesigning the Highway further to the right side: at least 80-100 m to the East and as much as it possible, closer to the Benyamin village. This will partly bypass the protection area of the site.

Azatan Megalithic Structures (# 70 in GM and Map 22) *(see Annex 3)*

- Shirak marz, Azatan community
- Distance in correspondence to the "0 point" of the road: 83.450 km
- GPS coordinates: N 40°, 42', 24, 3''; E 43°, 50', 21, 8"
- State List of Historical-Archaeological Monuments: # 7.4.9.

182. The interesting and rare monuments of Azatan are represented by complex structures consisting of three separate lines of vertically erected rocks, spreading on about of 2 kilometers along both sides of the existing Talin-Gyumri Road. The character of these constructions is still unclear. Those types of Megalithic structures mainly have a ritual meaning, sometimes symbolizing "holy roads" between the major cultic constructions. Timing of the monuments is not clear either: the constructions might belong to the Bronze - Iron Age periods.

Issues/Concerns – The existing structures are directly on the left side of the existing Road. The proposed design of the road will directly encroach on the site and directly affect and destroy the site.

Mitigation Measures:

- Redesigning the road turn to the South.
- Test excavations of the right side of the existing Road are required.
- The whole area of the site must be protected by the following mitigation measures:
    - No dumping and disposal of waste, garbage and construction debris inside the protection.
    - Inside or within the protection area of the Preserve the following shall not be allowed:
        - Parking of heavy construction equipment,

- Storing/piling of construction materials,
- Construction camps, office and warehouse,
- Use of local soil for construction and disposal of waste.

Cultural (Memorial) Objects of Direct Impact

183. 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.

- *Tiko, Tomo, Armen, Ara, Hrach Memorial* (# 41 in GM).
  Aragatsotn marz, Mastara community
  Distance in correspondence to the "0 point" of the road: 48.920 km
  GPS coordinates: N 40°, 26', 27, 0''; E 43°, 52', 29, 1"

- *Siraznik, Gagik Memorial* (# 47 in GM).
  Aragatsotn marz, Mastara community
  Distance in correspondence to the "0 point" of the road: 54.200 km
  GPS coordinates: N 40°, 28', 04, 3''; E 43°, 51', 55, 6"

- *Harutyunyan Suren Memorial* (# 48 in GM).
  Aragatsotn marz, Mastara community
  Distance in correspondence to the "0 point" of the road: 54.700 km
  GPS coordinates: N 40°, 28', 19, 6''; E 43°, 51', 56, 8"

- *Manasyan Artur Memorial* (# 59 in GM).
  Shirak marz, Maralik community
  Distance in correspondence to the "0 point" of the road: 69.390 km
  GPS coordinates: N 40°, 35', 11, 1''; E 43°, 52', 27, 5"

- Memorial Shrine (# 60 in GM).
  Shirak marz, Maralik community
  Distance in correspondence to the "0 point" of the road: 71.240 km
  GPS coordinates: N 40°, 36', 02, 7''; E 43°, 51', 51, 8"

- *"Black Khachkar"* (# 63 in GM).
  Shirak marz, Horom community
  Distance in correspondence to the "0 point" of the road: 75.900 km
  GPS coordinates: N 40°, 38', 28, 4''; E 43°, 51', 08, 9"

- *Gevorg Memorial* (# 64 in GM).
  Shirak marz, Lusakert community
  Distance in correspondence to the "0 point" of the road: 79.520 km
  GPS coordinates: N 40°, 40', 25, 0''; E 43°, 50', 59, 7"

- *Memorial to the Constructors – Victims of the 1988 Earthquake* (# 65 in GM).
  Shirak marz, Lusakert community
  Distance in correspondence to the "0 point" of the road: 79.990 km
  GPS coordinates: N 40°, 40', 39, 2''; E 43°, 50', 52, 5"

- *Yurik Memorial* (# 72 in GM).
  Shirak marz, Azatan community
  Distance in correspondence to the "0 point" of the road: 84.720 km
  GPS coordinates: N 40°, 43', 04, 3''; E 43°, 50', 18, 4"

- *Nazaryan Robert Memorial* (# 73 in GM).
  Shirak marz, Azatan community
  Distance in correspondence to the "0 point" of the road: 85.750 km
  GPS coordinates: N 40°, 43', 34, 5''; E 43°, 50', 01, 5"

Natural Monument of Direct Impact

Turtle Rock

184. This is a natural rock formation or sculpture in the shape of a turtle. Natural monuments are rare in Shirak marz so that this "sculpture" has become one of the loveliest places for locals and visitors alike to gather and contemplate a legend ascribed to it. The Turtle Rock is listed among the protected natural monuments of Armenia. As such, it is meant to be protected from various impacts, including potential rock slides and landslides due to the pre-design alignment and vibrations caused by excavator compaction machinery.

185. The road alignment has been moved to the right of the existing road in the vicinity of the Turtle Rock in order to mitigate the potential impact of the works on the site.

E. 2 Impacts Related to Design

186. The alignment starts in Talin at chainage Km 71+500 to end at Km 117+067 in Gyumri. Here the M1 highway links at least 10 communities. In order to overcome any social impacts associated with the severance of communities, there will be a total of 10 new grade-separated interchanges, nine of which are overpasses and one an underpass, and 16 t-junctions will be constructed to provide connection to local roads/communities. Other reinforced concrete structures comprise 6 agricultural overpasses for machinery, pedestrians and animals; 6 agricultural underpasses for machinery and 4 for animals and pedestrians; 3 river bridges and one road-over-rail bridge and a total of 132 culverts for surface water and irrigation systems.

E. 3 Indirect Impact Receptors Due to Design

187. There will be 10 cultural (memorial) objects and 1 archaeological site that will be indirectly impacted by the Project. Although these sites are not directly affected by the construction activities, the following mitigation measures shall be strictly followed:

- the construction activities must be managed carefully to prevent destruction and put in ground or cover the historical and memorial structures by construction waste or spoils;
- the use of the protection area of the site for parking heavy equipments, trucks, storing construction materials and using the local soil for construction purposes will not be allowed.

188. The 10 Cultural Memorial objects to be indirectly affected include the following:

Tiko, Tomo, Armen, Ara, Hrach; Siraznik, Gagik; Harutyunyan Suren; Artur Manasyan; Shrine; "Black Khachkar"; Gevorg; To the constructionspecialists - victims of 1998 earthquake; Yurik; and Robert Nazaryan

189. The newly discovered Archeological/Historical site that will be indirectly affected by the project is Mastara -3 Settlement (see location Map # 25), Aragatsotn marz.The site is located nearby the southern outskirts of the village of Mastara. According to surface materials the Mastara-3 settlement belongs to the Bronze-Iron Age period. It represents rich archaeological deposits and remnants of dwelling constructions.

190. Although not directly affected by the construction activities, the 10 Cultural Memorial objects and Mastara -3 Settlement should be protected by the following mitigation measures:

- the construction process has to be done carefully in order not to destroy it or to cover the structures by construction waste.
- as the activities should run near the protection area of the site, it is forbidden to use its area for parking the heavy mechanisms, for storing constructional materials or using local soil for constructional purposes.
- construction activities may not close the access to the site.

E. 4 Impacts during Construction

191. Activities during the pre-construction, site preparation, and construction phases are outlined below, together with the assessment of their potential impacts and the main recommended mitigation measures.

192. Detailed mitigation measures including the requirement to prepare detailed operating plans for specific aspects are included in the EMP.

193. Regulations on environmental protection, safety of the public, and safety and hygiene of workers should be fully complied with in all phases of the project.

194. 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.

195. PMU must require its contractors to implement a waste management program, which will include regular collection and disposal of wastes at 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. Waste from these containers will be regularly collected (dump truck of the contractor) to be disposed of at a dumpsite designated 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 clean-up 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.

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

- Appointment 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:

197. 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:

198. 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:

199. Construction site safety for workers and residents of the nearby communities is crucial. 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:

200. 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 also minimize social problems otherwise caused by non-local workers attracting camp followers.

Environmental Orientation:

201. 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:

202. 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:

203. 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:

204. 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:

205. 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 NO2 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:

206. 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:

207. 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.

208. 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:

- siting of construction camps away from residential areas;
- distancing noisier activities away from receptors where practicable;
- scheduling of noisy activities towards the middle of the day and avoiding night time activities;

- minimizing the need for heavy vehicles to pass through residential areas by specifying routes along public roads, site access points, and haul routes;
- installing and maintaining effective exhaust silencing systems on vehicles and equipment; and
- installing temporary hoarding around noise sources where considered necessary where other mitigation measures are not sufficient or practicable.

Vibration:

209. 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.

Excess Spoil:

210. 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:

211. 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 bunded 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:

212. 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 inconjunction 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:

213. 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:

214. 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.

E. 5 Impacts Related to Operations

Air Quality:

215. 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:

216. Operational noise levels are predicted to increase beyond ambient levels that already exceed day and night standards in the 7 communities with receptors close to the new highway.

Socio-economic:

217. As is often the case 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. Alternative arrangements are proposed, including the provision of market areas near the new road, to mitigate the impact on these vendors.

218. 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.

E. 6 Cumulative Environmental Effects

219. 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 activities will likely not occur simultaneously and consequently, there will be no adverse combined impacts during construction.

F. Analysis of Alternatives / Alternatives to the Pre-Design

220. 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.

221. The Talin-Gyumri segment 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 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.

222. The potential impacts of the project on the environment and primarily to archaeological/historical sites, natural and cultural (memorial) monuments will be reduced by proposed modest changes in the design and 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.

223. The proposed changes in the design as alternatives to the Pre-design are highway interchanges, road geometry, alignment and road widening. These alternatives are proposed to mitigate and preserve the importance and significance of the sites' archaeological, historical and cultural values in 4 to archaeological/historical sites. Also, it will eliminate 1 of the archaeological monuments from the direct impacts of the Project.

- Mastara Archaeological Complex - (#42 in GM, Map 13 and 14)
- Tomb Field and MedievalVillage remains of Hayrenyats - (# 62 in GM and Map 19)
- Beniamin Archaeological Complex - (# 67 in GM, Map 20 and 21)
- Azatan Megalithic Structures - (# 70 in GM and Map 22)

F. 1 Mastara Archaeological Complex

224. The site consists of several large Early Bronze Age and Hellenistic period settlements and tomb fields. This once urban area was an important spot on the traditional trade route. Keeping these sites from destruction is important.

225. The tomb field is considered secondary and can be excavated under archaeological supervision as construction proceeds.

226. The archaeological complex, however, is much more valuable and can be considered in two sections:

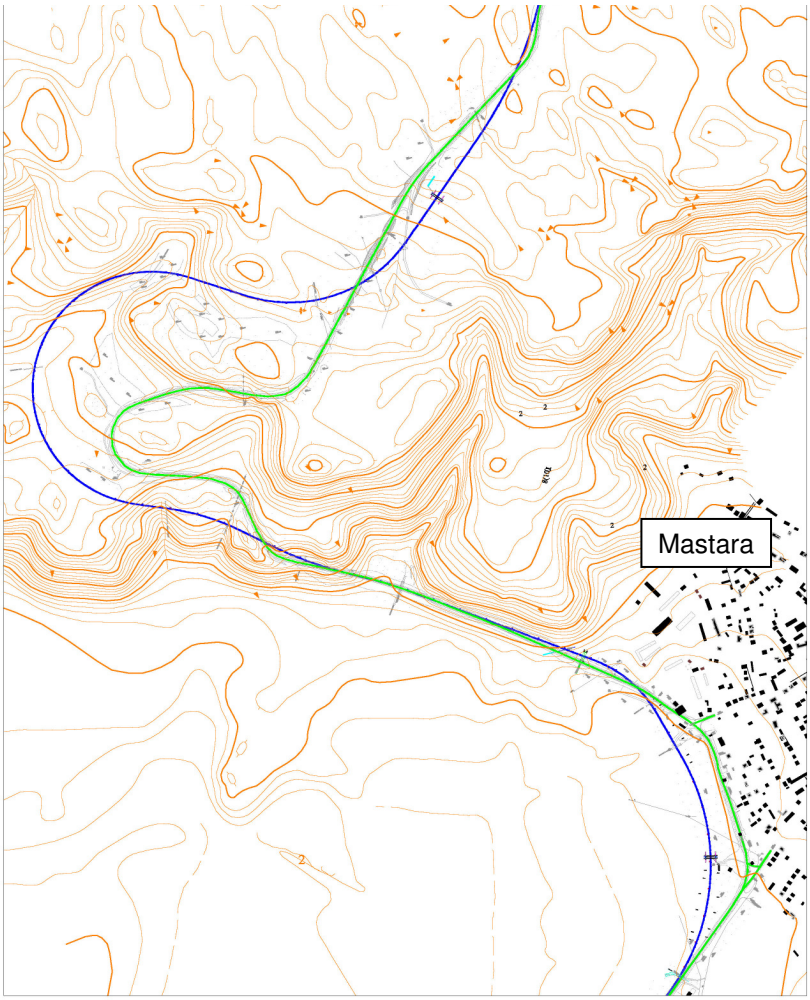
- The impact on the first, from about 50+000 to 51+000, (Design Chainage 79+200 to 80+200) should be minimized by observing strict chance-find procedures.

- The second, which is considered one of the most important archaeological sites in the project, is proposed to be preserved as follows:
  - from 51+200, (Ch 80+400) instead of switching to the left, stay close to the existing road on the right
  - at 50+700 to 52+800 (Ch 79+900 to 82+000) undertake archaeological investigation

227. Two alignment alternatives were considered at Mastara

- Alternative 1 : Widen the existing road to a 4-lane dual carriageway. Because of the difficult mountainous terrain in this area, the existing road follows a winding alignment which does not comply with Category 1 Design Standards. Consequently, the alignment of the dual carriage would also not comply with Category 1 standards.
- Alternative 2 : Design the new dual carriageway to Category 1 standard, the standard applied on all other sections of the North South Road Corridor project, and mitigate the environmental impacts.

The alignment alternatives are illustrated in the following extract from the Design Drawings :



Existing Road

New Alignment (Category 1 Design Standard)

228. Following detailed consultation between the Ministry of Treansport and the Ministry of Culture of the GoRM, Alternative 2 was adopted due to

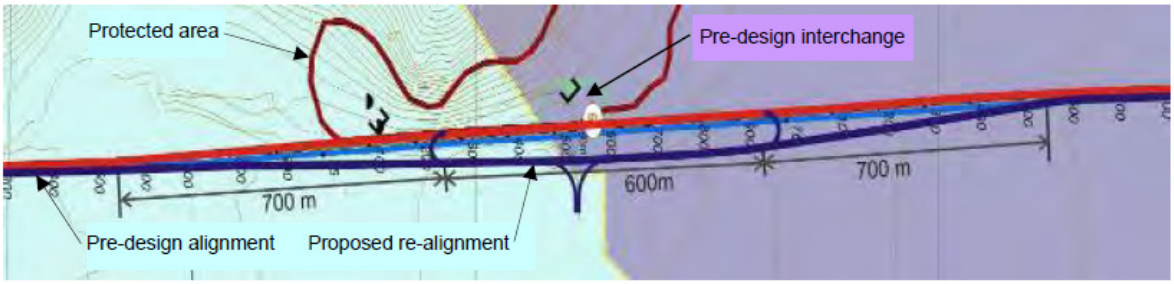
- the better Public Health and Safety features of the higher road design standard
- the ability to mitigate the impacts on the archaeological site by advance excavation of the affected areas and full protection of the surrounding area during construction
- the Traffic Safety advantage of maintaining the same design standard throughout the North South Road Corridor Project.

229. The new alignment will be on the right side of the existing road between 50+000 and 51+000, (Design Chainage 79+200 to 80+200) to avoid impact on the archaeological complex on the left side of the road. The EMP requires full archaeological excavation to be carried out, in advance of the road construction works, on the areas to be directly affected by the works. The "chance-find" procedure must also be enforced.

F. 2 Hayrenyats Archaeological Site

230. The site is a Bronze Age through Iron Age tomb field in combination with the remains of a medieval village. The site is an important example of the use of an ancient cemetery by inhabitants of more recent periods as living area.

231. Initial assessment of the proposed junction location included a proposal to relocate the new road and interchange east of the existing road, as illustrated in the following Sketch.



Following detailed consultation between the Ministry of Transport and the Ministry of Culture of the GoRM it was considered that it constituted a greater environmental impact as it involved the construction of 2km of new dual carriageway and isolated a large area of "sterile" land between the existing and the new road. It was decided to retain the junction in its existing location (Chainage 104+200) but implementing mitigation during construction as specified on other sites – advance excavation of the affected area and protection of the archaeological zone.

232. The final layout will have to ensure that the impact on the archaeological sites is mitigated .

233. Archaeological studies will have to be undertaken prior to construction activities starting from Km 102+300 to Km 104+500 to cover an area of 30.8 hectares.

234. In addition, the EMP also includes responsibility requirements for all contractors with construction works within and/or adjacent to archaeological, historical and cultural sites to strictly adhere to the following:

- No deposition of construction wastes and debris on the site,

- Soils from the site must not be utilised for construction purposes, and
- Open access to the site must be maintained.

F. 3 Benyamin Archaeological Complex

235. The site is one of the largest in Armenia. It contains impressive architectural structures and cultural remains. Saving the site form destruction is therefore very important. Most of the site is on the left but a wedge-shaped area is on the right.

236. The design of the dual carriageway involves the construction of the new northbound carriage on the right hand side of the existing road, away from the important areas of the site. The design of the Interechange (Km 110+000) has been modified to minimize impact on the archaeological area and residual impacts are mitigated by carrying out full archaeological excavation, in advance of the road construction works, on the areas to be directly affected by the works. The “chance finds” procedure must also be enforced.

237. A relatively small scale archaeological excavation covering an approximate area of 33 hectares must precede construction of the road at Km 109+000 to Km 112+000.

F. 4 Azatan Megalithic Structures

238. The megalithic structure represents a rare type of monument with three lines of stones erected for a distance of about 2 km.

239. To save the site form destruction, it is proposed that the pre-design to switch from right to left be relocated approximately 200 m south at Km 112+000 – Km 112+400.

240. Also, an archaeological examination at Km 112+000 to Km. 115+000 will have to be conducted before the construction activities start.

G. Information Disclosure, Consultation and Participation

241. 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".

242. Specifically, prior to the implementation or start of construction and after the updates to the EIA and EMP documents have been duly completed and have been submitted to the Ministry of Natural Protection the project shall abide by the applicable provisions of Article 6. the procedure of notification about the implementation of the intended activity of the law of the Republic of Armenian environmental impact assessment

G. 1 Public Consultations

1st Public Consultation

243. 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.

244. On 27 May 2010, two meetings were held: (i) in Maralik, the meeting was held atthe Municipal Hall, attended by 44 persons, and chaired jointly by the Mayor of Maralik and ADBstaff consultant; and (ii), in Gyumri, the meeting was held at the Uyumjyan School, attended by 16 persons, and conducted by the ADB staff consultant. The total of 78 attendees included representatives of relevant government agencies, NGOs, and media. 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 Armenia's coat of arms.

245. In Maralik, ADB's EIA staff consultant was interviewed by two television networks, which also recorded part of the public consultation. Following the public consultation in Maralik, a meeting was requested by the Mayor of Maralik and ensued, including the EIA team and two Shirak marz officials23. After the meeting in Gyumri, Christine from the Gyumri Orhus CentreNGO requested and received a copy of the MS PowerPoint presentation.

246. Copies of the actual attendance sheets and their translations in English are in Annexes 4 and 5.

2nd Public Consultation

247. The consultations took place on 1 and 2 July 2010 and again 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.

248. On 1 July 2010, two meetings were held: (i) in Maralik, the meeting was held at the Municipal Hall, attended by 32 persons, and chaired jointly by a representative of the Mayor of Maralik and the

PMU Public Relations Officer; and (ii), in Gyumri, the meeting was held at the Uyumjyan School, attended by 11 persons, and conducted by the ADB staff consultant. After the meeting in Gyumri, a representative from Gyumri Orhus Centre NGO again requested and received a copy of the MS PowerPoint presentation.

249. 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.

250. 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.

251. In total, the two public consultations were attended by 48 persons, including from Government, from media organizations, and from the different NGOs listed below. Several of the persons attended both consultations.

List of the NGOs that attended the consultations:

- ADB Forum
- Asparez Club
- Biosophia
- Consumers' Association of Armenia
- Eco Alliance
- Ecological Academy
- Environmental Survival
- Geo Botanic
- Geophone
- Guarantee
- GyumriOrhusCenter
- J.E.T
- M.E.K
- M.I.P
- Margartatsagik
- Shogher Union
- Support Benevolent

G. 2 Information Disclosure

252. Information about the project was disclosed primarily during the two public consultation meetings 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.

253. The advertisements in 'Republic of Armenia' newspaper for the first and second public consultations were posted on the MOTC's website. Copies of the advertisements as they appeared in 'Aragats World' and 'Republic of Armenia' newspapers are in Annex 4 and Annex 5 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.

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

G. 3 Stakeholder Meetings

255. Stakeholders were involved during the information disclosure and consultation meetings with affected people. During these activities comments and concerns received from affected people and other stakeholders are to be addressed by the updated EMP.

256. The meetings were held with representatives of a number of stakeholder groups. Further meetings will be organised 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 14.

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

Date	Entity/Venue	Attendees
07 May 10	MNP	• Margarita Korkhmazyan, Head, International Relations • ADB: Klaus Schonfeld, Arman Vermishyan
10 May 10	MOC	• Ms. Arev Samonyan, Deputy Minister • Armenak Sargsyan, Head, Department of Cultural Heritage • Artyom Grigoryan, Head, Dept. of Historic and Cultural • 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

Date	Entity/Venue	Attendees
06 Jul 10	Ministry of Health	• Ruzanna Yuzbashyan • Klaus Schonfeld, ADB
06 Jul 10	Ministry of Education	• Suzanna Mashuryan • Klaus Schonfeld, ADB

Table 14: Stakeholder meetings

H. Grievance Redress Mechanism

257. 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.

258. 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.

259. The entities potentially involved are: complainant, contractor, EA, PMU, NGOs, ADB, and the courts.

H. 1 Framework and Timeframes

Contractor

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

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

Executing Agency

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

- arbitrate disagreements between PMU, contractor, and aggrieved person; and
- report periodically to ADB.

PMU

262. PMU staff to include an appropriate specialist who will:

- monitor grievance process;
- coordinate and arbitrate grievances with contractor;

- coordinate with NGO; and
- report periodically to EA (MOTC).

NGOs

263. NGOs have participated in the public consultation events described in Chapter G. They are committed to:

- provide public monitoring dimension;
- assist with grievance redress negotiations;
- assist with grievance arbitration; and
- assist PMU to raise public awareness of the project.

Complainant

264. 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 limitto 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.

H. 2 Mechanisms

265. The steps described above are shown graphically in Figure 2.

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Figure VIII-1: Grievance Procedure and Redress Mechanism

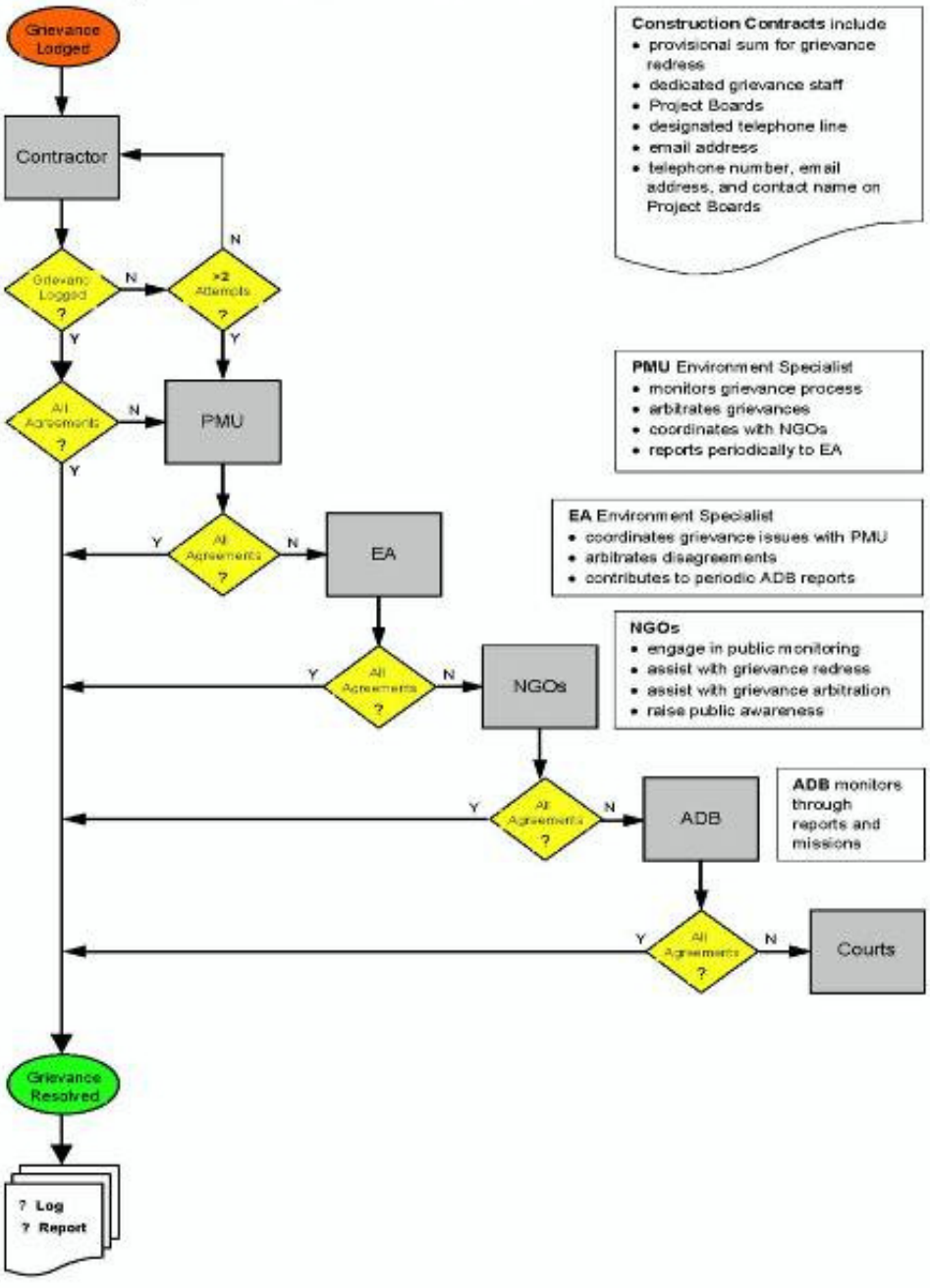

Figure 2: Grievance Procedure and Redress Mechanisms / Steps

I. Environmental Management Plan

266. The Environmental Management Plan (EMP) presents the set of mitigation and management measures to be taken during project implementation to avoid, mitigate or compensate for adverse environmental impacts. The EMP is detailed in Annex 7.

I. 1 Mitigation

267. The identified anticipated environmental impacts and risks include:

At detail design stage:

- Encroachment, destruction / degradation of archaeological sites and loss of historical value;
- Impact to archaeological sites and chance-finds;
- Cutting / removal of trees, degradation and displacement of Red Book flora and fauna species;
- Environmental protection and preservation requirements that do not reflect detail design.

At construction stage:

- Social conflicts from non-local workers and restriction towards female workers;
- 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;
- 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;
- Lack of information and understanding by communities and affected parties about the planned works activities and schedule of implementation that can lead to frustration and complaints which could in turn result in delays;
- Uncontrolled clearing and undue disturbance and displacement of Red Book flora and fauna species;
- Uncontrolled encroachment and damage to archaeological, historical, and cultural sites and monuments;

- Disruption to services impacting on end users;
- Environment degradation, workers health, sanitation and safety;
- Water pollution;
- Dust and noise, impact on nearby residents;
- Erosion of soil, material piles, and discharge of sediment and pollutants into water courses;
- Leakage or spillage of diesel or oil may result in these toxic substances to enter the soil, surface water including reservoirs, and groundwater;
- Traffic hazards and safety;
- Improper disposal of construction spoils and debris at the construction site and immediate vicinities;
- Leakage or spillage of diesel or oil may result in these toxic substances to enter the soil, surface water, and groundwater;
- Water pollution from liquid waste and effluents from construction sites, work camps and from quarries, crushing plant, and concrete batch plant;
- Removal and/or destruction of protected species of plants;
- Nuisance from excessive dust along construction sites;
- Air quality;
- Exceedence of allowable noise (decibel) limits;
- 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.

At operation and maintenance stage:

- Noise impacts;
- Air pollutants from vehicle emissions;
- Revegetation not established.

268. The proposed mitigation measures together with proposed responsible entitites and indicative associated costs are detailed in Annex 7 – Table 1. Environmental Management Plan. Proposed Mitigation Measures.

I. 2 Monitoring

269. The monitoring framework and mechanisms are described in Annex 7 – Environmental Monitoring Plan.

270. 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;
- Reporting on findings with respect to impact prevention and mitigation and the actions recommended to problems encountered.

271. The critical component covered by the monitoring program refers to construction management since the key impacts are those generated during this phase of work.

272. 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 Annex 7 – Table 2. Environmental Monitoring Plan. The Plan covers both the construction and operation stages.

Reporting

273. 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.

274. 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

275. 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, their 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.

I. 3 Implementation arrangements

Implementation schedule and costs

276. Mitigation measures are proposed at each step of project implementation / for each project activity. Their phasing in line with project activities and their indicative costs are presented in Annex 7 – Table 1. Environmental Management Plan. Proposed Mitigation Measures.

Institutional arrangements

277. The key departments within the MNP (Ministry of Nature Protection) that have administrative authority over the EIA and the project approval process are two Organizations:

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

278. 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.

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

280. 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).

281. 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).

282. The steps described above are shown graphically in Figure 3.

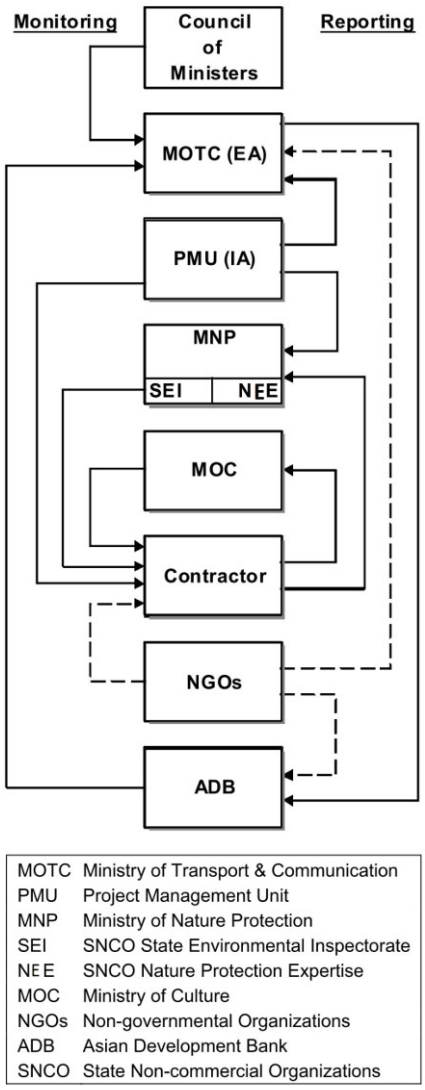

Figure 3: Monitoring and Reporting Relationships

I. 4 Performance Indicators

283. The identified performance indicators are detailed in Annex 7 – Table 2. Environmental Monitoring Plan.

J. Conclusion and Recommendation

284. It is concluded that:

- The key benefit of this project is a safer, more efficient highway that is expected to contribute to the **economic growth** of Armenia.

- The **proposed changes and alternatives to the detail design** of the project have been defined **to reduce the significant environmental impact** of the project and **to eliminate irreversible adverse impacts to the important archaeological sites** and preserve the historical, architecture and cultural values of the sites.

- **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 Environmental Management Plan.

- By considering the proposed / recommended changes / revisions in the road alignment and engineering designs as alternatives to the Pre-design
    - in Mastara Archaeological Complex;
    - in Tomb Field and Medieval Village Remains of Hayrenyats;
    - in Benyamin archaeological complex; and
    - in Azatan Megalithic Structures)

  impacts to the sites will be greatly reduced and minimise the direct impacts to the sites and important historical structures.

- Through strict adherence to the mitigation measures set out in the Environmental Management Plan, the archaeological sites that might otherwise be destroyed will be preserved.

Annexes

Annex1	Rapid Environmental Assessment Checklist
Annex 2	Environmental Report in Support of EIA
Annex 3a	Archaeological Impact Assessment Report - Part 1
Annex 3b	Archaeological Assessment Report – Part 2
Annex 4	1st Public Consultation (advertisements, attendance lists and sheets, handout)
Annex 5	2nd Public Consultation (advertisements, attendance lists and sheets, handout)
Annex 6	Environmental and Monitoring Report Forms
Annex 7	EMP (Management Plan and Monitoring Plan)
Annex 8	Quarry Locations (Schematic)

Annex1 Rapid Environmental Assessment Checklist

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

1/3

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.

2/3

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

For ADB-funded North-South Road Corridor Investment Program, Tranche 3 (Talin - Gyumri)

[20.06.2011]
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Local Environmental Expert
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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 3 project consists of upgrading about 47 km 2-lane road from Talin to Gyumri 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 3 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:

identification of environmental values of areas along the highway,

assessment of potential impacts of road construction on environment,

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 **reservoir north of Talin** is situated on the left site of the Talin – Gyumri highway, just after Talin city. The reservoir is used for watering of cattle and is therefore important to the local population. It is about 140 m from the highway. New alignment passes through right side of existing road. It may be impacted during construction. The environmental management and monitoring plan (EMP) should include special mitigation measures to protect the reservoir from construction-related impacts.

Pond near Town Maralik (ShirakProvince)

This artificial water storage pond for cattle watering with approximate size 40m x 80m is situated near the highway close to the Town of Maralik in ShirakProvince. No submerged and floating aquatic vegetation were found and no conditions for waterfowl were evident. Special ecological values were also not evident. The pond is classified as follows:

Ramsar Classification Wetland Type	(2) – ponds (Farmer, watering place, etc.) up to 8 ha

Caution is recommended during construction to avoid contaminating the pond. Appropriate mitigation measures should be included in EMP.

Natural monument "Turtle"

This is a natural rock formation, or sculpture, in the shape of a turtle. Natural monuments are rare in Shirak marz so that this "sculpture" has become one of the loveliest places for locals and visitors alike to gather and contemplate a legend that is ascribed to it. This natural rock monument is included in the MNP's list of Natural Monuments of Armenia (Governmental Decision 967 N, 14 Aug 2008) which is in the list of the protected natural monuments of Armenia.

According to design new road alignment pass through right side of existing road and during construction there will be implemented huge volume of earth works. So, during construction the impact on the natural monument will be a minimum. Appropriate mitigation measures will be included in EMP.

Investigation of Flora and Fauna along the Talin - Gyumri highway

The Talin - Gyumri highway pass through steppe landscape zones. Main plant formations are` Stipae – Festucae, Bromusae – Festucace, Agropuron, Bothriochloa bush and tragacanth types. All botanic formations widespread along the highway used as spring and autumn grasslands.

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

There are three Red Book species near the highway.

- Allium oltense Grossh - 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: Mastara, Lanjik.

  Limiting factors: Limited territory for living and spreading; loss of habitat and degradation as a result of land cultivation and grazing.

- 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.

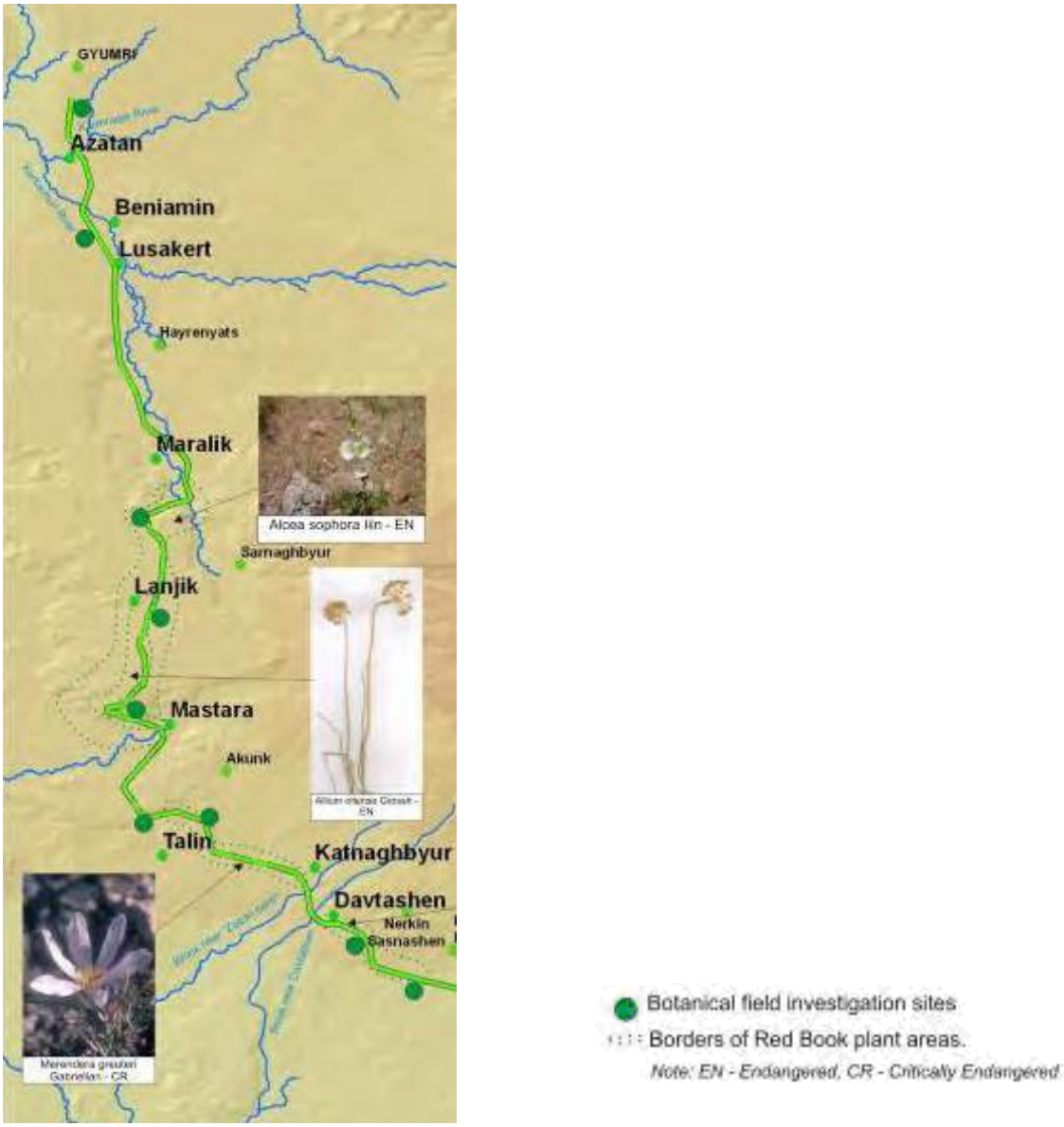
  Habitat: Between Katnakhbyur and Talin communities.

  Limiting factors: Limited territory for living and spreading; loss of habitat and degradation as a result of land cultivation.

- Alcea sophora Iiin- 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:Maralik, Talin, Mastara.

  Limiting factors: Limited territory for living and spreading; loss of habitat and degradation as a result of land cultivation and irregular grazing.



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.

The Contractor should engage a 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 30 m in the km 81+300, about 1.2 km rare trees line in Maralik community from km 99+150 till km 100+350, about 1 km thick trees line from km 111+500 till km 112+500, two group of trees in the km 113+600 and from

km 116+450 till km 116+500, about 1.8 km thick trees line near Gyumri from km 116+750 till km 118+500).

Among these trees are 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 steppe zone 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.

In some sections it will be necessary to cut trees, mainly growing in the right side of the existing road (approximately 600-800 trees).

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 (M. subterraneus), 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[4]	Note
Invertebrates				
Insects				
1	Van Brike Bluet	Coenagrion vanbrinkae Lohmann, 1993	VU B1a+B2a	
2	Armenian Grasshopper	Gomphocerus armeniacus (Uvarov, 1931)	VU B 1a+B 2a	AE5
3	Dutch Alcon Blue	Maculinea alcon monticola (Staudinger, 1901)	VU B 1a+B2a	
4		Lithurge fuscipenne Lepeletier, 1841	VU B 1a+B 2a	
5	Daghestan bumblebee	Bombus daghestanicus Radoszkowsky, 1888	VU B1a+B2a	
Reptiles				
6	Dwarf Lizard	Parvilacerta parva Boulenger, 1887	CR A2ac	
7	Dahli Lizard	Darevskia dahli (Darevsky, 1957)	EN B1a+2a	
8	Unisexual Lizard	Darevskia unisexualis (Darevsky, 1966)	VU B1a	

[4]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.

[5]AE-Armenian Endemic, BC- Included in Bern Convention's Annex II, CE – Caucasus endemic.

9	Armenian Steppe Viper	Vipera (Pelias) eriwanensis (Reuss, 1933)	VU B1ab(iii, v)	CE
Birds				
1	Egyptian vulture	Neophron percnopterus Linnaeus, 1758	A2bcde+3bcde +4bcde	EN
2	Eurasian Griffon Vulture	Gyps fulvus (Hablizl, 1783)	VU D1	
3	Greater spotted eagle	Aquila clanga Pallas, 1811	VU C2a(ii)	
4	Steppe eagle	Aquila nipalensis orientalis Hodgson, 1833	VU C2a(i); D1	
5	Golden eagle	Aquila chrysaetos (Linnaeus, 1758)	VU D0	
6	Eurasian eagle - owl	Bubo bubo (Linnaeus, 1758)	VU B1a; C2a(i); D1	
7	Eurasian roller	Coracias garrulus (Linnaeus, 1758)	VU B1ab(iii)	
Mammals				
1	Asia Minor Ground Squirrel	Spermophilus xanthoprymnus Bennet 1835	EN B2ab (ii, iii, iv)	
2	Schidlovsky Pine Vole6	Microtus (Sumeriomys) schidlovskii Argyropulo, 1933	EN B1ab (ii, iii, v)	
3	European Marbled Polecat	Vormela peregusna (Guldenstaedt, 1770)	VU A2c+B1 b(iii)	
4	Old World Otter	Lutra lutra meridionalis	EN D	

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 12 possible areas for animal migration passages installation for crossing the road were revealed (km 74+500, 79+200 (livestock passageway), 80+800, 81+500, 82+200, 83+300, 85+100, 87+300 (livestock passageway), 89+500, 92+500, 102+300, 110+700).

The chainage of some elements of drainage system (culverts, box culverts) coincides with possible locations of migration passages (km 71+832, 80+310, 94+025, 102+282, etc.), so the drainage system to be installed in that areas will also serve as passage to ensure safe migration, hunting, nesting, etc. of animalas.

[6] Endemic subtype

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;
- using equipments with low noise, vibration and with less exhaustions;
- 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.

Annex 3a Archaeological Impact Assessment Report - Part 1

The North-South Road Corridor Investment Programme Tranche 3

Archaeological Impact Assessment Report – Part 1

Dr. Mkrtich. H. Zardaryan
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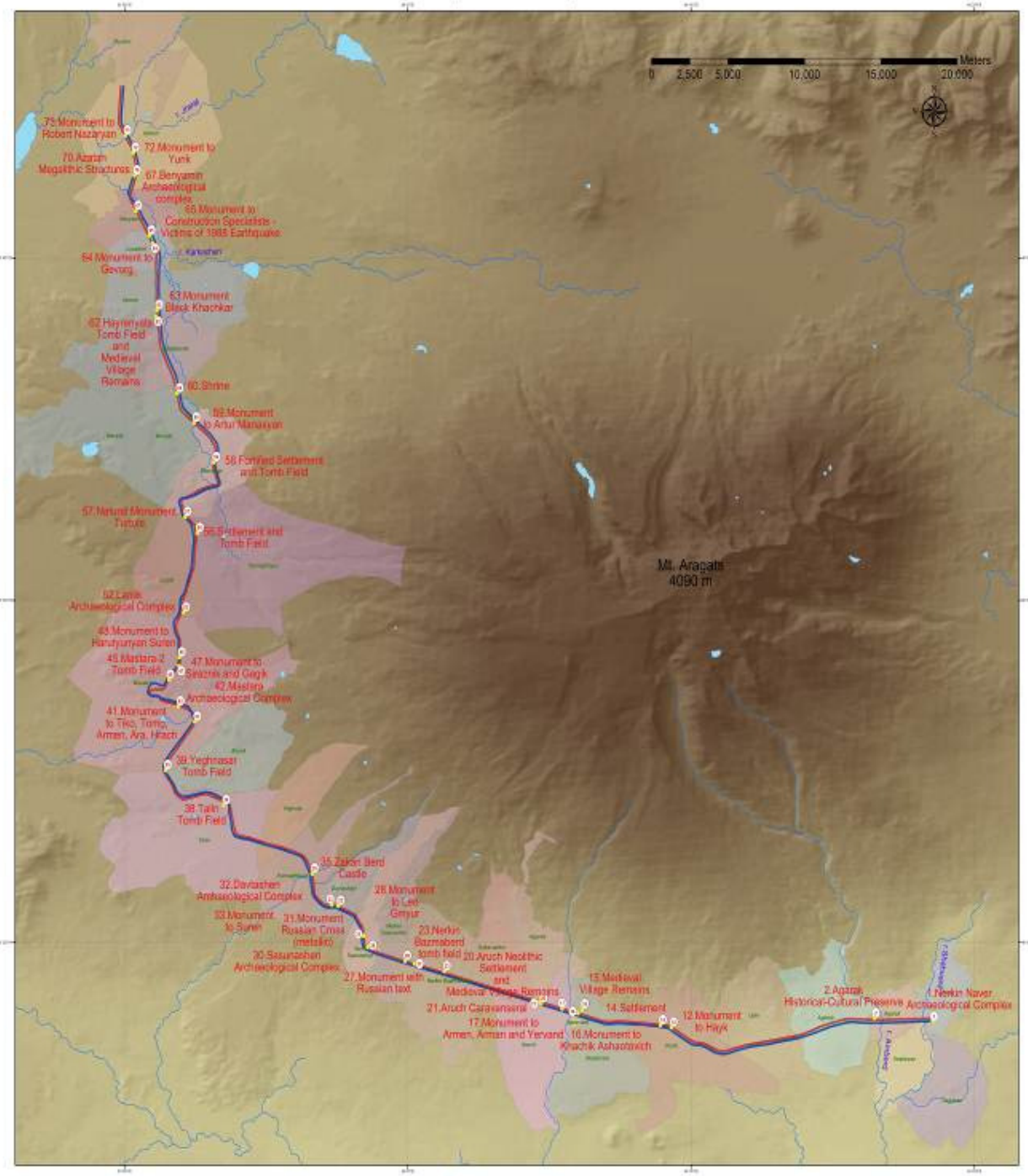
National Academy of Sciences, RA
Archaeological Consultant of the Programme

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

(Talin – Gyumri segment)[7]

[7]The "Zero" point mentioned in our Reports #1, 2 and 3 (Tranches 2, 3) = 30+080 of the General Map of theConstructors.

MAP OF HISTORICAL-ARCHAEOLOGICAL, NATURAL AND CULTURAL MONUMENTS AFFECTED BY NEW DESIGN OF THE ASHTARAK-GYUMRI HIGHWAY (0.000 - 88.400)
(1: 300 000)



A. Archaeological sites of direct impact

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 an area from the N-NE suburbs of Talin and then continuing East along the acting Ashtarak-Gyumri Road. The burials are concentrated by separate groups between the ameliorated agricultural fields. During the salvage excavations, conducted here since 1985 because of urban needs of Talin, around 90 separate tombs were examined. Most of the tomb structures belong to the Early Bronze Age and Late Bronze - Early Iron Ages (IV – I Millennia B.C.), 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, remaining out of the area of constructional activities, must be protected by the whole complex of mitigation measures mentioned in the Part 1 & 2 of our Report. In general, the site is making strong influence on the coast and the duration of the Project.

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.

33. Yeghnasar tomb field (# 39 in GM and Map 12)

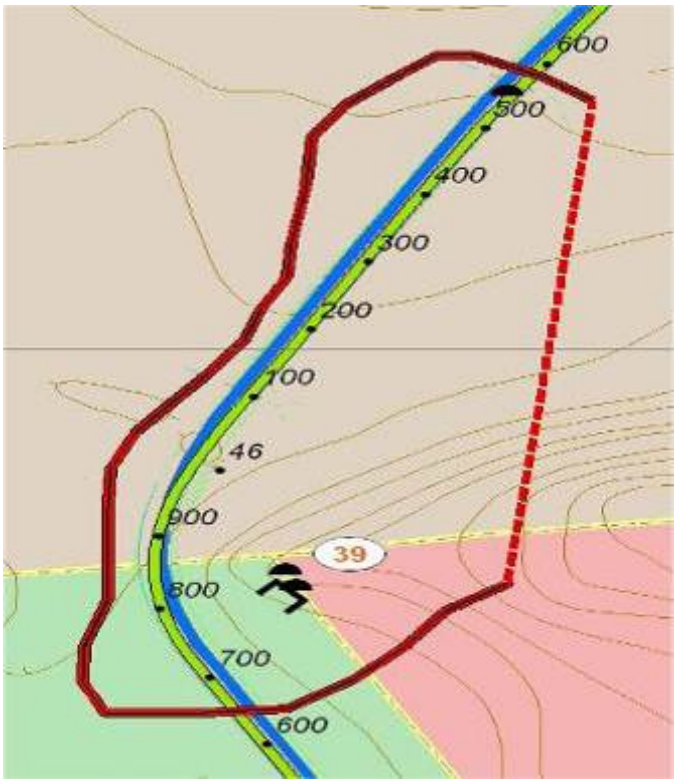
Aragatsotn marz, Talin-Akounk-Mastara communities
Distance in correspondence to the "0 point" of the road: 45.650 – 46.600 km
GPS coordinates: N 40°, 25', 02, 0'' ; E 43°, 51', 26, 8"
Site is discovered newly. 1

The site is represented bygroups of burials located along the both sides of the existing Ashtarak-Gyumri Road, between the agricultural fields. The site of Yeghnasar, in fact is the continuation to the North of the Talin tomb field and is not studied yet. Due to the field investigations the better preserved south-eastern part of the tomb field will not be directly affected by the future construction activities of the highway. The only object which is directly endangered is a large and well preserved Bronze - Iron Age burial mound on the left side of the existing highway (at the point of 46.550 km). The way to protect the cultural and historical significance of the burial is to conduct excavations and after remove and reconstruct it at the other place, closer to the highway, if it will represent an important architectural and archaeological characteristics.

It is more than possible to have the discoveries of other burials in the vicinity (some internal signs of burial constructions, like parts of cromlechs are

visible in nearby fields). That's why it is necessary to suggest the mitigation measures for the site, mentioned in our Reports 1 and 2. During the road construction chance-find regulations issued by the Ministry of Culture are strictly observed, because openings or discoveries of tombs during the soil removal are also possible. The construction contract should include provision of suitably qualified archaeological stuff, to ensure, that proper chance-find procedures are implemented.

References: None



Map 12. Physical boundaries of Yeghnasar tomb field in relationship with the new design of the Ashtarak-Gyumri Highway

34. Mastara archaeological complex (#42 in GM, Map 13 and 14)

Aragatsotn marz, Mastara community
Distance in correspondence to the "0 point" of the road: 50.000 – 51.900 km
GPS coordinates: N 40°, 26', 53, 8'' ; E 43°, 51', 53, 8"
Site is newly discovered. 2

This newly discovered site consists of series of settlements and tomb fields dating back to the III Millennium B.C. (Early Bronze Age), as well as the

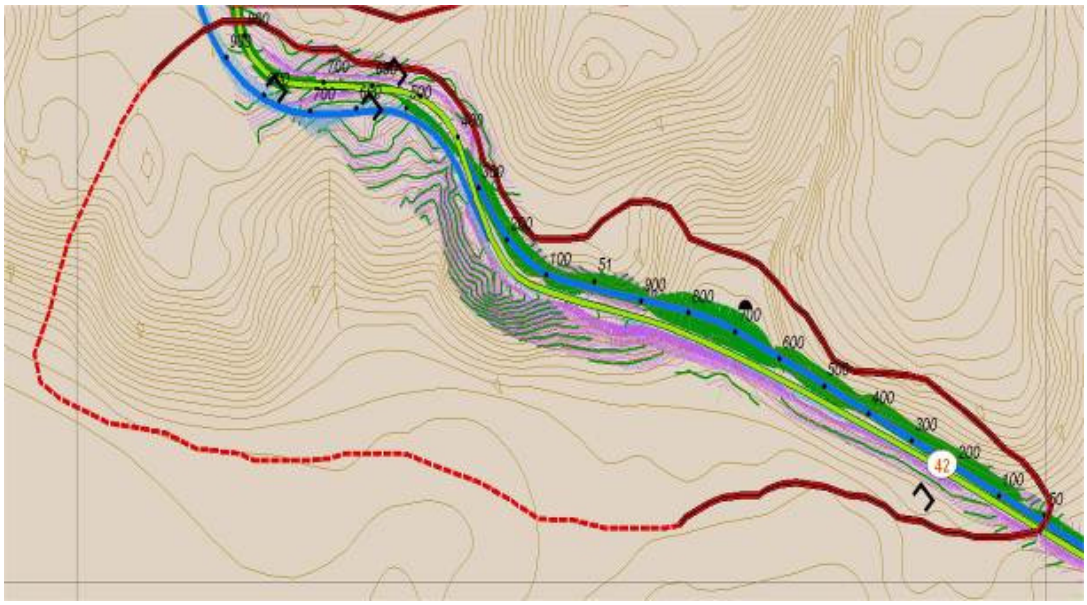
fortification structures and dwellings of the Classical period (VI century B.C – IV century A.D.), continuing on the distance of 4,5 km,. The cultural remains collected from the surface of the site are extremely rich for both periods, and even include an Early Bronze Age clay figurine. The Classical remnants (architecture, pottery etc.) are characteristic for an urban type of settlement. According to the size of the dwellings of this period, these suppose be a large city-type settlement, which was established on the trade root, linking the synchronous settlements of Agarak, Talin and Benyamin. The traces of this ancient road are visible in the north-western side of the settlement. The Early Bronze Age complex also seems to be an important settlement for this period, with the dwelling areas, temples and burials.

The site, mainly its northern side was partly destroyed during construction of the Ashtarak-Gyumri Road in 1980-ies. The southern part of the site carries lots of damage by field activities and the road connecting the Mastara and Zarinja communities. Constructions of the Early Bronze Age period are hafted by the existing highway and are poorly preserved on the right side on the slope of the hill. The suggested design of the highway is strongly affecting the site (especially it is overpass the best preserved part of the site belonging to the Early Bronze Age period).

For protection of the site from strong damage the redesign of this part of road is required. It would be necessary to widen the new highway using only the area on the right side of the existing road. In this case the excavations to be conducted in the areas of the new highway line will come up to minimum and case small damage to the cultural remains and constructions. However, Mastara archaeological complex is the second serious archaeological barrier for the construction of the new Ashtarak-Gyumri Highway, which will require both, change of the design and excavations together.

In general, the site isn't making too strong influence on the coast and the duration of the Project.

References: None



Map 13. Physical boundaries of Mastara archaeological complex in relationship with the new design of the Ashtarak-Gyumri Highway

Early Bronze Age settlement constructions of the Mastara Archaeological complex attached directly to the left side of the existing Ashtarak-Gyumri Road

Walls of the settlement of Classical period of the Mastara archaeological complex on the left side of the existing Ashtarak-Gyumri Road

Map 14. Aerial photograph of the northern edge of the Mastara Archaeological Complex (red dots) and the area of the archaeological excavations on the right side of the existing Road (yellow dotted triangles).

35. Mastara-2 tomb field (# 45 in GM and Map 15)

Aragatsotn marz, Mastara community

Distance in correspondence to the "0 point" of the road: 51.950 – 54.150 km

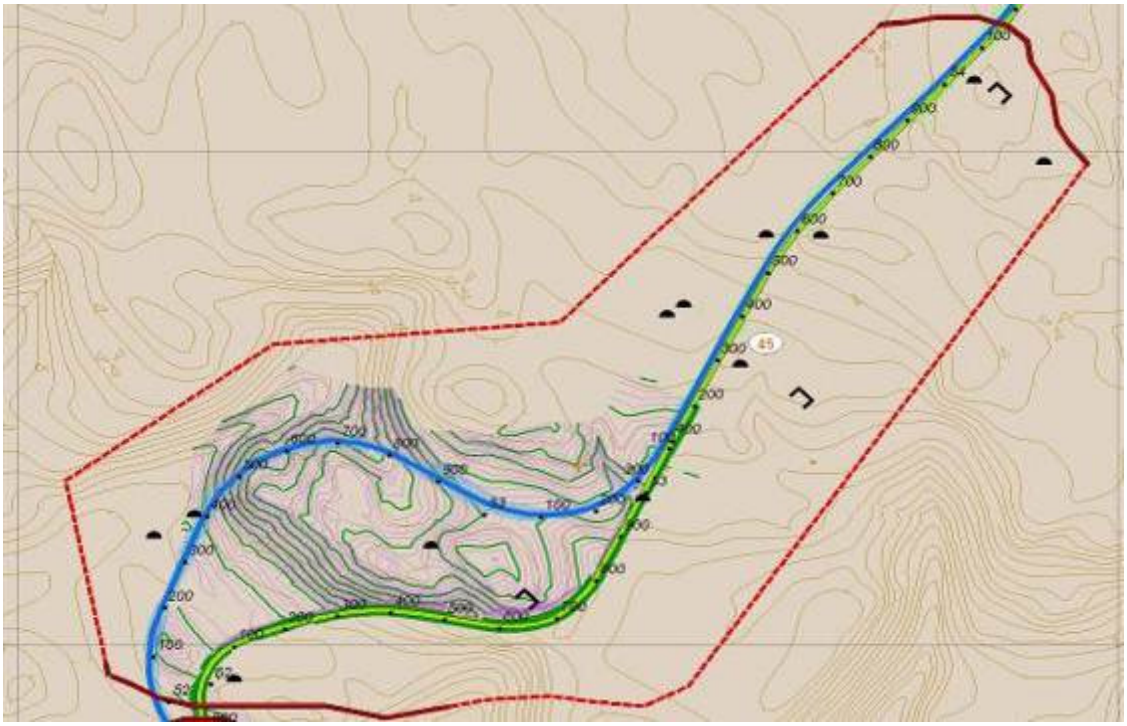
GPS coordinates: N 40°, 27', 40, 3'' ; E 43°, 51', 34, 6"

Site is discovered newly. 3

The site is represented by groups of burials spreading further to the North, which might be the continuation of the Mastara archaeological complex i.e. the cemeteries belonging to the inhabitants of the Early Bronze Age and Hellenistic period described above (see # 34). Some concentrations of III-I Millennia B.C. burial mounds are visible attached to the existing Road, as well in the areas of suggested new Highway. The task of protection for this site from destruction can be solved by series of excavations carried out at the portions where the new design of the road is directly affecting the tombs. There is no need for redesigning the road in this area. Protection of the cultural and historical value for this site is extremely important, because it will contain lots of information about the local populations of the mentioned periods and yield information about their social structure, ethnicity, burial and religious customs etc.

The unexcavated portions of the site must be protected by the whole complex of mitigation measures (see the recommendations in our Reports # 1-2). In addition, it is important to mention that during the road construction activities chance-find regulations issued by the Ministry of Culture are strictly observed, because openings or discoveries of tombs during the soil removal are possible. The construction contract should include provision of suitably qualified stuff, such as an archaeologist, to ensure, that proper chance-find procedures are implemented. In general, the site is making influence on the coast and the duration of the Project.

References: None



Map 15. Physical boundaries of Mastara-2 tomb field in relationship with the new design of the Ashtarak-Gyumri Highway

Main view of the Mastara-2 tomb field on the left side of the Ashtarak-Gyumri highway at the place where the new highway construction is planned

36. Lanjik archaeological complex (# 52 in GM and Map 16)

Aragatsotn and Shirak marzes, territory of Mastara – Lanjik - Sarnaghbyur communities

Distance in correspondence to the "0 point" of the road: 56.500 – 60.400 km

GPS coordinates: N 40°, 29', 38, 3'' ; E 43°, 52', 05, 4"

State List of Historical-Archaeological Monuments: **# 7.44.1-3**

The site of Lanjik is one of the biggest archeological complexes existing along the acting Ashtarak-Gyumri Road.It consists of series of Prehistoric fortresses and fortified settlements (III - I Millennia B.C.), tomb fields of Classical through Medieval periods, circular structures, medieval village remains (5-17 centuries A.D.), spread around 4 kilometers in length. Small scale excavations conducted here in 1992 discovered cultural remains of Early Bronze Age and Iron Age periods. During the survey of the area of this complex in 1998 the cultural remains of Classical and Medival periods were collected from the surface as well. The existing Ashtarak-Gyumri Road is passing through the site. During the field investigations of the latter some areas and objects of direct influence of the construction activities were noticed:

- the single courgans (burial mounds) located closer to the new line of the Highway need the detailed archaeological investigations,
- the medieval boundary stone (or mile stone), which can be re-established on the closest and safe point under control of an archaeologist, or removed to the ShirakRegionalMuseum.

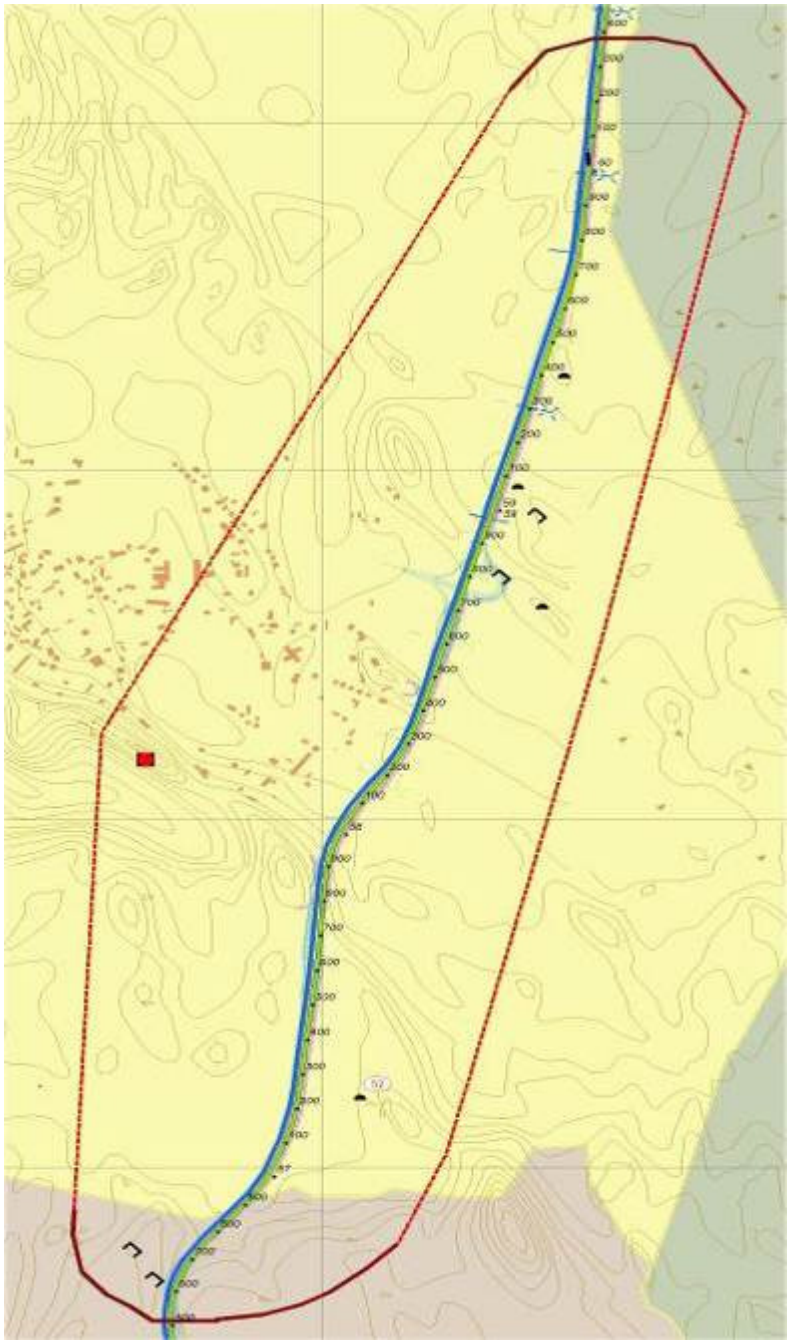
For rest of the site during the road construction activities chance-find regulations issued by the Ministry of Culture are strictly observed, because openings or discoveries of tombs during the soil removal are possible. The construction contract should include provision of qualified archaeological stuff, to ensure, that proper chance-find procedures are implemented. Whole area of the site must be protected by full complex of mitigation measures (see the recommendations in our Reports # 1-2).

In general, the site is not making strong influence on the cost and the duration of the Project.

Selected publications related to the site:

Petrosyan L., 1996, Excavations in Lanjik, Abstracts of reports on the Conference Devoted to the Archaeological Fieldwork results in 1993-1995, Yerevan, pp. 60-61 (in Armenian);

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. 198-201.



Map 16. Protection area of Lanjik archaeological complex in relationship with the new design of the Ashtarak-Gyumri Highway

Main view of the III-I Millennia B.C. fortified settlement of the Lanjik archaeological complex on the left side of the existing Ashtarak-Gyumri Road

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Circular structure in Lanjik archaeological complex on the right side of the existing Ashtarak-Gyumri Road.

Medieval boundary stone in Lanjik archaeological complex on the left side of the existing Ashtarak-Gyumri Road.

37; Settlement and tomb field in Lanjik (# 56 in GM and Map 17)
Shirak marz, Lanjik - Sarnaghbyur communities
Distance in correspondence to the "0 point" of the road: 61.600 – 62.400 km
GPS coordinates: N 40°, 31', 57, 8'' ; E 43°, 52', 34, 6"
Site is discovered newly. 4

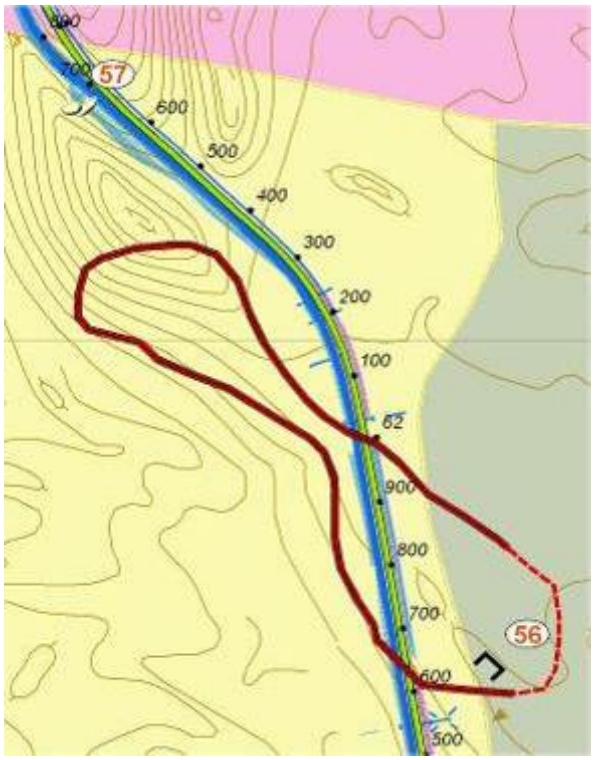
The site is represented byasettlement and tomb field dating back to the Early Bronze Age (IV-III Millennia B.C.). Small scale excavations at the site in 1992 opened a tomb belonging to the mentioned period. Field investigations carried out in this area showed that the site is heavily damaged by the existing Ashtarak-Gyumri Road, which hafted the site into two parts. The site is also damaged by intensive agricultural activities as well. The edges of the site overlooking the both sides of the highway lost their scientific and cultural

value, that's why no special archeological excavations are required to protect the site from the direct influence of the future constructional activities. In the case of this monument chance-find regulations issued by the Ministry of Culture are strictly observed, because openings or discoveries of tombs or other constructions during the soil removal are possible.

The construction contract should include provision of suitably qualified staff, such as an archaeologist, to ensure, that proper chance-find procedures are implemented. As well, the whole area of the site must be protected by full complex of mitigation measures (see the recommendations in our Reports # 1-2). In general the site is making no significant influence on the coast and the duration of the Project.

Selected publications related to the site:

Petrosyan L., 1996, Excavations in Lanjik, Abstracts of reports on the Conference Devoted to the Archaeological Fieldwork results in 1993-1995, Yerevan, pp. 60-61 (in Armenian).



Map 17. Physical boundaries of settlement and tomb field of Lanjik in relationship with the new design of the Ashtarak-Gyumri Highway

Main view of the settlement and tomb field of Lanjik on the right side of the existing Ashtarak-Gyumri Road.

Main view of the settlement and tomb field of Lanjik on the left side of the existing Ashtarak-Gyumri Road.

38. Fortified settlement and tomb field of Dzorakap (# 58 in GM and Map 18)

Shirak marz, Dzorakap community

Distance in correspondence to the "0 point" of the road: 66.700 – 67.050 km

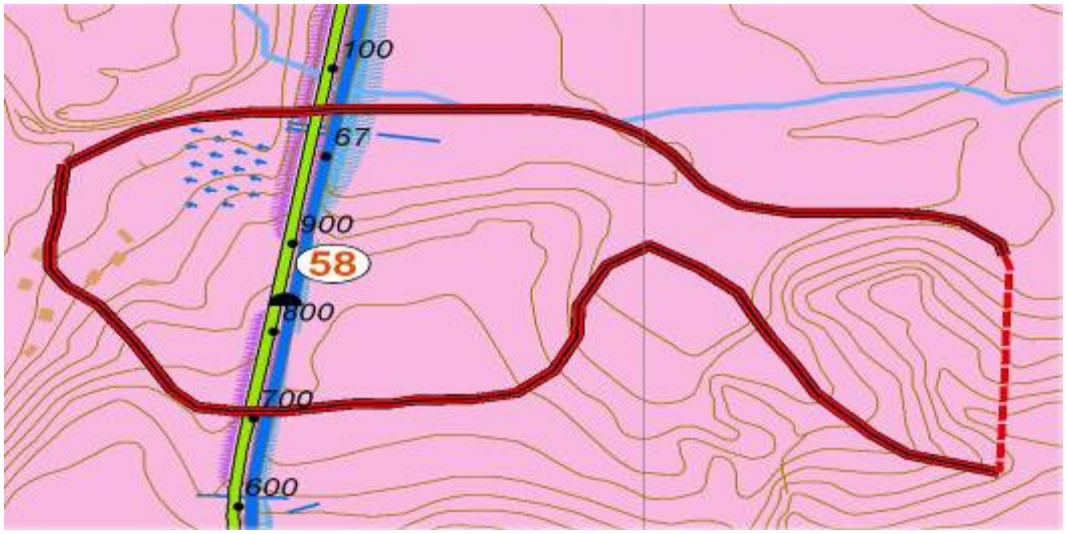
GPS coordinates: N 40°, 34', 01, 6'' ; E 43°, 53', 09, 5"

State List of Historical-Archaeological Monuments: **# 7.73.7**

The site consists of II – I Millennia B.C. fortified settlement together with its tomb field and a medieval village remains. Existing Ashtarak-Gyumri Road, passing though this area, cased a serious damage to the site. On the right side of the road, traces of partly destroyed tombs and wall constructions are visible. Pottery fragments and bones, documented along the sections of the existing Road, are showing the presence of the archaeological deposits all along the protection area of the site. The left side attached to the Road is completely destroyed by a powerful soil base, filled for the highway construction.

The suggested design of the new Highway is passing on the right side of the existing Road. It will cause a strong damage to the tombs and constructions. For this reason archaeological excavations along the existing highway on the full length of the site (around 400 meters) are required. This is the only way to protect the cultural and historical value of this portion of the Dzorakap archaeological site. For rest of the site full complex of mitigation measures (see the recommendations in our Reports # 1-2) are required. In general, the site is making strong influence on the coast and the duration of the Project.

References:None



Map 18. Protection area of fortified settlement and tomb field of Dzorakap in relationship with the new design of the Ashtarak-Gyumri Highway

Traces of constructions of fortified settlement and tomb field of Dzorakap on the right side of the existing Ashtarak-Gyumri Road.

Traces of constructions of fortified settlement and tomb field of Dzorakap on the left side of the existing Ashtarak-Gyumri Road.

39. Tomb field and Medieval village remains of Hayrenyats (# 62 in GM and Map 19)

Shirak marz, territory of Hayrenyats and Horom communities

Distance in correspondence to the "0 point" of the road: 75.000 – 75.900 km

GPS coordinates: N 40°, 38', 16, 8'' ; E 43°, 51', 06, 6"

Site is newly discovered. 5

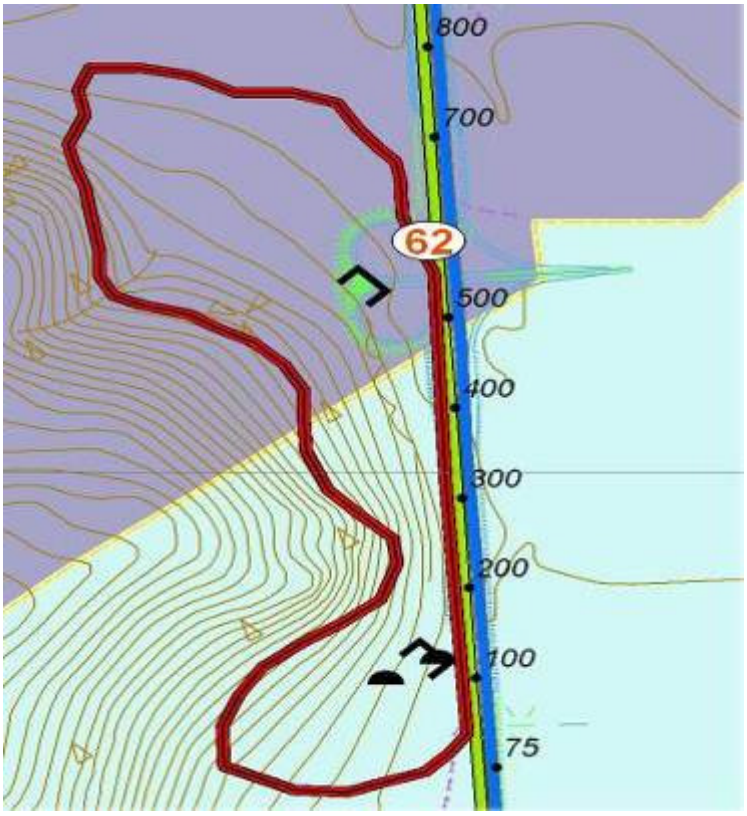
The site is represented by series of Bronze through Iron Age (II – I Millennia B.C.) tombs and remains of medieval village (13-14 centuries) occupying almost the same area. It is located on the left side of the existing Ashtarak-Gyumri Road, in front (West) of the Hayrenyats community. Thick bases of the accurately built walls and other constructions are visible at the place.

Suggested design of the new Highway is passing by the right side of the site and will cause no direct damage to it. The area of the site mainly will be affected by the "cloverleaf" which is planned for connecting the highway with the Hayrenyats community. Changing the position of the "cloverleaf" and removing it to the right side of the highway is required. This will fully save the

site from any direct affect from the constructional activities. In this case, only full complex of mitigation measures (see the recommendations in our Reports # 1-2) are required for protection of the site, making no significant influence on the coast and the duration of the Project.

References:None

View of the Medieval village remains of Hayrenyats on the left side of the existing Ashtarak-Gyumri Road, closer to the area of the cloverleaf joining the highway with the community



Map 19. Physical boundaries of tomb field and medieval village remain of Hayrenyats in relationship with the new design of the Ashtarak-Gyumri Highway

Traces of wall constructions in the area of Medieval village remains of Hayrenyats

40. Benyamin archaeological complex (# 67 in GM, Map 20 and 21)

Shirak marz, Benyamin community

Distance in correspondence to the "0 point" of the road: 80.800 – 81.800 km

GPS coordinates: N 40°, 41', 22, 3'' ; E 43°, 50', 24, 2"

State List of Historical-Archaeological Monuments: **# 7.27.9.**

The site of Benyamin occupies an area of more then 100 hectares, 15 km to the South from Gyumri, West from the village of Benyamin,dating back to the VI century B.C. to the III century A.D. The site was discovered in 1989 by the joint archaeological expedition of the Institute of Archaeology and Ethnography of the NAS, RA and the ShirakRegionalMuseum. The excavations here were continued by the joint Armenian-French archaeological expedition, with the support of the Ministry of Culture of France. During already two decades of explorations a territory over 4000 square meters had been excavated. A palace, religious and residential buildings, economic complexes, as well as over 240 burials have been unearthed. During the Classical period it has been a royal residence and it is considered to be the famous town of Draskhanakert (according Dr. F. Ter-Martirosov), the location of which was not known before. The unearthed architectural structures and rich archaeological materials are illustrated the commonalities of the development of Classical culture in Shirak region of Armenia, the cultural and economic ties with the Achaemenid, Hellenistic and Roman cultures of the Near East and Mediterranean, as well as with nomads of the North Caucasus. From this point of view the monument has an international importance.

Suggested design of the road is directly affecting the site from the right side of the existing Road, which is cutting it into two sides and running through the protection area of the complex. Another problem related to the suggested design is the “cloverleaf” for the entrance to the territory of the Benyamin community.

Map 20. Protection area of Benyamin archaeological complex in relationship with the new design of the Ashtarak-Gyumri Highway

Main view of Benyamin archaeological complex from the North-East, hafted by the existing Ashtarak-Gyumri Highway

Traces of Hellenistic period wall constructions in Benyamin archaeological complex on the left side of the existing Ashtarak-Gyumri Highway

View of Benyamin archaeological complex on the right side of the existing Ashtarak-Gyumri Highway

Map 21. The aerial photograph of the Benyamin archaeological complex. The yellow dotted line is marking the area required for test excavations on right side of the existing Road.

Complex solutions for minimizing the actual damage to the site during construction of the new Highway are required. First of all the change of "cloverleaf" location is required, which will cause the damage to the most well preserved part of the site. Next requirement is the redesign of the Highway further right, closer to the Benyamin village as much as it possible. In the case of redesigning the Highway and pushing it at least 80-100 m to the East, the new Highway will partly bypass (although not completely) the protection area of the site. At the same time, it does not exclude the absolute necessity of the test excavations of this new area.

The change of the "cloverleaf" position to the South (out of the protection area) along the existing Road, will cause minimal damage to the site and only the area occupied by this construction will be required for excavations. Otherwise long term and large-scale excavations along the right side of the existing Road will be required before the construction activities.

Benyamin archaeological complex, together with Agarak historical cultural preserve and Mastara archaeological complex, is the next serious archaeological "barrier" for the construction of the new Ashtarak-Gyumri Highway, which will require both, the change of Highway design and excavations, making strong influence on the coast and the duration of the Project.

Selected publications related to the site:

Ter-Martirosov F., 1996, Un paradis de l'antique de la classiqe: de la site de Draskhanakert, a` Beniamin, Armenie, Tresors de l`Armenie anciene, Somogy edition d`art, Paris, pp.187-189;
Ter-Martirosov F. et Stephan Deschamps, 2007, Un palais et ses depondances au cours de la période achemenide: Beniamin, Dans les montagnes d`Armenie, 500 000 ans d`histoire avant notre ere, Rouen, pp. 97-104;
Khachatryan H., 2007, L`habitat de Beniamin a l`epoque hellenistiqe, Dans les montagnes d`Armenie, 500 000 ans d`histoire avant notre ere, Rouen, pp. 113-115;
Yeganyan L., 2007, La necropole hellenistiqe de Beniamin, Dans les montagnes d`Armenie, 500 000 ans d`histoire avant notre ere, Rouen, pp. 116-118.

41. Azatan Megalithic structures (# 70 in GM and Map 22)

Shirak marz, Azatan community

Distance in correspondence to the "0 point" of the road: 83.450 km

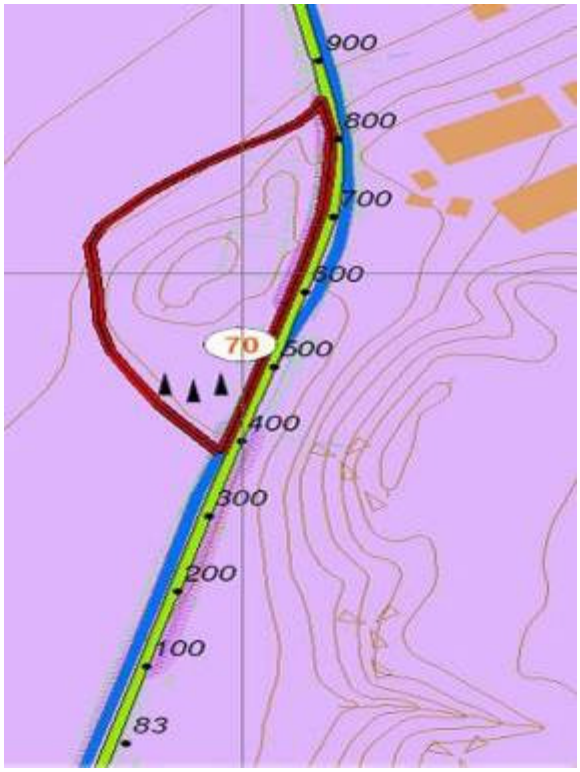
GPS coordinates: N 40°, 42', 24, 3'' ; E 43°, 50', 21, 8"

State List of Historical-Archaeological Monuments: # 7.4.9.

The interesting and rare monuments of Azatan are represented by complex structures consisting of three separate lines of vertically erected rocks, spreading on about of 2 kilometers along the both sides of the existing Ashtarak-Gyumri Road. The character of these constructions is still unclear. Those types of Megalithic structures mainly have a ritual meaning, sometimes symbolizing "holy roads" between the major cultic constructions. Timing of the monuments is not clear as well: particularly, the constructions might belong to the Bronze - Iron Age periods.

The existing portion of the structures is situated on southern ending of the Azatan village, directly on the left side of the existing Road. Combination of the suggested design of the new Highway with the site shows that the planned change of the direction of the Highway from the left side to the right can directly affect the site and destroy it. The redesigning of the turn to the South can partly solve the questions related to the possible danger of the destruction of the site. Together with the mentioned, the test excavations of the right side of the existing Road are required. Also the full complex of mitigation measures (see the recommendations in our Reports # 1-2) will be required for protection of the site, making no serious influence on the coast and the duration of the Project.

References:None



Map 22. Protection area of Azatan Megalithic structures in relationship with thenew design of the Ashtarak-Gyumri Highway.

Azatan Megalithic structures on the left side of the existing Ashtarak-Gyumri road.

B. Cultural (Memorial) objects of direct impact

The last group of recorded monuments that is being affected by the suggested Highway design consists of cultural sites (**## 41, 47, 48, 59, 60, 63, 64, 65, 72, 73 in General Map**). They are represented by 10 modern monuments of culture carrying religious or cultural significance. Those kinds of monuments are mostly memorials dedicated to the car accidents on the roads (see the sami in our Reports # 1 and 2) and in some cases they have decorative and worship meaning (like Numbers 60, 63). These monuments are not under state regulation and there are no special rules or laws that are ensuring their protection, but the monuments are deeply respected by the public, which means that they are under so-called “public protection”.

Because of their small sizes these monuments will be fully affected by road construction. They can be removed under the control and support of local communities in cooperation with the family members and relatives and re-erected in adjacent areas along the new Highway, after its construction will be finished.

The influence of these monuments on the suggested design and cost of the new Highway is minimal, and the construction organizations must take particular care of them, to avoid strong public criticism.

42. Tiko, Tomo, Armen, Ara, Hrach Memorial (# 41 in GM).

Aragatsotn marz, Mastara community

Distance in correspondence to the "0 point" of the road: 48.920 km

GPS coordinates: N 40°, 26', 27, 0'' ; E 43°, 52', 29, 1"

Map 23. The Memorial # 41 in GM

43. Siraznik, Gagik Memorial (# 47 in GM).

Aragatsotn marz, Mastara community

Distance in correspondence to the "0 point" of the road: 54.200 km

GPS coordinates: N 40°, 28', 04, 3'' ; E 43°, 51', 55, 6"

44. Harutyunyan Suren Memorial (# 48 in GM).

Aragatsotn marz, Mastara community

Distance in correspondence to the "0 point" of the road: 54.700 km

GPS coordinates: N 40°, 28', 19, 6'' ; E 43°, 51', 56, 8"

45. Manasyan Artur Memorial (# 59 in GM).

Shirak marz, Maralik community

Distance in correspondence to the “0 point” of the road: 69.390 km

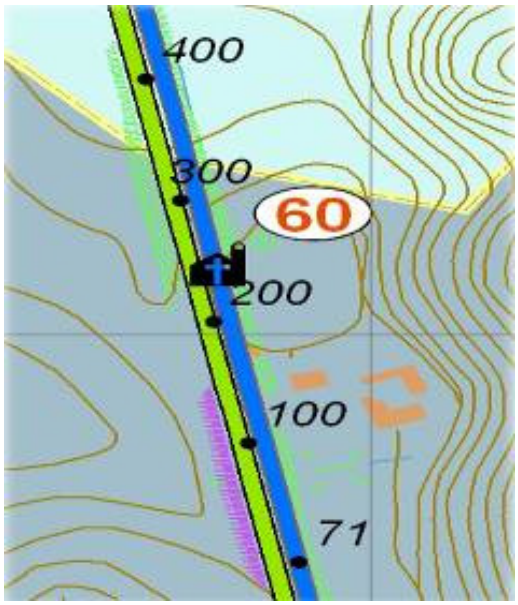
GPS coordinates: N 40°, 35’, 11, 1’’ ; E 43°, 52’, 27, 5”

46. Memorial Shrine (# 60 in GM).

Shirak marz, Maralik community

Distance in correspondence to the “0 point” of the road: 71.240 km

GPS coordinates: N 40°, 36’, 02, 7’’ ; E 43°, 51’, 51, 8”



Map 24. Memorial Shrine, # 60 in GM.

47. “Black Khachkar” (# 63 in GM).

Shirak marz, Horom community

Distance in correspondence to the “0 point” of the road: 75.900 km

GPS coordinates: N 40°, 38’, 28, 4’’ ; E 43°, 51’, 08, 9”

46. Gevorg Memorial (# 64 in GM).

Shirak marz, Lusakert community

Distance in correspondence to the “0 point” of the road: 79.520 km

GPS coordinates: N 40°, 40’, 25, 0’’ ; E 43°, 50’, 59, 7”

47. Memorial to the Constructors – Victims of the 1988 Earthquake (# 65 in GM).

Shirak marz, Lusakert community

Distance in correspondence to the "0 point" of the road: 79.990 km

GPS coordinates: N 40°, 40', 39, 2'' ; E 43°, 50', 52, 5"

48. Yurik Memorial (# 72 in GM).

Shirak marz, Azatan community

Distance in correspondence to the "0 point" of the road: 84.720 km

GPS coordinates: N 40°, 43', 04, 3'' ; E 43°, 50', 18, 4"

49. Nazaryan Robert Memorial (# 73 in GM).

Shirak marz, Azatan community

Distance in correspondence to the "0 point" of the road: 85.750 km

GPS coordinates: N 40°, 43', 34, 5'' ; E 43°, 50', 01, 5"

Shrine in Maralik (Number 60 in GM)

C. Archaeological sites of indirect impact

50. Mastara -3 Settlement (Map # 25)

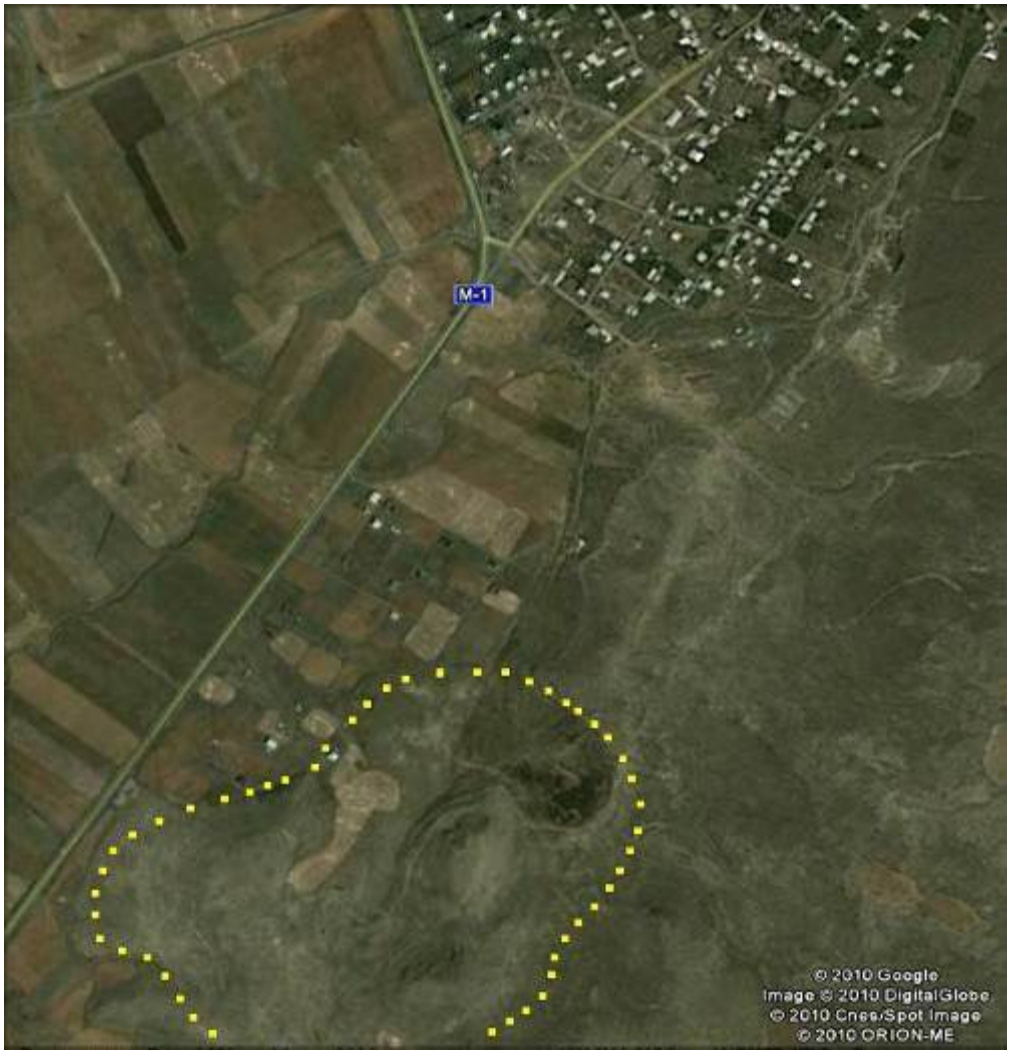
Aragatsotn marz, Mastara community

Distance in correspondence to the "0 point" of the road: 48.500 – 49.000 km

GPS coordinates: N 40°, 24', 11, 02'' ; E 43°, 52', 57, 17"

Site is newly discovered.

The site is located nearby the southern outskirts of the village of Mastara. According the surface materials the Mastara-3 settlement belongs to the Bronze-Iron Age period and is representing rich archaeological deposits and the remnants of the dwelling constructions.



Map 25. Boundaries of the Mastara -3 Bronze Age settlement (yellow dotted).

Though this site is not directly affected by the constructional activities of the new Highway, the next mitigation measurements are required as well: the construction process has to be done carefully near the settlement, in order not to destroy it or to cover the structures by construction waste. As the activities should run near the protection area of the site, it is forbidden to use its area for parking the heavy mechanisms, for storing constructional materials or using local soil for constructional purposes. The construction activities may not close the access to the site.

Conclusions

Summarizing the study of the physical cultural resources along the new design of the Ashtarak-Gyumri Mian Highway we can say that the most problematic targeting points are the 20 archaeological monuments, which are affected by the suggested preliminary design. For at least 8 of those monuments, change of the suggested design is required. Among those are: Agarak historical-cultural preserve, Aruch medieval Caravanserai, Zakari Berd castle, Mastara archaeological complex, Tomb field and medieval village remains of Hayrenyats, Beniamin archaeological complex, Azatan Megalithic structures.

Suggested solutions will be able to change the category of 5 monuments from directly affected to the category of not affected. Those are: **Aruch Neolithic settlement and medieval village remains, Aruch medieval Caravanserai, Zakari Berd castle, Tomb field and medieval village remains of Hayrenyats, Azatan Megalithic structures.**

Even in that case the rest **3 monuments: Agarak historical-cultural-preserve, Mastara archaeological complex, and Beniamin archaeological complex,** which were separated by the existing road and the parts of them are on both sides of the road. So, it is impossible to find solutions for saving them from full destruction. These sites must be excavated, and in thereby their cultural-historical value can be preserved.

For the rest of the sites any changes of suggested design are not required. At least for **8** of them (**Medieval village remains in**

Shamiram,Nerkin Bazmaberd tomb field, Verin Sasunashen archaeological complex, Davtashen archaeological complex, Talin tomb field, Yeghnasar tomb field, Mastara-2 tomb field, Fortified settlement and tomb field of Dzorakap) archaeological test-excavations are required, because part of their structures are directly affected by the newly built highway. And at least in **4** of those sites(**Nerin Naver archaeological complex, Kosh Settlement, Lanjik archaeological complex, Settlement and tomb field in Lanjik**) chance-find regulations issued by the Ministry of Culture are strictly observed, because discoveries of archaeological finds during soil removal process are possible. In summary in at least 11 archaeological monuments located along the Ashtarak-Gyumri Highway archaeological excavations are required. Those procedures will affect not only the cost of the new road construction, but will influence on the time table and duration of the whole project. We can consider that the physical-cultural resources are the main difficulty in the whole picture of road construction activities and it is strongly recommended that PMU must open a position for an archaeologist 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 and construction bodies. The task of the mentioned expert must 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 the rest of the physical cultural resources - historical-archaeological and cultural monuments recorded along the Ahstarak-Gyumri Highway, which are not directly affected by the constructional activities of the new highway, mitigation measurements are required as well. Those must include the same procedures: the construction process has to be done carefully near the monuments in order not to destroy them or to close 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 soil for constructional purposes. The construction activities may not close the access to the sites.

Dr. Mkrtich. H. Zardaryan
14. 03. 2011

ANNEX 3b Archaeological Assessment Report – Part 2

The North-South Road Corridor Investment Programme Tranche 3

Archaeological Impact Assessment ReportPart2

Dr. Mkrtich. H. Zardaryan
Head of the Department of Archaeology of Ancient Armenia
Institute of Archaeology and Ethnography
National Academy of Sciences, RA
Archaeological Consultant of the Programme

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

The zones of the archaeological sites

and the costs and timing of their investigations

1 (32) Talin tomb field (# 38 in GM and Map 10). From the area of the Interchange on the second recent crossing leading to Talin (Tranche 2) up to the end of Talin tomb field (Tranche 3).
Aragatsotn marz, Talin community.
GPS coordinates: N 40°, 24', 03, 0'' ; E 43°, 53', 30, 7".
State List of Historical-Archaeological Monuments: # 2.3.3.
Length: 71+100(old data). New: 69+900 - 71+100 – 75+730.8
Adjacent area under construction: 96.5 hectares.9
Costs of investigation: $ 65.000 USD.
Time of investigation: 5 months.

2 (33) Yeghnasar tomb field (# 39 in GM and Map 12).10
Aragatsotn marz, Talin-Akounk-Mastara communities.
GPS coordinates: N 40°, 25', 02, 0'' ; E 43°, 51', 26, 8".
Site is discovered newly.
Length: 45.650 – 46.600 km (old data). New: 75+730 – 76+700.
Adjacent area under construction: 15 hectares.
Costs of investigation: $ 40.000 USD.
Time of investigation: 4 months.

3 (34) Mastara archaeological complex (#42 in GM, Map 13 and 14).
Aragatsotn marz, Mastara community
GPS coordinates: N 40°, 26', 53, 8'' ; E 43°, 51', 53, 8".
Site is newly discovered.
Length: 50.000 – 51.900 km (old data). New: 79+900 – 82+000.
Adjacent area under construction: 32.2 hectares.
Costs of investigation: $ 35.000 USD.
Time of investigation: 4 months.

[8]According the revised "picketage". The "Zero" point mentioned in our Reports #1, 2 and 3 (Tranches 2, 3) = 30+080, according the General Map (preliminary) of the Constructors.

[9] The area for the archaeological investigations had been calculated in correlation with "the zone of engineering activities" – 70 m to the right and left from the axis of existing road. The areas of new interchanges had been calculated according their territories.

[10] The division of the sites # 1 (32) and 2 (33) is conditional. Here we are dealing with the same Tomb field marked by the adjacent remarkable toponymes.

4 (35) Mastara-2 tomb field (# 45 in GM and Map 15).11
Aragatsotn marz, Mastara community.
GPS coordinates: N 40°, 27', 40, 3'' ; E 43°, 51', 34, 6".
Site is discovered newly.
Length: 51.950 – 54.150 km (old data). New: 82+000 – 84+230.
Adjacent area under construction: 33.7 hectares.
Costs of investigation: $ 35.000 USD.
Time of investigation: 4 months.

5 (36) Lanjik archaeological complex (# 52 in GM and Map 16).
Aragatsotn and Shirak marzes, territory of Mastara – Lanjik - Sarnaghbyur Communities.
GPS coordinates: N 40°, 29', 38, 3'' ; E 43°, 52', 05, 4"
State List of Historical-Archaeological Monuments: # 7.44.1-3
Length: 56.500 – 60.400 km (old data). New: 84+230 – 90+500.
Adjacent area under construction: 91.3 hectares.
Costs of investigation: $ 45.000 USD.
Time of investigation: 5 months.

6 (37) Settlement and tomb field in Lanjik (# 56 in GM and Map 17).
Shirak marz, Lanjik - Sarnaghbyur communities.
GPS coordinates: N 40°, 31', 57, 8'' ; E 43°, 52', 34, 6".
Site is discovered newly.
Length: 61.600 – 62.400 km (old data). New: 91+400 - 92+500.
Adjacent area under construction: 16.4 hectares.
Costs of investigation: $ 30.000 USD.
Time of investigation: 4 months.

7 (38)Fortified settlement and tomb field of Dzorakap (# 58 in GM and Map 18).
Shirak marz, Dzorakap community.
GPS coordinates: N 40°, 34', 01, 6'' ; E 43°, 53', 09, 5".

[11] The division of the sites # 3 (34) and 4 (35) and 5 (36) is also conditional. Here we have the Settlement and its large Tomb field marked by the adjacent remarkable toponymes.

State List of Historical-Archaeological Monuments: # 7.73.7
Lenght: 66.700 – 67.050 km (old data). New: 93+600 – 96+100.
Adjacent area under construction: 34.8 hectares.
Costs of investigation: $ 35.000 USD
Time of investigation: 5 months.

8 (39) Tomb field and Medieval village remnants of Hayrenyats(#62 in GM and Map 19).
Shirak marz, territory of Hayrenyats and Horom communities.
GPS coordinates: N 40°, 38', 16, 8'' ; E 43°, 51', 06, 6".
Site is newly discovered.
Length: 75.000 – 75.900 km (old data). New: 102+300 – 104+500.
Adjacent area under construction: 30.8 hectares.
Costs of investigation: $ 20.000 USD
Time of investigation: 2 months.

9 (40) Benyamin archaeological complex (# 67 in GM, Map 20 and 21).
Shirak marz, Benyamin community.
GPS coordinates: N 40°, 41', 22, 3'' ; E 43°, 50', 24, 2"
State List of Historical-Archaeological Monuments: # 7.27.9.
Length: 80.800 – 81.800 km (old data). New: 109+000 – 112+000.
Adjacent area under construction (right side of the road): 33 hectares.
Costs of investigation: $ 220.000 USD
Time of investigation: 8 months.
The main territory of the site of Benyamin is located on the left side of existing road and its area here is larger than the frames mentioned above. So, this territory must be left out of any constructive activity.

10 (41) Azatan Meghalithic structures (# 70 in GM and Map 22).
Shirak marz, Azatan community.
Distance in correspondence to the "0 point" of the road: 83.450 km (old data).
New: 112+000 – 112+400.
GPS coordinates: N 40°, 42', 24, 3'' ; E 43°, 50', 21, 8"
State List of Historical-Archaeological Monuments: # 7.4.9.
The Megalitic structures are located on the left edge of existing road. The site is included in the State List of Historical-Archaeological Monuments (see above). It is under the State protection and must be protected irrespective of

its scientific investigation. In order of that, the new road line needs to be moved to the right side of existing road, leaving the left side inviolable.

Together with the Megalits, there is a Tomb field in this area (the megalithic structure is a part of that). Before the beginning of construction activities, the territory to the right of existing road needs the archaeological examination.

Length: 112+000 – 115+000.

Adjacent area under construction (right side of the road): 42.1 hectares.

Costs of investigation: $ 15.000 USD

Time of investigation: 3 months.

To be added to the Report

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. So, the timing of archaeological research of the sites and the expenses of investigations could be different from the abovementioned.

By the same reasons, during the constructive activities the new archaeological units (not mentioned in the State List of Historical-Archaeological Monuments or the present list of the sites) could be unearthed. Because of that, the close contacts between the archaeologists and constructors as well as the presence of an archaeologist in each major unit of constructors during the process of road construction are essential.

The investigations of the archaeological sites registered along the Tranche 3 line (as well as in frames of Tranche 2) will take not less than 8 months. In this framework it is necessary to take into account the severe seasonal-climatic characteristics of the Talin and Shirak regions (late spring, early winter) that will put its impact on the field work process.

Since the work will start simultaneously on the number of sites, it will not withhold the process of road construction.

M. H. Zardaryan
11. 08. 2011
Institute of Archaeology and Ethnography
National Academy of Sciences, RA
Archaeological Consultant of the Programme

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 ՄԱՅԻՍ 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 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 Սադաթյան 1, Մարալիկ	27 մայիսի	14:00
Գյումրի Ուսումնչյան դպրոց վարժարանի դահլիճ Մհեր 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

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

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

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

ADB
Asian Development Bank

1st Public Consultation – 26 & 27 May 2010 (Yerevan, Maralik, Gyumri)
Armenia: North-South Road Corridor Investment Program Tranches 3 – Environmental Impact Assessment Report

On 26 May 2010, a meeting was held in one of MOTC's meeting rooms in Yerevan. The meeting was chaired jointly by the PMU Director and ADB staff consultant and was attended by 18 persons.

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

On 27 May 2010, two meetings were held:
(i) in Maralik, the meeting was held at the Municipal Hall, attended by 44 persons, and chaired jointly by the Mayor of Maralik and ADB staff consultant; and
(iii), in Gyumri, the meeting was held at the Uyumjyan School, attended by 16 persons, and conducted by the ADB staff consultant.
The total of 78 attendees included registered representatives of relevant government agencies, NGOs, and media. Each attendee received a project fact sheet in English and Armenian.

List of Attendees – Maralik, 27 May 2010

No	Name	Organization
1	AndranikHovhannisyan	“Maralik”repair-construction
2	BabkenSamvelyan	HeadofMaralikgasservice
3	HovhannesGasparyan	residentofMaralik
4	GurgenOleyan	residentofMaralik
5	IgirAraratyan	residentofMaralik
6	JiroSargsyan	residentofMaralik
7	GrigorGabrielyan	residentofMaralik
8	SergoHambaryan	Araratmarzofficial
9	ManukKarapetyan	didnotprovide
10	BabkenNersisyan	didnotprovide
11	MozhoAvetisyan	didnotprovide
12	HaikHakobyan	gasService
13	TorgomGhandilyan	trainerofSportsSchool
14	DanielOleyan	trainer
15	SurikAvetisyan	residentofMaralik
16	SosMelikyan	residentofKarabaird
17	KristinaMkrtchyan	“Gula”TV
18	SatenikKughzvantsyan	“Liberty”radio-station
19	ArmenMovsisyan	residentofMaralik
20	LevonGhazaryan	residentofMaralik
21	ArtakAvdalyan	residentofMaralik
22	SerjozhaSahakyan	residentofMaralik
23	ArthurCharchoghyan	residentofMaralik
24	AnushHovhannisyan	Publiclibrary
25	YelenaUrumyan	Publiclibrary
26	GyulnaraMuradyan	Publiclibrary
27	AlvardKarapetyan	Publiclibrary
28	GoharManukyan	Publiclibrary
29	TatevAvdalyan	M.E.K.
30	ManyaAvdalyan	M.E.K.
31	TsovinarMkrtchyan	Maralikcommunitypre-schoolfacility
32	FridaUrutyan	Maralikcommunitypre-schoolfacility
33	AnahitPoghosyan	Maralikcommunitypre-schoolfacility
34	AidaHarutyunyan	Maralikcommunitypre-schoolfacility
35	AsyaKarapetyan	Maralikcommunitypre-schoolfacility
36	SofikHakobyan	MaralikArtsSchool
37	AnnaKocharyan	MaralikArtsSchool
38	NaraAyvazyan	MaralikArtsSchool
39	VormizdukhtGrigoryan	MaralikArtsSchool
40	AvetikNazaryan	MaralikSocialServiceRegionalOffice
41	HovhannesHovhannesyan	MaralikSocialServiceRegionalOffice
42	FurmanSaroyan	Maralikelectricitynetwork
43	ManvelNazaryan	MaralikMayor’soffice
44	ArmenGevorkyan	MayorofMaralik

List of Attendees Gyumri,27May2010

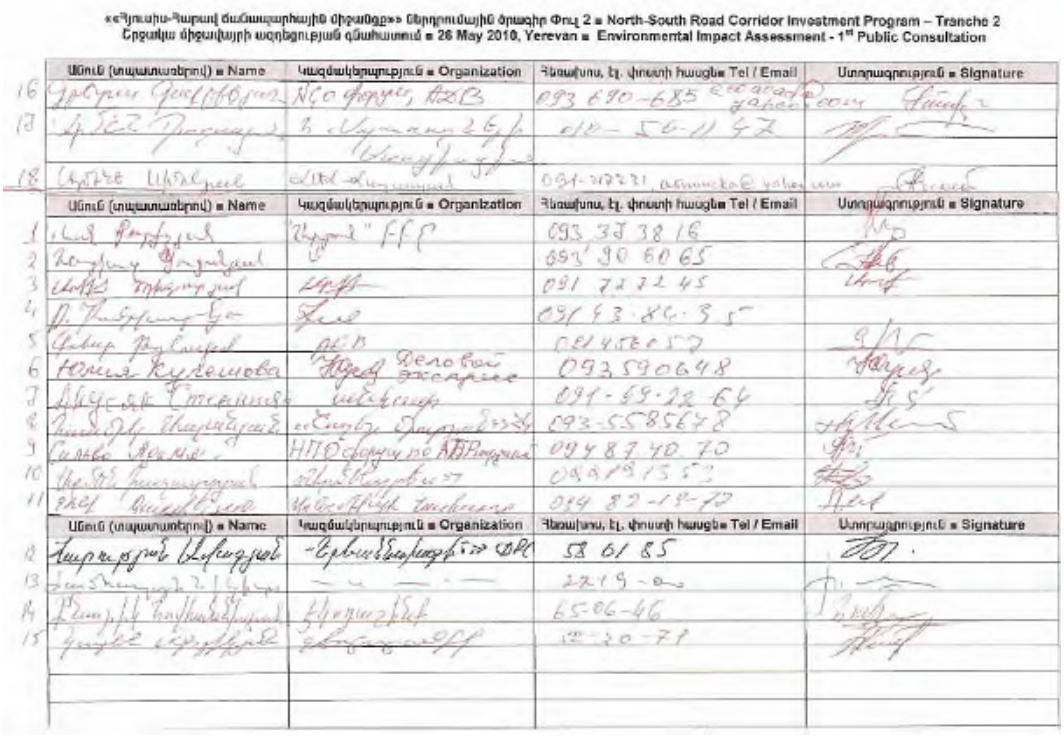
No	Name	Organization
1	KoryunSumbulyan	Bavravillagemayor
2	RolanGasparyan	Instituteofgeophysicsandenginee
3	MartinTonoyan	Head,EnvironmentPreservationD
4	KarineBazeyan	ShirakArmenologyResearchCent
5	HamazaspKhachatryan	Director,ShirakRegionalMuseum
6	ArtashesBoyajyan	ShirakGeologyMuseum
7	GrishaTagvoryan	“Support”BenevolentNGO
8	SeyranMartirosyan	Head, A.
9	GevorgPetrossyan	GyumriOrhusCenter
10	AniKocharyan	BiosophiaNGO
11	YeranuhiSoghoyan	“Hetq”dailynewspaper
12	LevonBarseghyan	“Asparez”Club
13	LevonMartirossyan	GeophoneNGO
14	GrigorAghanyan	ShirakArmenologyResearchCent
15	LarisaYeganyan	MonumentsProtectionAgency
16	HamletGasparyan	Shirak*marzpetaran*

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

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

Handout (Armenian EIA contains this handout in Armenian language)

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, Maralik ■ Environmental Impact Assessment - 1st Public Consultation

	Անուն (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե Tel / Email	Ստորագրություն ■ Signature
31	[illegible]	[illegible]	2-22-99	[illegible]
32	[illegible]	[illegible]	2-29-47	[illegible]
33	[illegible]	[illegible]	2-27-04	[illegible]
34	[illegible]	[illegible]	2-23-69	[illegible]
35	[illegible]	[illegible]	2-18-24	[illegible]
36	[illegible]	[illegible]	2-?-65	[illegible]
37	[illegible]	[illegible]	2-23-53	[illegible]
38	[illegible]	[illegible]	2-23-92	[illegible]
39	[illegible]	[illegible]	2-22-52	[illegible]
40	[illegible]	[illegible]	2-22-69	[illegible]
41	[illegible]	[illegible]	2-15-07	[illegible]
42	[illegible]	[illegible]	2-29-29	[illegible]
43	[illegible]	[illegible]	2-22-38	[illegible]

	Անուն (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե Tel / Email	Ստորագրություն ■ Signature
24	[illegible]	[illegible]	093-02-45-25	[illegible]
25	[illegible]	[illegible]	077-88-33-53	[illegible]
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	Անուն (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե Tel / Email	Ստորագրություն ■ Signature
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«Հյուսիս-Հարավ ճանապարհային միջանցք» ներդրումային ծրագիր Փուլ 2 ■ North-South Road Corridor Investment Program – Tranche 2
Շրջակա միջավայրի ազդեցության գնահատում ■ 27 May 2010, Maralik ■ Environmental Impact Assessment - 1st Public Consultation

	Անուն (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե Tel / Email	Ստորագրություն ■ Signature
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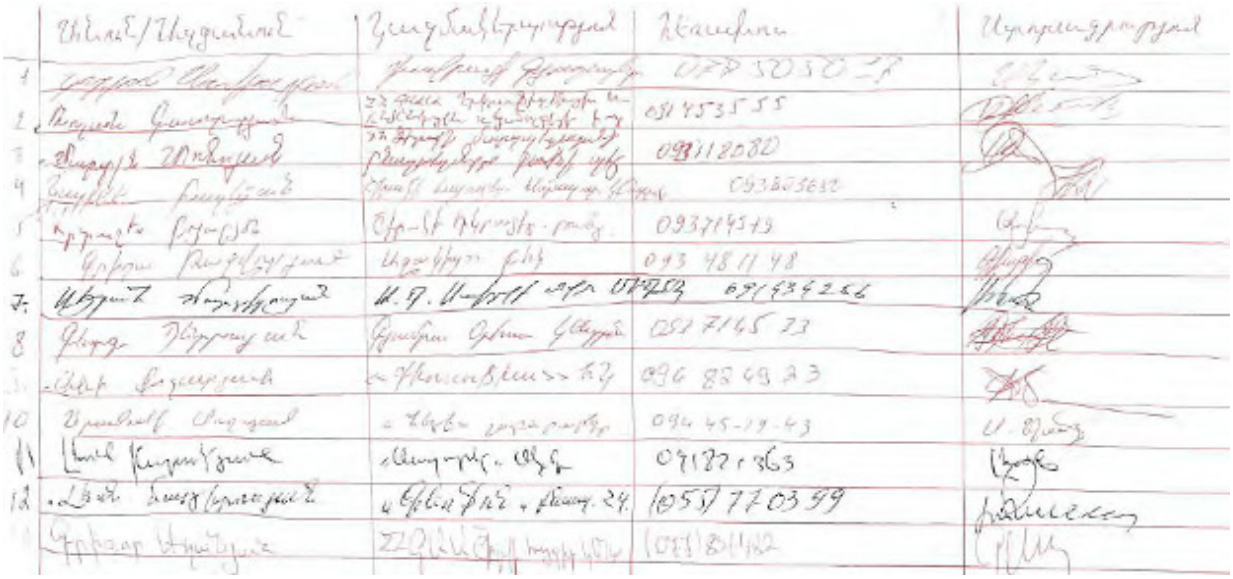
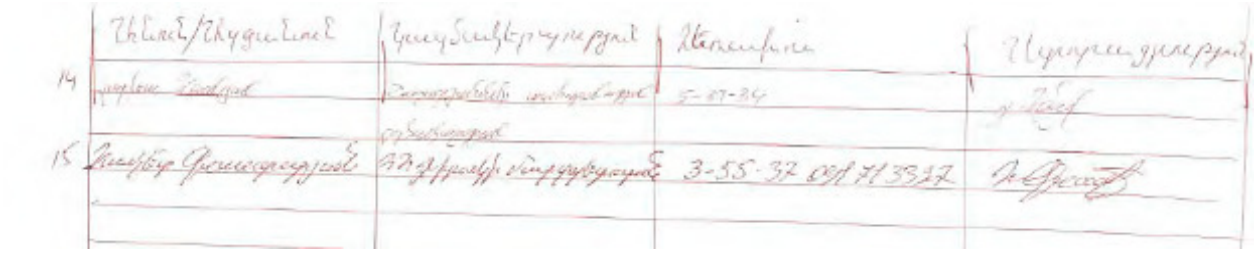


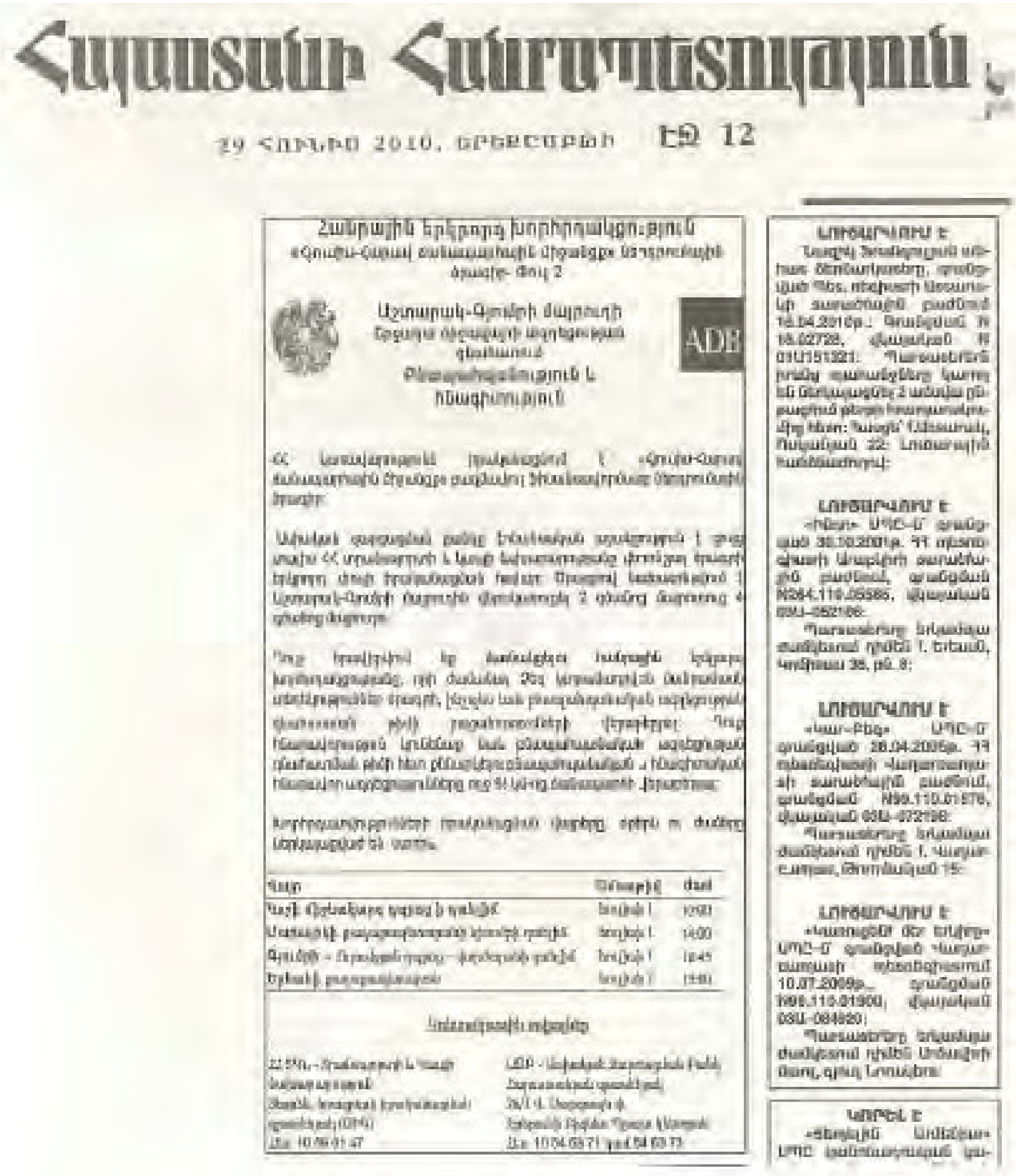


Annex 5 2nd Public Consultation (advertisements, attendance lists and sheets, handout)

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)


Հայաստանի Հանրապետություն

29 ՀՈՒՆԻՍ 2010, ԵՐԵՔՇԱԲԹԻ էջ 12

ADB

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: Aragats World (28 June 2010)

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

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

ADB

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

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

Armenia: North-South Road Corridor Investment Program Tranche 3 – Environmental Impact Assessment Report

The second Public Consultation was conducted on1July2010. Three consultations were held:

(i) Municipal Hall of Maralik, attended by 32 persons, and chaired jointly by a representative of the Mayor of Maralik and the PMU Public Relations Officer; and

(ii), Uyumjyan School in Gyumri, the meeting was attended by 11 persons, and conducted by the ADB staff consultant.

ListofAttendees–Gyumri,1July2010

No	Name	Organization
1	JulietaEganian	"Margartatsagik"NGO
2	GoharMkrtchyan	"Guarantee"NGO
3	AniKocharyan	"Biosophia"NGO
4	Cristine(nosurnamegiven)	GyumriOrhusCentre
5	HarutyunyanGagik	ChefSpecialistinTransport department, Shirak Marzpetaran
6	KhndrtsyanKhachatur	ShirakMarzpetaran,HeadofTransport&Road Construction
7	TonoyanPatvakan	didnotprovide
8	NalbandyanAram	didnotprovide
9	MartirosyanSeyran	"MIP"NGO
10	TonoyanMartin	HeadofNaturalProtectionatShirakMarzpetaran
11	KhachatryanHamazasp	JET

List of Attendees – Maralik , 1 July 2010

No	Name	Organization
1	GrigoryanVormizdukht	"ArtSchool"
2	SaroyanFirman	Maralikresident
3	HovhannisyanAnush	CityLibrary
4	UrumyanYelena	CityLibrary
5	MkrtchyanTsovinar	Maralikcommunitypre-education
6	PetrosyanIgit	MaralikCityHall
7	AgharabyanIgit	MaralikCityHall
8	HakobyanSofik	"ArtSchool"
9	KocharyanAnna	"ArtSchool"
10	SimonyanHeghine	"ArtSchool"
11	SimonyanHasmik	ChildrenSportSchool
12	KarapetyanAghasi	MusicSchool

No	Name	Organization
13	DokhoyanVahram	Maralikresident
14	PetrosyanAni	“ArtSchool”
15	AgharabyanArmine	“ArtSchool”
16	GhazaryanVarduhi	“ArtSchool”
17	VarzhapetyanLuiza	ChildrenSportSchool
18	OleyanDaniel	ChildrenSportSchool
19	HarutyunyanGagik	ChiefSpecialist,Transport and Construction Shirak*marzpetaran*
20	KhndrtsyanKhachatur	Head,Transport&Road and Construction Shirak*marzpetaran*
21	AyvazyanNaira	“ArtSchool”,deputydirector
22	AvdalyanAnna	“ArtSchool”,Maralik
23	AghababyanArmine	“ArtSchool”
24	ManukyanVardan	Maralik,Cadastre
25	MkrtchyanAmalya	Maraliklibrary
26	AvagyanGohar	Maraliklibrary
27	MovsisyanArmine	MaralikCityHall
28	AbajyanGohar	MEK
29	AvdalyanManya	MEK
30	MkoyanCristine	MaralikCityHall
31	NikolyanLilit	MaralikCityHall
32	YuzbalyanSatenik	MaralikCityHall

The July 2, 2010, Yerevan meeting was held in one of MOTC’s meeting rooms. The 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.

The second public consultation was attended by a total of 48 persons. Among them are representatives of relevant government agencies and from NGOs. Allattendee received a project fact sheet in English and Armenian.

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 (Maralik, Gyumri, &Yerevan)

Armenia: North-South Road Corridor Investment Program Tranche 3 – Environmental Impact Assessment Report

ActualAttendance Sheet

«Հյուսիս-Հարավ ճանապարհային միջանցքի» 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 (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե ■ Tel / Email	Ստորագրություն ■ Signature
Ashot Mirzoyan	Consumers Association	093 367327 ashot_mirzoyan@mail.ru	[illegible]
[illegible]	[illegible]	52-30-71	[illegible]
[illegible]	[illegible]	093-690-685	[illegible]@yahoo.com
[illegible]	«Հայաստանի» [illegible]	091727245 [illegible]@yahoo.co.uk	[illegible]
[illegible]	[illegible]	568027 [illegible]@rambler.ru	[illegible]

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

Armenia: North-South Road Corridor Investment Program Tranche 3 – Environmental Impact Assessment Report

ActualAttendance Sheet

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

Անուն (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե ■ Tel / Email	Ստորագրություն ■ Signature
[illegible]	[illegible]	[illegible]	[illegible]
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Շրջակա միջավայրի ազդեցության գնահատում ■ 1 June 2010, Maralik ■ Environmental Impact Assessment – 2nd Public Consultation

Անուն (ազգանուն) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե ■ Tel / Email	Ստորագրություն ■ Signature
[illegible]	[illegible]	2-22-64	
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Շրջակա միջավայրի ազդեցության գնահատում ▪ 1 June 2010, Gyumri ▪ Environmental Impact Assessment – 2nd Public Consultation

	Անուն (տպագրատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե Tel / Email	Ստորագրություն ▪ Signature
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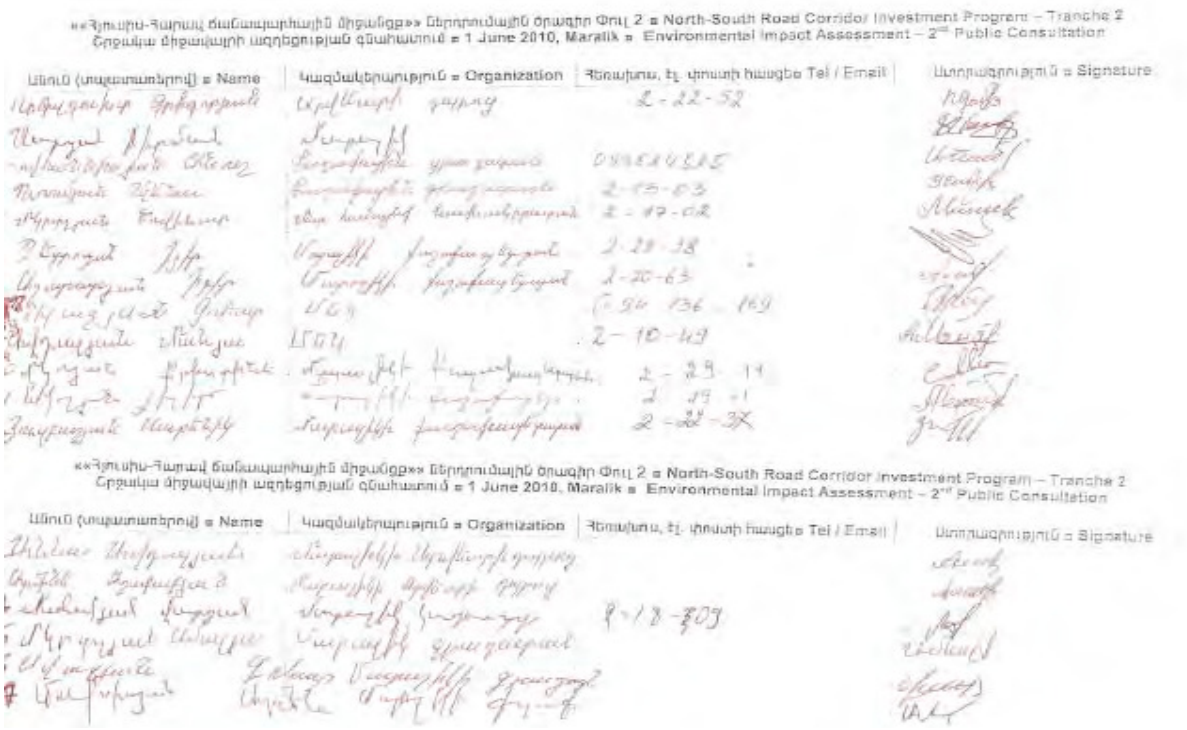
2nd Public Consultation – 1 & 2 July 2010 (Maralik, Gyumri, &Yerevan)

Armenia: North-South Road Corridor Investment Program Tranche 3 – Environmental Impact Assessment Report

ActualAttendance Sheet



Annex 6 Environmental and Monitoring 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

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.

Provide details of any environmental permit that the contractor failed to secure prior to conducting any specific activities.

6.Complaint(s)

Provide details of any complaints that have been raised by the local population and other stakeholders (who, what, where, when).

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 monitoringactivities

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:

- implementation of mitigation measures during subproject design;
- implementation of mitigation measures by contractors, and
- 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 stressed 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 the Archaeologist, archaeological site excavation/preservation activities is estimated at $890,000.00 and cost for environment protection is included in total construction cost, estimated to be maximum 2%.

Table1: 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 detail design Talin tomb field Yeghnasar tomb field Mastara-2 tomb field Lanjik archaeological complex Settlement and tomb field in Lanjik Fortified settlement and tomb field of Dzorakap Mastara archaeological complex Tomb field and Medieval village remnants of Hayrenyats Benyamin archaeological complex Azatan Megalithic structures	Encroachment, destruction /degradation of archaeological sites and loss of historical value	(i) **Revise and finalize** the highway interchange, road alignment and design that encroached and cut across the archaeological sites. The revisions will entail relocation of the alignment and/or by shifting the widening of the road either to the right and left side of the existing road to eliminate the direct impacts if not reduced the impact to its minimum. The concerned archaeological sites are the following: (ii) Archaeological excavation in advance of the Works and protection of the archaeological zone to be included in the Works Contract. (iii) Chance finds procedure to be applied. (iv) Mastara Archaeological Complex **-** Revise road alignment from 51+200, widening of the highway shall be on the right side of the existing road. (v) Tomb Field and Medieval Village Remains of Hayrenyats **-** Revise the half-cloverleaf access design and location that will encroached the protection area of the archeological site**.** The relocation of the cloverleaf will avoid a larger area for archeological excavations and will reduce adverse impact of project to the minimum. (vi) Benyamin archaeological complex **–** Revise the cloverleaf which will be located inside the complex. Locate the cloverleaf further to the right side closer to the Benyamin village. A grade separated internal loop junction will reduce adverse impact of project to the archaeological site to the minimum. Redesigning the Highway and pushing it at least 80-100 m to the East (vii) Azatan Megalithic Structures - Relocate alignment to the left side of the highway at Km 112+000 - Km.112+400 and redesign the 'turn' to the South.	**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

Table1: 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.	**Contractor** **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
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

Table1: Environmental Management Plan

Project Activities	Potential Issues/ Constraints and Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation ($US)
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, (l) 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

Table1: Environmental Management Plan				
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

Table1: 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[34](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. **(viii) Illegal trafficking.**Workers should be made aware that traffickingof wildlife, endangered species, and illegal substances through the road corridor will not be tolerated and be advised of graduated penalties up to and including dismissal	**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

Table1: 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 developed in 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

Table1: 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 14. 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

Table1: 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. Talin tomb field = 5 months b. Yeghnasar tomb field. = 4 months c. Mastara archaeological complex = 4 months d. Mastara-2 tomb field = 4 months e. Lanjik archaeological complex = 5 months f. Settlement and tomb field in Lanjik = 4 months g. Fortified settlement and tomb field of Dzorakap = 5 months h. Tomb field and Medieval village remnants of Hayrenyats = 2 months i. Benyamin archaeological complex = 8 months j. Azatan Megalithic structures = 3 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 workers to 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. Talin tomb field – at km 69+900 - 71+100 – 75+730 = 96.5 hectares; b. Yeghnasar tomb field - km 75+730 – 76+700 = 15 hectares, c. Mastara archaeological complex – km 79+900 – 82+000 = 32.2 hectares; d. Mastara-2 tomb field – km 82+000 – 84+230 = 33.7 hectares; e. Lanjik archaeological complex – km 84+230 – 90+500 = 91.3 hectares; f. Settlement and tomb field in Lanjik – km 91+400 - 92+500 = 16.4 hectares; g. Fortified settlement and tomb field of Dzorakap – km 93+600 – 96+100 = 34.8 hectares; h. Tomb field and Medieval village remnants of Hayrenyats – km 102+300 – 104+500 = 30.8 hectares; i. Benyamin archaeological complex – km 109+000 – 112+000 = 33 hectares: right side of the existing road; j. Azatan Megalithic structures – km 112+000 – 115+000 = 42.1 hectares on the right side of the road. **Note**: the calculated area for archaeological investigation is based on the kilometre sections for each site and the full width of 70m is measured from each side of the existing road centre-line. Except for the Benyamin archaeological complex and Azatan Megalithic structures the widths are measured on the right side of the existing road.	**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** liaisonwith MOC **ADB** **Review** implementation reports	**Contractor** $350,000 (archaeologist) site a = $65,000 site b = $40,000 site c = $35,000 site d = $35,000 site e = $45,000 site f = $30,000 site g = $35,000 site h = $20,000 site i = $220,000 site j = $15,000 **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table1: 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

Table1: Environmental Management Plan

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

Table1: Environmental Management Plan

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

Table1: 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

Table1: 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

Table1: 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 in the 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

Table1: 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

Table1: 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

Table1: 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 2% of total construction cost **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 andFauna 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

Table1: Environmental Management Plan				
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

Table1: 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; 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

Table1: 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

Table1: Environmental Management Plan				
Project Activities	**Potential Issues/ Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Operation and Maintenance Phase				
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

General

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 and
- 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 1b 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 regardingopen 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.

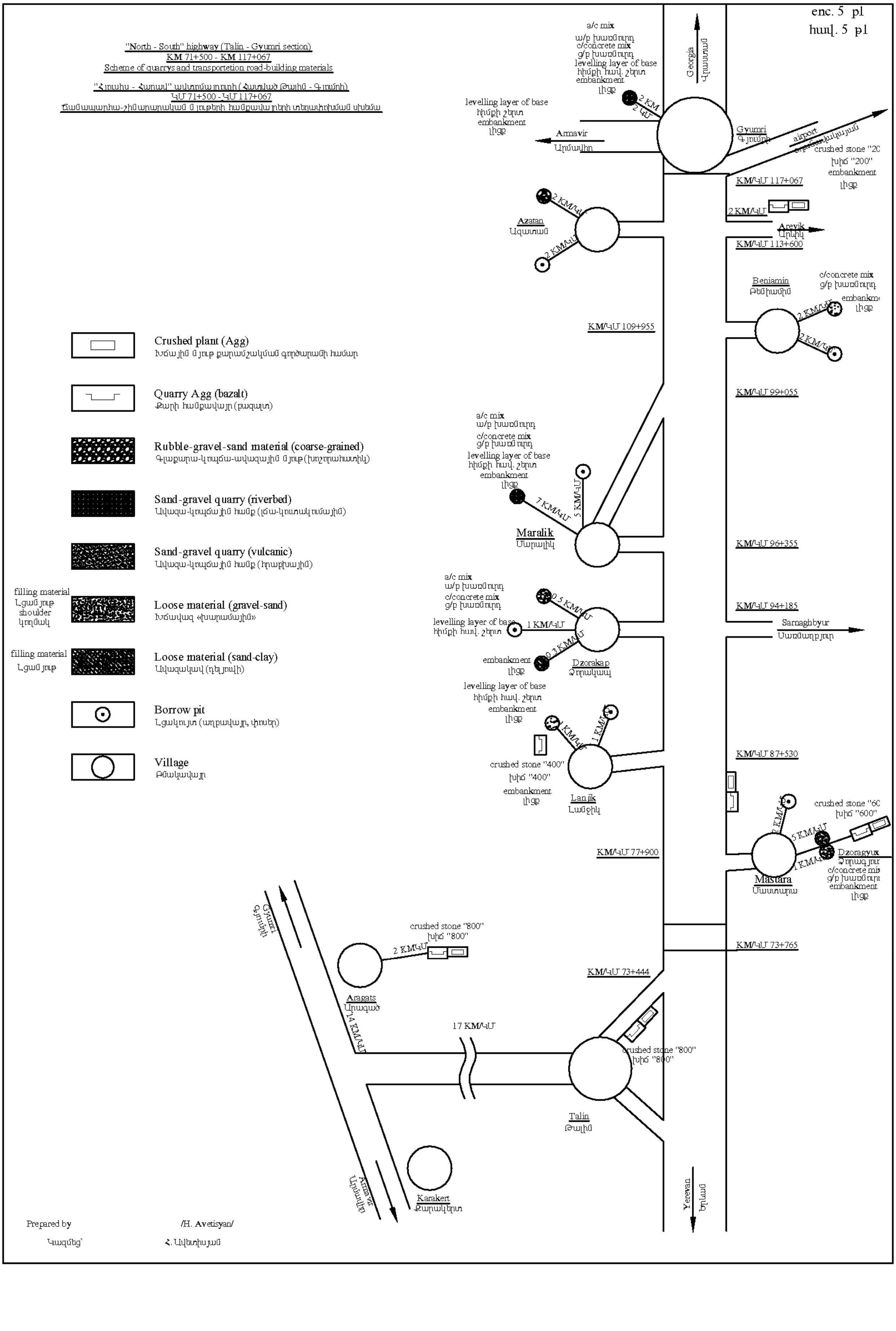
Table 1b: Environmental Monitoring Plan All monitoring must be verified by independent expert or NGO						
Location Activity Phase	**Parameters To be Monitored**	**Monitoring Locations**	**Instruments & Method**	**Environmental Performance Indicator**	**Responsible Entities**	**Frequency & Time**
Construction 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 LAeq, 70dBA LAmax - 10pm to 6am (night) – 45dBA LAeq, 60dBA LAmax 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

Table 1b: 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) - Tempera-ture - 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

Table 1b: 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**
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

Table 1b: 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**
Revegetation and Site Rehabilitation	Vegetation cover, Exposed soils on slope areas, Natural drainage lines, Construction 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** **Monito**r developments	Monthly during the 1st year, Quarterly on the 2nd year, and Bi-annually for the 3rd year

Annex 8 Quarry Locations (Schematic)


enc. 5 pl
"North - South" highway (Talin - Gyumri section)
KM 71+500 - KM 117+067
Scheme of quarrys and transportetion road-building materials
Crushed plant (Agg)
Quarry Agg (bazalt)
Rubble-gravel-sand material (coarse-grained)
Sand-gravel quarry (riverbed)
Sand-gravel quarry (vulcanic)
filling material
shoulder
Loose material (gravel-sand)
filling material
Loose material (sand-clay)
Borrow pit
Village
Georgia
Gyumri
airport
Armavir
Azatan
Arevik
Beniamin
Maralik
Dzorakap
Sarnaghbyur
Lanjik
Mastara
Dzoragyux
Aragats
Talin
Karakert
Yerevan
a/c mix
c/concrete mix
levelling layer of base
embankment
crushed stone "200"
crushed stone "400"
crushed stone "600"
crushed stone "800"
KM/ԿՄ 117+067
KM/ԿՄ 113+600
KM/ԿՄ 109+955
KM/ԿՄ 99+055
KM/ԿՄ 96+355
KM/ԿՄ 94+185
KM/ԿՄ 87+530
KM/ԿՄ 77+900
KM/ԿՄ 73+765
KM/ԿՄ 73+444
17 KM/ԿՄ
14 KM/ԿՄ
7 KM/ԿՄ
5 KM/ԿՄ
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1 KM/ԿՄ
0.5 KM/ԿՄ
Prepared by
/H. Avetisyan/