Initial Environmental Examination

May 2014

ARM: Sustainable Urban Development Investment Program –Tranche 2

Construction of Road Links of the Yerevan Western Ring Road
Road Link 3- Argavand Junction

Prepared by the Yerevan Municipality for the Asian Development Bank.

REPUBLIC OF ARMENIA

YEREVAN MUNICIPALITY

CONSTRUCTION OF ROAD LINKS OF THE YEREVAN WESTERN RING ROAD

Sustainable Urban Development Investment Program

Project 2

Road link 3 - Argavand Junction

Initial Environmental Examination

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VERSION HISTORY

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ABBREVIATIONS

ADB	Asian Development Bank
AM	Accountability Mechanism
AP	Affected Person
BOD	Biochemical oxygen Demand
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERT	Emergency Response Team
HSE	Health, Safety & Environment
IA	Implementing Agency
IEE	Initial Environmental Examination
IFI	International Financial Institution
IMF	International Monetary Fund
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
MOE	Ministry of Economy
MENR	Ministry of Energy and Natural Resources.
MPC	Maximum Permissible Concentration
NGOs	Non-government organizations
NO	Nitrogen oxide
NO2	Nitrogen Dioxide
NPE	Nature Protection Expertise
PIU	Project Implementing Unit
PPTA	Project Preparatory Technical Assistance
RA	Republic of Armenia
RAMSAR	Ramsar Convention on Wetlands
REA	Rapid Environmental Assessment (checklist)
SEI	State Environmental Inspectorate
SEMP	Site-Specific Environmental Management Plan
SNCO	State Non-commercial Organization
SO2	Sulfur Dioxide
SPS	Safeguard Policy Statement (2009)
SUDIP	Sustainable Urban Development Investment Program
TOR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States of America Dollar
YMPIU	Yerevan Municipality Project Implementation Unit
YM	Yerevan Municipality

WEIGHTS AND MEASURES

dBA	Decibel (A-weighted)
km	Kilometer(s)
km^2	Square kilometer(s)
l	Liter
m	Meter(s)
mg/m^3	Milligram(s) per cubic meter

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A. EXECUTIVE SUMMARY

A.1. Project Background

1. The Sustainable Urban Development Investment Program (SUDIP) is funded by the Asian Development Bank's (ADB) Multitranche Financing Facility (MFF). A matter of policy of the Bank requires that all projects supported and to be funded by the ADB must comply with the requirements of the Safeguard Policy Statement (SPS, 2009). Under the SPS 2009, an environmental assessment report is required for all environment category "A" and "B" projects. Its level of detail and comprehensiveness is directly related with the significance of potential impacts and risks to the environment. A project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. In that case a full Environmental Impact Assessment (EIA) is required. A project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A. In that case an Initial Environmental Examination (IEE) is required.

2. The initial Environmental Assessment activities for the "Construction of Two Road Links of Yerevan Western Ring Road", were carried out by the Project Preparatory Technical Assistance (PPTA) consultants for the whole Project. The PPTA consultants visited the Project's site and also carried out public consultation prior to preparation of the report. They concluded that the Project can be classified as a category B project. (see also section A.2 below. Based on the REA Checklist, Road link 2: New Shirak Street and Artashat Highway urban Road links and Road link 3: Argavand Junction to Shirak Street Urban Road link are classified as a Category "B" by ADB). Consequently PPTA prepared an IEE report for the whole Project.

3. It must be noted that the IEE report for the Project as prepared by the original PPTA consultants was lacking full conformity with ADB's SPS 2009, and with the Environmental Assessment and Review Framework (EARF, March 2010). It is also incomplete with respect to the RA's law on Environmental Impact Assessment. Also, at the request of YMPIU, Project 1 has been separated in three groups of Road links for which independent environmental assessments is carried on.

4. Although ADB requirements are for an IEE to be submitted due to the category of the Project, Armenian legislation requires that an EIA should be undertaken. As a result this EIA report is developed to ensure compliance of Road link 3 with ADB's Safeguard Policy Statement (2009) as well as the requirements of the RA EIA Law and environmental standards.

A.2. Screening and Classification

5. Road link 3: Argavand Junction to Shirak Street Urban Road link under the SUDIP have been screened to determine its environmental category with the ADB's Rapid Environmental Assessment Checklist (REA). A REA checklist completed by the PPTA consultants is attached as Annex 1 of this report. The classification was based on the most environmentally sensitive component of the Road links, which means that if one part of a project has the potential for significant adverse environmental impacts, then the Road links are to be classified as environmental category "A" regardless of the potential environmental impacts of other aspects of the Road links. Based on the REA Checklist, Road link 3: Argavand Junction to Shirak Street Urban Road link is classified as a Category "B" by ADB. Notwithstanding the Categorization B, an EIA is prepared to meet requirements of Armenian legislation.

A.3. Compliance and Fulfillment of the SPS Policy & RA Law on EIA

a) Public Consultation and Participation

6. According to ADB's SPS (2009) and RA Law on Environmental Impact Assessment (EIA) (1995) the public consultations are to be held at the early stage of EIA field work and during project preparation as soon as EIA draft report is developed. To meet the requirements of ADB SPS and Armenian legislation the following meetings and consultations have been organized.

7. Consultation meetings with the representatives of stakeholders: governmental authorities and NGOs:

(i) Ministry of Economy – the Executing Agency:
- Department of Economic Development Policy

(ii) Municipality of Yerevan – the Implementing Agency:
- Yerevan Municipality Project Implementation Unit (YMPIU)

(iii) Ministry of Nature Protection;
- Biodiversity Policy Division
- Water Resources Policy Division
- Atmospheric Air Policy Division

(iv) Ministry of Culture:
- Agency for Protection of Historical and Cultural Monuments
- Department of Cultural Heritage

(v) Non-government organizations (NGOs) such as:
- Public Environmental Alliance (an alliance of NGOs)
- Association for Sustainable Human Development

8. A public consultation event to disclose the initiative and to present the Project took place on 19 March 2010 at Yerevan Municipality. An advertisement was placed in the Haykakan Jamanak newspaper and on the Municipality of Yerevan website, as well as the invitations were sent directly to key stakeholders. Amongst the attendees were fifteen recorded participants, including representatives of relevant government agencies and NGOs, as well as those from general public (See Annex 3).

9. Another Public consultation has been organized on 14 February 2014 after the submission of the environmental safeguards document to the ADB to fully comply with the policy requirements on Public Consultation and Information Disclosure. The consultation has been scheduled in coordination with the MNP to comply with the government's EIA requirement on Public consultation as well. The notice advertising the public consultation was posted on a daily newspaper. Announcement, attendance list and minutes of the public consultation are attached as Annex 12a & Annex 12b.

b) Information Disclosure

10. The ADB SPS's information disclosure requires that meaningful consultations are carried out with project stakeholders, relevant government units, the community, the persons or groups affected by the Project, civil society and NGOs.

11. The information about the Project was disclosed through the public consultation events mentioned in A3 a), as well as during series of introductory and follow-up meetings with relevant ministries and other official authorities such as the Ministry of Nature Protection, Ministry of Culture, Agency for Protection of Historical and Cultural Monuments, Department of Cultural

Heritage among others and with several NGOs.

12. For the information disclosure purposes the following documents shall be put on the ADB's, YM and YMPIU websites and regularly updated when needed:

(i) EIA report (including EMP);
(ii) Environmental Assessment and Review Framework (EARF);
(iii) Bi-annual reports.

A.4. Grievance Redress Mechanism

13. A grievance redress mechanism has been developed to continuously communicate with affected people during the project implementation in order to receive and address the affected peoples' concerns, complaints, and grievances about the Project's environmental performance. The grievance redress mechanism is designed to address affected people's concerns and complaints promptly, using a simple procedure and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The affected people will be appropriately informed about the mechanism during the public consultation and participation.

A.5. Report, Methodology and Scope of the Study

14. The present study has been undertaken in accordance with the ADB's Safeguard Policy Statement (2009), Environmental Assessment Guidelines (2003) and the Environmental Assessment and Review Framework (EARF) agreed between the Government of Armenia and ADB. Internationally recognized standards and guidelines were applied where local standards were not available. This includes World Bank Group Environmental, Health, and Safety General Guidelines (2007).

15. The environmental assessment and the preparation of the report and the Environmental Management Plan (EMP) involved the following major activities:

(i) Gathering of baseline information on the physical, biological, and socio-economic environment of the Project area and understanding the technical, social, and institutional aspects;
(ii) Discussions with officers of RA Ministry of Nature Protection, Ministry of Culture, other relevant official aouthorities; Organisation of public consultation events;
(iii) Identification of impacts, concerns and other potential issues, related to the location, design, construction, and operation to distinguish those that are likely to be significant;
(iv) Preparation of EMP indicating impact areas, recommended mitigation measures, methods of monitoring the impacts, responsible agencies/persons, and associated costs; and
(v) Proporsals on institutional set-up for implementation of the EMP.

16. The Structure of this EIA report follows the following outline:

A. Executive Summary
B. Policy, Legal and Administrative Framework
C. Description of the Project
D. Description of the environment (baseline data)
E. Anticipated environmental impacts and mitigation measures
F. Analysis of alternative
G. Information Disclosure, Consultation and Participation
H. Grievance Redress Mechanism
I. Environmental management plan (mitigation and monitoring)
J. Conclusion and recommendations.

17. The report is also prepared in Armenian language for posting on the website of the Municipality of Yerevan.

18. Baseline data and other information were obtained from published and unpublished sources including climate, topography, geology and soils, natural resources, flora and fauna and socio-economic data. The Yerevan City Master Plan Vol.5, (2006) is the primary source of baseline data, and has been supplemented by other information sources and specialist studies and field investigations.

19. Physical baseline data were obtained by noise, air and water quality experts from the Department of Sanitation and Hygiene under the Ministry of Healthcare (MoH) and from the Environmental Effect Monitoring Center State Non-commercial Organization (SNCO) under the MNP respectively.

A.6. Tasks and Accomplishments

20. Table A-1 presents the tasks accomplished and the current actions being undertaken for the Project by the executing and implementing agencies (MOE and YMPIU).

Table A-1: Task and Actions

Task	Response/Action taken
(i) Prepared environmental screening checklist for classification of the Project.	Environment categorization has been accomplished by ADB.
(ii) Ensure that an Environmental Assessment is prepared in compliance with the requirements of the Government of Armenia and ADB, and that adequate consultation with affected people is undertaken in accordance with ADB requirements	The initial IEE report was prepared by the PPTA consultants and a Public consultation was conducted on 19 March 2010 in the Municipality of Yerevan. The second Public consultation dedicated to Road links 2 & 3 only took place on February 14, 2014.
(iii) Undertake review of the initial IEE report and EMP to ensure their compliance with the requirements of the Government of Armenia and ADB.	The initial IEE report and EMP were reviewed and updated by the Engineer to comply with the requirements of the Government of Armenia and ADB. The need to produce an updated EIA report has been identified in accordance with

Task	Response/Action taken
	Armenian legislation.
(iv) Obtain necessary permits and/or clearance, as required, from MNP and other relevant government agencies, ensuring that all necessary regulatory clearances are obtained before commencing any civil work	The necessary approvals and/or clearances such as conclusion of nature protection expertise from MNP and recognition of excavated area as archaeologically free from the, MOC shall be processed by the Engineer. After the updated EIA is prepared and presented to the MNP Also assistance will be provided to Contractor in obtaining other permits and clearances before commencing any civil work.
(v) Submit to ADB the EIA report of Road link 3 including EMP and other documents, as necessary to comply with Public Disclosure	The EIA report, together with the EMP will be submitted to ADB by YMPIU for review and to be posted at ADB, YM and YMPIU websites. Armenian versions of the EIA report and the EMP will be disclosed on YM and YMPIU official websites.
(vi) Ensure that the EMP, including relevant mitigation measures that need to be addressed during the construction stage by the contractor, is included in the bid and contract documents.	The environmental specialists in the YMPIU will coordinate with the Engineer to ensure that all EMP requirements are included in the bid and contract documents.
(vii) Ensure that contractors have access to the EIA and EMP reports of the Project.	The YMPIU shall provide the contractors with the bid documents with a copy of the EIA report and EMP of the Project.
(viii) Ensure and monitor that an EMP, including an environmental monitoring plan, will be properly implemented.	The YMPIU and the Engineer will regularly - monitor construction activities to check the compliance to EMP and monitoring plan.
(ix) In case that the Project constraints need to be adapted during implementation, review the environmental classification, revise it accordingly and identify whether a supplementary EIA study is required.	An additional EIA shall be carried out should major changes in alignment and ROW take place in the Project design after the environmental expertise conclusion is granted.
(x) Submit bi-annual environmental reports to ADB.	The YMPIU will submit environmental bi-annual reports to ADB.

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

B.1. ADB Environmental Assessment Requirements

21. The Safeguard Policy Statement (2009) sets the requirements of environmental assessments for all projects supported by the ADB. At an early stage of project preparation, the policy also requires that the Project's potential risks and their significance are to be identified through the consultation and communication of stakeholders represented by the Shengavit and the Malatia-Sebastia Administrative Districts, as well as in Argavand and Getapnya rural communities, Yerevan Municipality, Ministry of Economy, members of the community, persons affected by the Project and the NGOs etc. If potentially adverse environmental impacts and risks are identified, an environmental assessment must be undertaken as early as possible. The assessment should consider all phases of the Project including construction and operation, and impacts should be prevented where possible or mitigation be recommended.

B.2. Armenian Laws Governing Environmental Management and Assessment

22. 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. The Law on Environmental Impact Assessment (EIA) (1995) serve as the framework for Ministry of Nature Protection for granting the approval of various development projects in the country.

23. The Law on Environmental Impact Assessment contains the standard steps of the EIA process for various projects and activities in Armenia. The following Articles are relevant to the requirement for a Nature Protection Expertise:

(i) Article 2-5 establishes the general legal, economic, and organizational principles for conducting the mandatory state EIA of various types of projects and "concepts" of sectorial development, which includes construction and infrastructure.

(ii) The Law forbids 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.

(iii) Paragraph 1 of Article 4 defines the list of proposed activities subject to environmental impact expertise. As previously mentioned, preliminary documentation of all types of activities given in the list of the mentioned Article should be submitted to the authorized body for consideration. At the stage of preliminary consideration the documents should cover general data on the proposed activity, its productivity, location and expected impact on the environment. MNP considers the submitted documentation and makes a decision about the necessity of EIA.

(iv) Pursuant to Article 4.2, the Decision #193 of the Government (March 30, 1999) approves the list of limiting values for carrying out of EIA. Limiting values of such parameters as productivity, volume, occupied territory, etc. are given in the list. Proposed activity with higher parameters shall undergo EIA. According to the point 9 "Infrastructures", if there is Road construction (reconstruction) more than1 kilometer, so environmental expertizes is needed. Article 4.4 also establishes that the authorized state institution may decide to carry out EIA even in cases when the proposed activity does not exceed the established limiting values, on the basis of:

- Proposals of local authorities of a region where the activity is planned;
- Proposals of the ministries and other state structures;
- Proposals of public organizations and initiative groups of the public;
- Own initiative.

(v) The Article 15.1 of the Law on EIA provides the list of the conceptual programs subject to obligatory EIA. The Ministry of Nature Protection can initiate a review of environmental impact when it considers it necessary to do so. The EIA Law specifies notification, documentation, public consultations, and appeal procedures and requirements (Articles 6-11).

24. The key departments within the MNP that have administrative authority over the EIA and the Project approval process are two state non-commercial organizations:

(i) The "Nature Protection Expertise" (NPE), the State Non-commercial Organization (SNCO) is responsible for reviewing and issuance of assessment conclusion reports required for implementation of a project and adding conditions when necessary to protect the environment; and

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

25. The EIA process and the SEI's power to inspect are the principal tools used by the MNP to achieve compliance with environmental protection principles. To satisfy relevant regulations and to gain a positive assessment conclusion from the MNP, this EIA report is prepared in accordance with the Law on Environmental Impact Assessment (EIA) (1995), the legislative provisions relevant to environmental protection are considered accordingly. The MNP EIA process has similar, if not identical, requirements as the ADB SPS. The legislative provisions relevant to the environmental protection and mitigation measures will be addressed accordingly.

26. Other pieces of pertinent environmental legislation are also considered during the assessment. These include, air protection, cultural and historical monuments, flora, fauna, water use, seismic defense, waste, hygiene, and workers' protection such as:

(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 Historic Monuments and Historic Environment (1998) provides the legal and policy basis for the protection and use of such monuments in Armenia and regulates the relations among protection and use activities. 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. 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 (***marzpeds***).

(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 following regulations and procedures of the Water Code (2002) are relevant: (a) permitting procedures, (b) environmental flows, (c) drainage water, (d) water alternative accounting, (e) access to information on trans-boundary water, (g) reservation of underground water sources, (h) registration of documents in state water cadaster, 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 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.

(ix) 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.

B.3. Armenia's Participation in International Environmental Conventions and Protocols

27. 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. Table B-1 lists the global and regional multilateral international environmental agreements signed and/or ratified by Armenia.

Table B-1. 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 of Environmental Modification Techniques (Geneva, 1976)		04 Dec 01
The Protocol on Pollutant Release and Transfer Registers (Kiev, 2003)	21 May 03	
Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam, 1998)	1998	22 Oct 03
UNECE Convention for the Protection and Use of Trans-boundary Watercourses and International Lakes (Helsinki, 1992)	1998	22 Oct 03
Protocol on Water and Health (London, 1999)	17 Jun 99	
Stockholm Convention on Persistent Organic Pollutants (Stockholm, 2001)	23 May 01	22 Oct 03
European Landscape Convention (Florence)	14 May 03	23 Mar 04
Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property		22 Jun 93
Convention Concerning the Protection of World Culture and Natural Heritage		22 Jun 93
European cultural convention		22 Jun 93
European Convention for the Protection of the Archaeological Heritage	18 Jun 05	
Convention for the Protection of the Architectural Heritage of Europe	19 May 06	
Convention for Protection of Non-material Cultural Heritage		20 Mar 06
Bern Convention - Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979)	2006	

B.4. Administrative Framework

a) Management Board

28. A Management Board of the Sustainable Urban Development Investment Program (SUDIP) is chaired by the Prime Minister. It is comprised of the Minister of Economy, Minister of Finance, Minister of Territorial Administration, Minister of Justice, Minister of Transport and Communications, Mayor of Yerevan, and representatives of the Central Bank, the Real Estate Cadastre Agency, and Yerevan Municipality PIU. The Management Board has been set up to follow up the implementation of the Program. The Management Board is meeting every month.

b) Executing Agency

29. The Executing Agency (EA) of the SUDIP is the Ministry of Economy (MOE). The EA will oversee the implementation of the Program and the disbursement of the loan.

c) Implementing Agency

30. The Implementing Agency (IA) for the services is the Municipality of Yerevan (The Client) which will be responsible for the overall technical supervision and execution of the Projects. The Municipality also has the responsibility for waste management services that include organization of waste collection, assigning dump sites for construction waste and further maintaining the Project's landscape planting and beautification as well as cleaning squares, gardens and other public places of municipal significance.

d) Yerevan Municipality Project Implementation Unit

31. Within the IA, the Yerevan Municipality Project Implementation Unit (YMPIU) is responsible for day-to-day management of this Project. It is headed by a full-time Project Director. The YMPIU includes the following specialists: Institutional, Technical, Financial, Monitoring and Evaluation, Legal/Contract administration, Procurement, Resettlement, Environment, Communication and public relations, assistant/translator. Responsibilities of the YMPIU include:

(i) preparing and updating procurement plan;
(ii) tendering, evaluating bids, and awarding works;
(iii) contracting administration;
(iv) managing the Engineer;
(v) supervision;
(vi) quality control;
(vii) obtaining copies of the approvals and permits from relevant agencies;
(viii) preparing contract awards schedule and disbursing the loan according to ADB guidelines;.
(ix) inspectingthe Contractor's implementation of mitigation measures as specified in the EMP;
(x) prepareing and submiting bi-annual environmental reports regularly to the ADB;
(xi) serving as point of public contact for any complaints or concerns;
(xii) responding to emergencies and notifying the relevant authorities within reasonable times; and
(xiii) keeping updated with changes in authority requirements and legislation and respond as appropriate.

e) Engineer

32. Engineer's key responsibilities include:

(i) update or prepare the final Environmental Impact Assessment (EIA) or Initial Environment Examination (IEE) as applicable, along with the relevant Environment Management and Monitoring Plan (EMP), and other documents as required;
(ii) submit the updated EIA, EMP and EARF for the MOE, MTA, or YM and ADB's review and approval;
(iii) conduct the necessary consultations in compliance with the Environment Assessment and Review Framework (EARF) approved in 2010 between ADB and

the Government of Armenia; and

(iv) apply for and get a positive environmental expertise conclusion from the Environmental Expertise of the RA Ministry of Nature Protection for the EIA/IEE report and EMP as prescribed by the Armenian legislation (including, agreement on route with the RA Ministry of Culture, etc.).

33. During construction the key tasks of the Engineer will include the following major key activities:

(i) supervise and monitor construction of the Project including the implementation of the Site Specific EMP;

(ii) ensure that all work associated with the Project are carried out in full compliance with the designs and specifications and following international engineering and quality standards;

(iii) manage contract changes, contractor claims and scope revisions;

(iv) monitor the Project performance, benefits and ensure compliance with all social requirements; ensure that resettlement and environmental requirements, road safety, health & safety and monitoring are carried out in compliance with the relevant safeguards documents, the ADB safeguards policy and the applicable laws of Armenia;

(v) liaise with government and municipal authorities, program management Consultants, NGO's, civil society, and other stakeholders concerned with the Project implementation to carry out proper consultation;

(vi) carry out 2 visits during the defects liability period;

(vii) ensure that the construction contractor prepares the detailed site specific EMP;

(viii) reporting to YMPIU.

f) Contractors

34. The Contractors' key responsibilities are listed below but are not limited to the following:

(i) update the EMP and prepare Site-specific environmental management plan (SEMP) as a working construction document based on the present EIA and the EMP report, update the SEMP during the construction when needed and obtain the Engineer approval of the updated part;

(ii) hire the services of one Environment Specialist and one Health& Safety specialist or Environmental Specialist with back ground in Health and Safety as defined in the tender document;

(iii) implement the SEMP as a special part of the contract and particular conditions; coordinate with the Engineer for the implementation of the various components of the EMP including monitoring;

(iv) in cases of emergencies and accidents or extraordinary situations notify the Engineer and the relevant emergency authorities immediately;

(v) obtain permits and approvals from relevant agencies and provides copies to Engineer;

(vi) report on EMP as specified in Annex 4.

g) Asian Development Bank

35. ADB may carry out periodic project reviews, inspections and supervision of the Project throughout the Project cycle in conformity with the principles and requirements embodied in the SPS 2009. ADB will provide assistance to the YM in managing the social and environmental

impacts and risks, thus contributing to the promotion of the long term sustainability of investments. To achieve this ADB will ensure that YM comply and adhere to the social and environmental safeguard requirements during project preparation and implementation.

36. ADB will also promote the disclosure of information about the Project through the placing the English version of EIA and EMP on the website.

37. Listed below are roles that ADB will perform through the different phases of the Project:

Pre-Construction:

(i) Reviews project screening results and approves project categorization;
(ii) Reviews and approves IEEs/EIAs on no-objection basis;
(iii) Discloses IEEs/EIAs to the public through the ADB website;

Construction Phase:

(iv) Reviews bi-annual reports and provides necessary advice to the YMPIU;

Post-construction Phase:

(v) Undertakes annual environmental review missions for environment category "A" and "B" projects.

38. The government agencies and their roles that could be involved in the Road link 3 are as follows:

h) Ministry of Nature Protection

39. The Ministry of Nature Protection (MNP) is responsible for the protection, sustainable use, and regeneration of natural resources as well as the improvement of the environment in the Republic of Armenia. In those areas, the MNP's authority includes overseeing national policy development, developing environmental standards and guidelines, and enforcement. The MNP implements those functions through its structural departments. The key departments within the MNP that have administrative authority over the EIA and the project approval process are:

(i) The NPE is responsible for reviewing and issuance of assessment conclusion reports and adding conditions when necessary to protect the environment; and
(ii) The State Environmental Inspectorate (SEI) is responsible for inspecting projects to ensure compliance with conditions imposed by the NPE and with the Project EMP.

40. 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.

41. The EIA to be submitted to MNP is developed based on the scope of Law on Environmental Impact Assessment (EIA) (1995) which is similar, if not identical to the scope of EIA according to ADB SPS.

42. The MNP is also the Government authorized body in the area of waste management of the RA. Article 8 of the Law on Waste (24.11.2004) sets authorities of the environmental sector (Ministry of Nature Protection of RA) as the state authorized body mandated with the tasks and responsibilities in the area of waste management.

i) Ministry of Energy and Natural Resources

43. The Ministry of Energy and Natural Resources, Divisions and State Agencies is the

authorized government body who has the jurisdiction over the mineral resources of the RA. The Ministry and the State Inspectorates for the Mining and Energy, and is tasked with planning, assessment, exploration and implementation of programs and projects relating to mining explorations and operations of the mining industry.

44. The State Inspectorates provides for the enforcement of protection for the environment, property and human life. Also responsible for safe mining operations, security of systems and facilities and compliance of the energy and mining projects to the provisions of the law.

45. Similarly, with the Agency of Mineral Resources, the goal and objectives of the Subsoil Concession Agency include formulation of plans and programs for the mineral resource exploration, surveys and rationalized utilization and protection of the natural resources, to ensure the provisions of the Mining Law are followed, in undertaking exploration and mining projects; approval and opening of borrow pits.

j) Ministry of Culture

46. The Ministry of Culture (MoC) has jurisdiction over archaeological, historical, and cultural sites. The Law on preservation and utilization of Immovable Monuments of History and Culture and of the Historic Environment (adopted November 11, 1989).
(http://www.parliament.am/legislation.php?sel=show&ID=1641&lang=arm)

47. Under the law the Project will have to comply with the provisions of the following chapters:

(i) Chapter 19. Any construction activity in areas containing historical monuments or archaeological sites must be realized in agreement with the authorized body (Ministry of Culture).
(ii) Chapter 20. Newly discovered sites obtain immediately protected status by law until they are included in the State Lists.
(iii) Chapters 21-22**.** Destruction of historical monuments and its environment is forbidden. Before the realization of any kind of activity at the area of the site the authorized body must study it and give corresponding permits or solutions.

C. DESCRIPTION OF THE PROJECT

C.1. Type of Project

48. Sustainable Urban Development Investment Program (SUDIP) is financed through the multitranche financing facility (MFF) of the Asian Development Bank (ADB). The investment program will be implemented over a period of 9 years. The Program will have the following components and expected outputs:

(i) Component A: Completion, extension, rehabilitation, and improvement of urban transport municipal infrastructure in urban areas in Armenia (physical investment);
(ii) Component B: Institutional Capacity Development Plan, with urban transport institutional and management capacity strengthened in relevant municipalities including concession (non- physical investment);
(iii) Component C: Program Management Facility, with assistance and consulting services to implement and manage the Program and all the specific projects under the MFF (non-physical investment).

49. The Project falls within component A and has been divided into three separate Road links:

(i) Road link 1, the widening of Arshakunyats street on approximately 1.3km (The EIA of Road link 1 has been approved by ADB and MNP),
(ii) Road link 2, the construction of New Shirak Street and widening of Artashat Highway and Road link 3, construction of the link from Argavand Junction to Shirak Street. The present EIA refers to construction of Road link 3,Project Location

C.2. Location of the Project

50. Road link 3 is located in the south-west area of Yerevan in the administrative districts of Shengavit and the Malatia-Sebastia (approximately 6 km south-west of Yerevan City centre), as well as in Argavand and Getapnya rural communities of Ararat Marz. The Project includes the construction of a Road link between Argavand Junction and Shirak Street West of length approximately 1.3km. The alignment passes through the archaeological site known locally as Karmir Blur and a bridge will be built to cross Hrazden RiverThe Road links will provide dual carriageways of two or three lanes.

Figure C-1 - Location of Road link 3: Argavand Junction

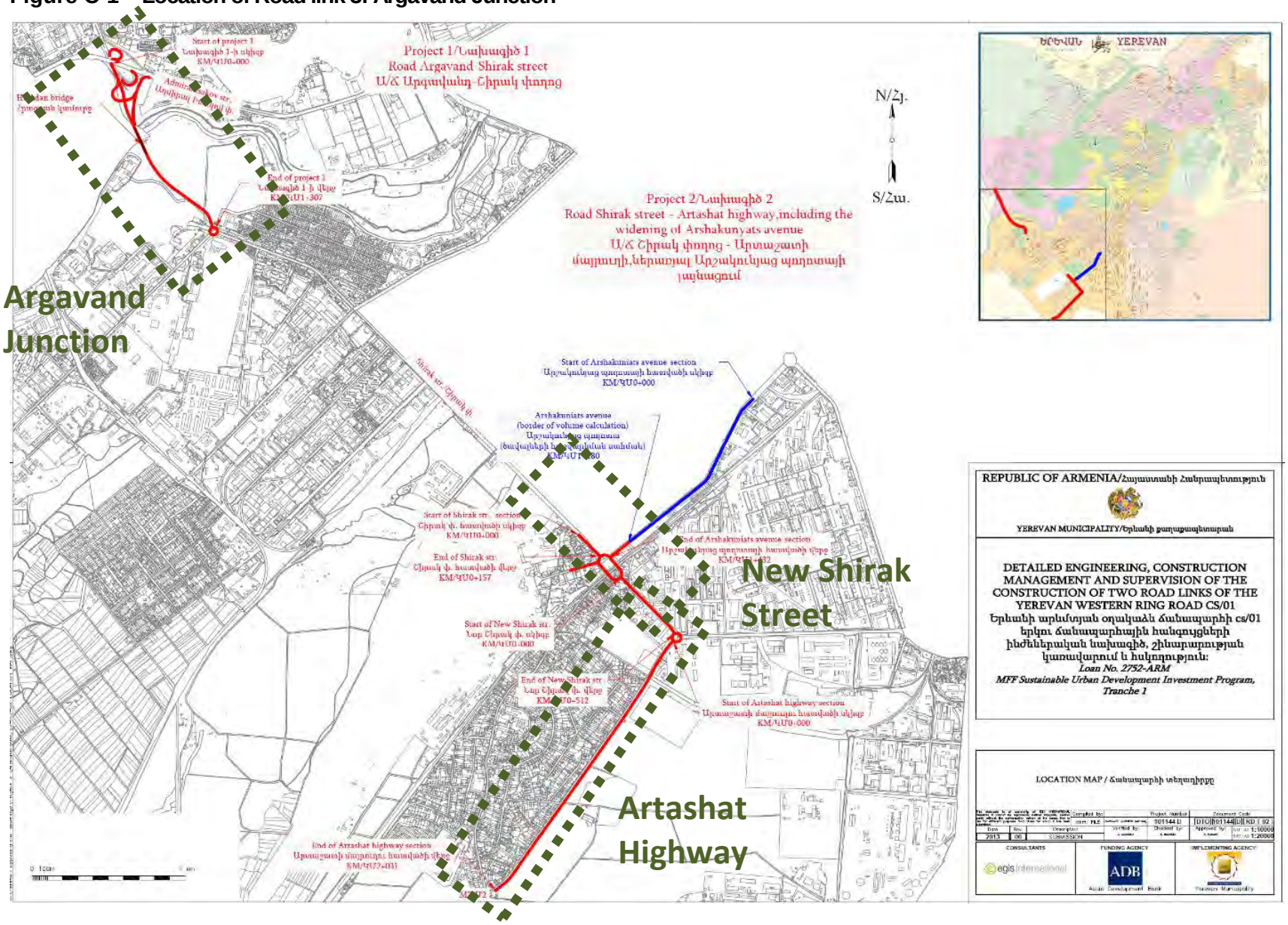
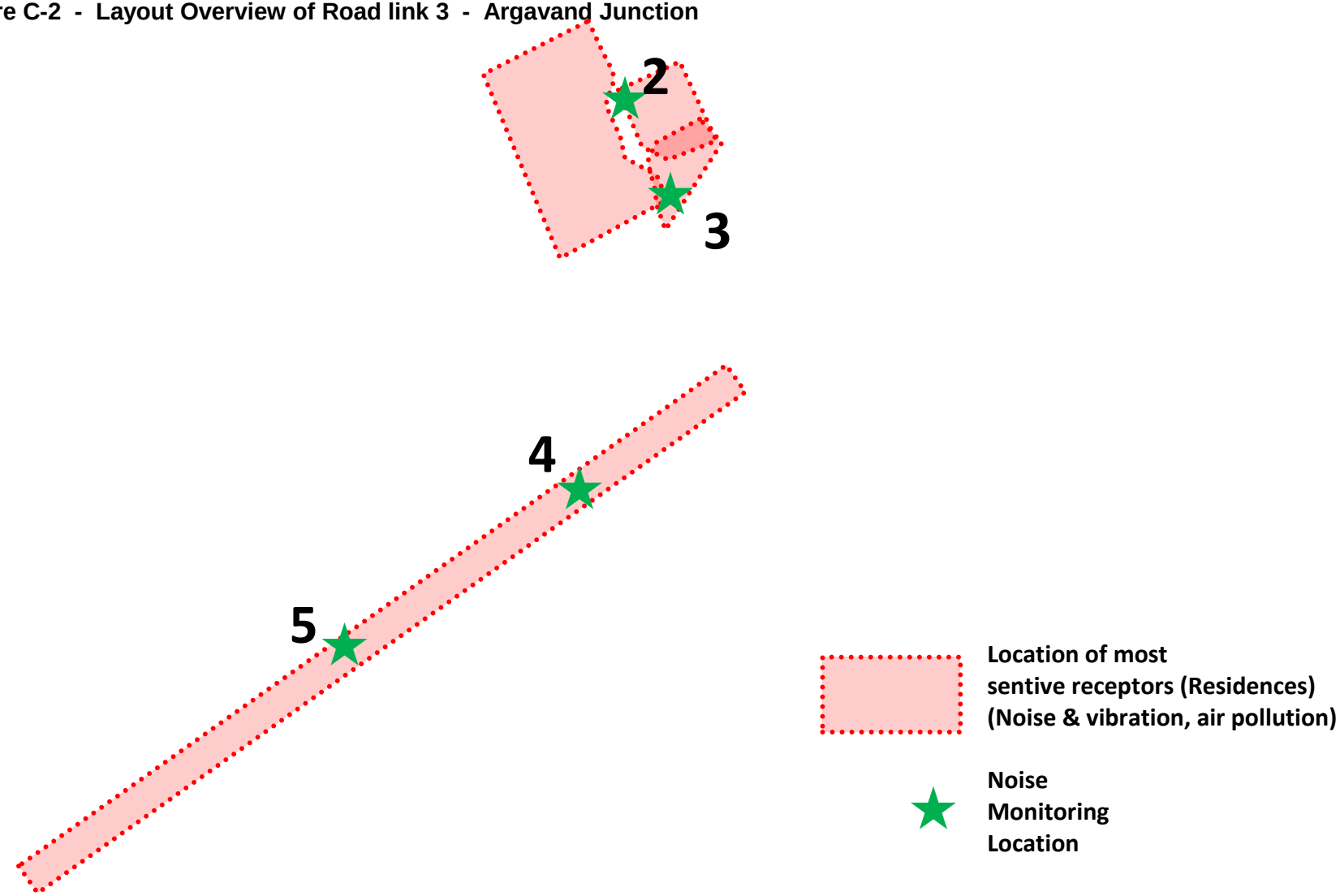
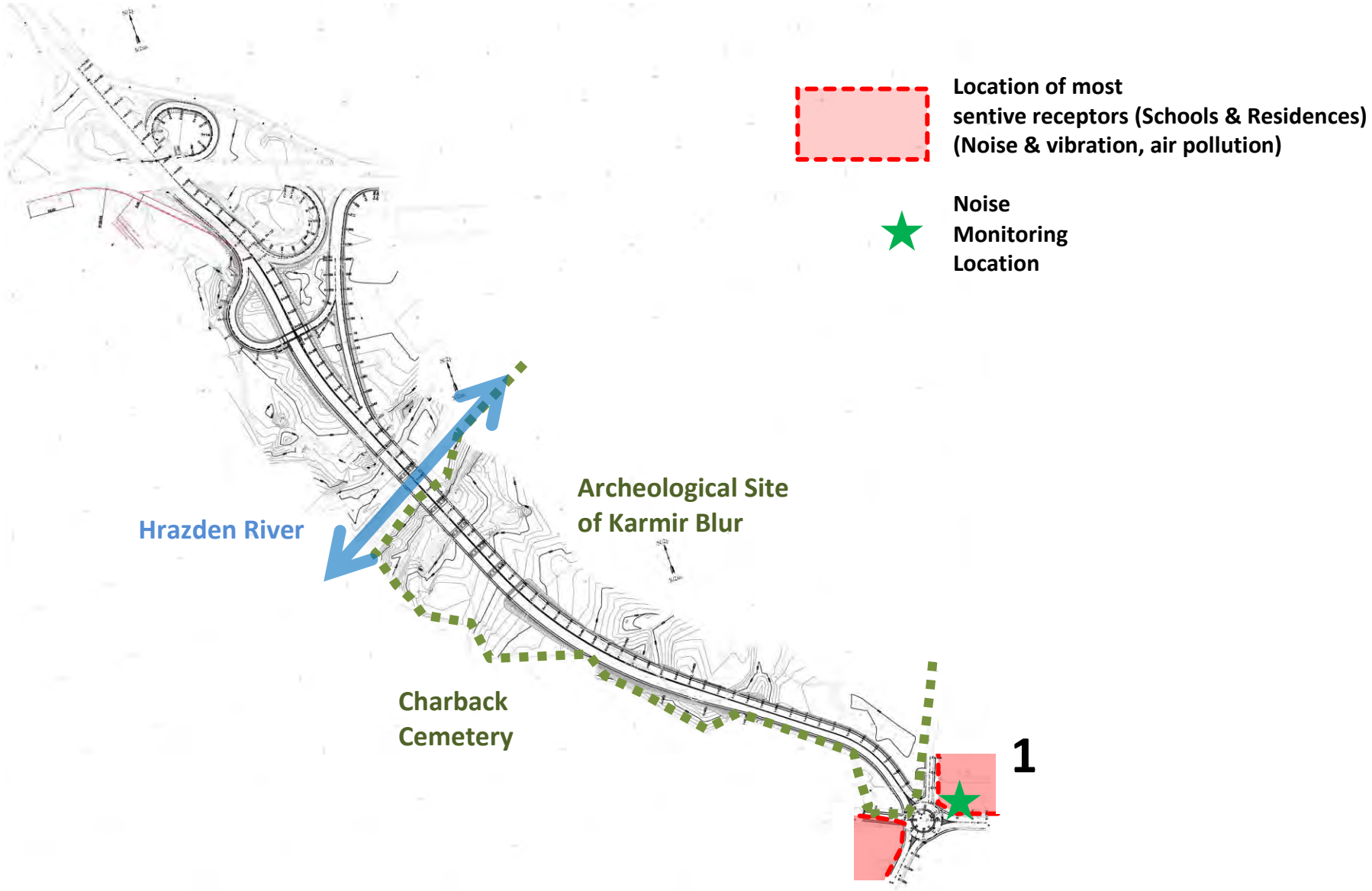


Figure C-2 - Layout Overview of Road link 3 - Argavand Junction




Location of most
sentive receptors (Schools & Residences)
(Noise & vibration, air pollution)
Noise
Monitoring
Location
Hrazden River
Archeological Site
of Karmir Blur
Charback
Cemetery
1

C.3. Description of the Works

51. The Argavand Junction to Shirak Street urban Road link comprise the main following components:

(i) Demolition of existing structures;
(ii) Construction of a new 6-lane dual carriageway over a length of approximately 1.3km built to expressway standards on new alignment and 1.2km of ramps;
(iii) Diversion of utilities including High Voltage lines;
(iv) Construction of a new bridge over the River Hrazdan of 257 m long including three spans at 42m;
(v) Construction of slip roads to at existing interchange at Argavand Junction;
(vi) Construction of an at grade round-about at Shirak Street.

52. This Road link crosses the environmentally sensitive archaeological area of Karmir Blur. As the Karmir Blur archeological area is thought to be rich in archeological vestiges, the assessment and management of the cultural heritage within the Project right-of-way is a priority.

53. The Bridge over the Hrazdan River located at Km 0+440 of the Argavand-Shirak road section. The whole length of the bridge measures 252,0 m and consists of a continuous six steel-concrete composite deck spans with length of 42+60+42+36+36+36 m as shown on next page.

54. The piers have been located so not to impede the free water flow and/or occupying the flooding area. Road section measures 12,5 m so that the bridge road alignment runs at the same way of the project itself (Argavand road link). The cross section is organized as indicated in picture below.

55. Piers for each carriageway consist of a couple of reinforced concrete (r.c.) circular shaft joined at the head by means of a r.c. pier cap and have been the subject of a specific architectural study

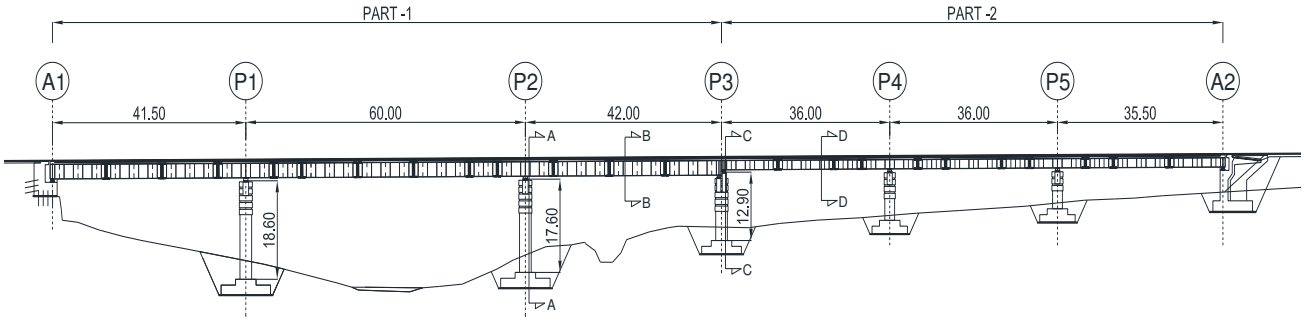


Figure C-3 - Longitudinal cross-section - Hrazdan River bridge

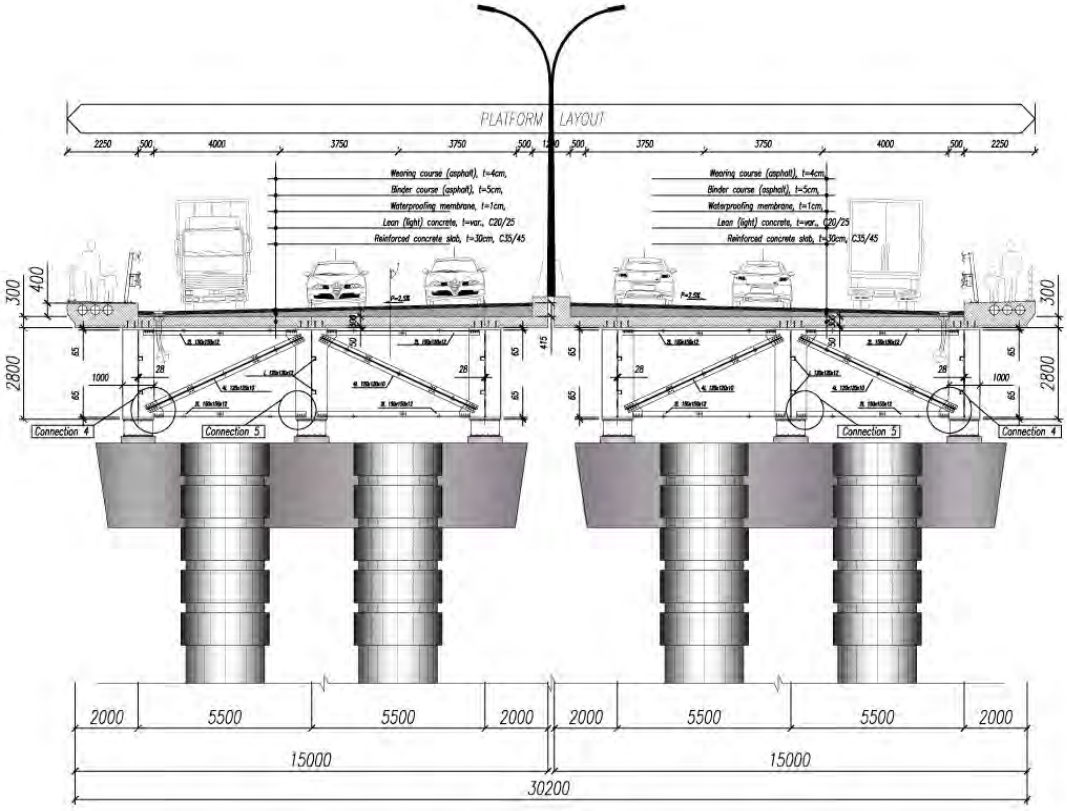


Figure C-4 - Transversal cross-section - Hrazdan River bridge

56. Detailed design has been completed for this Project and it is expected that construction will be undertaken over a period of 18 months.

C.4. Magnitude of Operation

57. Road link 3 is part of the program of road upgrades to complete the Yerevan western bypass, aiming to divert through-traffic around Yerevan's City centre, which will improve traffic flow and reduce congestion on local roads.

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

58. This section describes relevant physical, biological, and socioeconomic conditions within the study area. It also looks at current and proposed development activities within the Project's area of influence, including those not directly connected to the Project. It indicates the accuracy, reliability, and sources of the data.

D.1. Physical Resources

a) Climate, Air Quality, Noise & Vibration

59. **Climate** - Based on meteorological data from the Zvartnots airport monitoring station, located approximately 4 kilometers from Road link 3, the site experiences a continental climate, with hot and dry summers and moderately cold winters with unstable snow coverage. The average annual air temperature near the project site is 12° C, whilst the average low is -4° C in January and the average high of 26.1° C is in July. Humidity is generally low with 46%-50% in summer and 76%-82% in winter. Average annual precipitation is 286mm with the highest level in May at 42mm and the lowest in August at only 9mm. The prevailing wind direction is north-east.

60. **Air Quality** - Yerevan is surrounded by mountains on three sides which hampers the natural dispersion of pollutants in the atmosphere, thereby resulting in high concentrations in the air. The main source of air pollutants are emissions arising from automobiles which is exacerbated by a congested road network. It is estimated in the Yerevan Master Plan that approximately 95% of the pollutants in the air is associated with the operation of urban transport.

61. According to the Yerevan Master Plan of Yerevan, Road link 3 - Argavand Junction, is located within a zone experiencing ‘moderate’ background air pollution.

62. Another source of data on air quality is an MNP Air Quality Monitoring Station located at Erebuni airport (the second airport of Yerevan). This Monitoring Station is distant of about 3100 m to 4200 m from Road link 3 - Argavand Junction.

63. Data collected at the Erebuni Aiport MNP station are representative of the background Air Quality found in Road Link 3 corridor. Indeed if one perform a baseline Air Quality survey in the Project’s corridors, measuring the same parameter as the one being measured at Erebuni Airport, results won’t be significantly different. We are in an urban environment where air quality is already negatively impacted by pollution. Pollution generated by traffic using the Project’s corridor won’t influence significantly the Air Quality of the Project’s corridors.

64. Table D-1 below presents the concentrations of air pollutants (Dust, Sulfur dioxide, Nitrogen oxide and nitrogen dioxide) measured from 2007 to 2012 at this station. The table presents also the maximum permissible concentration of air pollutants based on the Armenian standard Maximum Permissible Concentration (MPC) for Ambient Air in Human Settlements.

(i) Dust: based on the total annual average measured, dust pollutants (0.18) exceeded the Daily Medium (0.15) MPC. However, the total average from 2007 to 2012 was below (0.5) Maximum Single Event allowable.

(ii) Sulfur dioxide: from 2007 to 2011 sulfur dioxide values did not exceeded both the maximum and daily medium MPC.

(iii) Nitrogen oxide: the annual average measured for nitrogen oxide (0.05) have not exceeded the MPC for maximum single event and have maintained (0.06) allowable daily medium MPC.

(iv) Nitrogen dioxide: over the years 2007 to 2012, the total annual average measured nitrogen dioxide (0.07) has not consistently exceeded the MPC.

65. Results providing from MNP Air Quality Monitoring Station located at Erebuni airport seem to confirme what is presented in Yerevan Master Plan: the average Air Quality is close to permissible concentrations.

Table D-1: Measured Concentrations and Maximum Permissible Concentration of Air Pollutant

Pollutant	**Annual average measurement at monitoring Station N7 – Erebuni airport (mg/m3)**							**Maximum permissible concentration (mg/m3)**	
	2007	2008	2009	2010	2011	2012	TOTAL AVERAGE 2007-2009	Maximum Single Event	Daily Medium
Dust	0.16	0.15	0.07	0.11	No data	0.4	0.18	0.5	0.15
Sulfur Dioxide (SO2)	0.07	0.05	0.04	0.04	0.02	No data	0.05	0.05	0.05
Nitrogen Dioxide (NO2)	0.085	0.052	0.061	0.096	0.053	0.068	0.07	0.085	0.04
Nitrogen Oxide (NO)	0.04	0.02	0.02	0.07	0.07	0.06	0.05	0.4	0.06
Data supplied by the Environmental Effect Monitoring Centre, According to Maximum Permissible Concentration (MPC) for Ambient Air in Human Settlements, Republic of Armenia government decision n N160 -N, 02/02/2006.									

66. In addition to pollution caused by vehicle emissions, extensive deforestation, which has occurred in regions located at the City outskirts, generates also significant quantity of dust during the dry summer months. Transportation and deforestation combined explain results shown in Table D-1 where yearly averages of dust concentrations in 2007 to 2012 consistently exceeded the daily medium MPC.

67. **Noise & Vibration** - Currently, the dominant noise source in Yerevan is associated with the operation of urban transport (approximately 90%). The Armenian noise standard limits are presented in Table D-2 below.

Table D-2. Maximum Permissible Noise

Levels1 Receptor	Time (hours)	Level of Noise LA and Level of Equipment Noise L_{Aeq} dBA	Maximum Level of Noise LA_{max} dBA
Close territories of apartment buildings, policlinics, dispensaries, rest homes, boarding houses, home for senior or disabled citizens, preschools, schools and other educational institutions, libraries	06:00 - 22:00	55	70
	22:00 - 06:00	45	60
Source: Ministry of Health, Republic of Armenia, Order N138, 6 March, 2002, urban construction			

68. Noise & vibration monotoring were performed by a certified Noise & vibration consultant in October 2013 at 1 location. Those locations are recognized to be sensitive receptor (school) found along Road link corridor. Monitoring locations are shown on Figures C-3 on page 22. Results of monitoring are presented in Annex 6.

69. For Road link 3 – Argavand junction:

(i) Point 1: (School) On Shirak Street near the entrance to the Cemetery at sensitive hotspots n°5 on the Alignment Sheet (High Scool n° 115) (See Annex 6). At this location, noise levels exceed threshold values of the sanitary-hygienic norms SN N 2III-11.3.

70. For all 1 location, vibration levels are consistent with the Armenian regulation.

71. Noise and vibration data will also be collected by the Contractor prior commencement of work.

b) Surface and Ground Water

72. Being crossed by Road link 3 (Argavand Junction) the Hrazdan River flows in a gorge in a south-west direction. The river is predominantly snow-fed and highly regulated, with the nearest upstream regulation at Yerevan Lake, approximately 2.5km west.

73. Hrazdan River water quality baseline data were collected and analysis was performed in October 2013 at the location of the new bridge (See Annex 7). Results are showing that water quality of the Hrazdan River is generally p oor. Results show that COD and most of heavy metals consistently exceed MPCs.

74. A sewer pipeline discharges untreated sewage directly into the River approximately 100m downstream from the Project.

75. The Hrazdan River flow is regulated via Yerevan Lake located upstream from the Project. The Yerevan Master Plan indicates that there is virtually no risk of flooding in the vicinity of the Project right-of-way.

76. Two canals follow closely the Hrazdan River alignment on both banks of the River. Those canals have historical value and will be protected during construction and maintained during operation.

77. The Project right-of-way slopes gently towards the Hrazdan River before it drops into the gorge.

It is likely that the groundwater beneath the site varies between 5 and 10m at the north-western and south-eastern extents.

78. Annex 7 provides detailed information on the Results of hydrochemical analysis of the Hrazdan River, including phytoplankton and macroinvertebrates analysis, determined Value of Chemical Indexes in the bottom sediments of Hrazdan River and Results of macrophytes analysis

79. The clay content of the soil and ground layers would limit filtration into the groundwater; however, there still potential for contamination of groundwater by one or more of the mentioned contaminants beneath or around the investigation area.

c) Topography, Soils, Geology, Seismology

80. The Road link 3 study corridors is located in the western part of Yerevan within the Ararat valley which is mostly flat. There is no available information about landslips detected in the past and the occurence of them happening is considered to be low. Altitude of study corridors is approximately 870-900m above sea level.Road Link 3 will be developed on a rocky terrain with very poor soil cover.

81. Yerevan City and the adjacent regions are located in a seismic area and are considered to have a high degree of seismic risk along existing fault lines. Earthquakes in the area can reach up to the magnitude of 9 and above on the Richter scale and maximum horizontal acceleration of 0.4g. 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.

82. The geology is based on an intrusive ground investigation, believed to have been undertaken in the 1980's; and theYerevan Master Plan. The shallow geology of the project site consists of late-quaternary and alluvial sediments. The solid geology comprises interbedded clay and sand with a variable proportion of gravel (approximately 20-30%). The clay content of the soils recorded by the investigation is considered to limit the downwards migration of contaminants into groundwater. The geology has limited filtration potential due to dry climates and poor vegetation coverage (humus cover of less than 1%).

83. At various locations along the Road link 3, the Yerevan Master Plan states that the soils contain concentrations of heavy metals (including chromium, nickel, zinc, copper, cobalt, molybdenum and silver) which are elevated when compared to background concentrations. Significant concentrations of metals have been recorded in areas which have been occupied by industrial land uses and information in the Yerevan Master Plan suggests that such contamination is localized to these industrial areas.

84. The study corridor of Road link 3 is located on the right Bank of the Hrazdan River, about 877 m above sea level. The climate of the area is semi-aride with even dryer areas.Topsoil is charachterized by brown soils with poor concentration of humus. Vegetation is poor with mostly drought tolerant species, as well as salt tolerant desert plants. As a result of centuries of irrigated agriculture, typical irrigated agrcicultral patern of parcels were laid out. Agricultural lands are about 50 hectare and irrigated by Hrazdan river waters. 20 hectare of community lands are used as arable lands. There are also orchards and vineyards in residential lands. There no pastures in the study corridor.

Other potential sources of contamination within or in the vicinity of the road alignment are associated with

(i) Dumped waste along the route;
(ii) Small orchard which may have been sprayed with pesticides.

D.2. Ecological Resources

85. The Project study corridor is located in a semi-desert landscape zone with elements of desert with the flora and fauna species which are typical for the whole Yerevan. Generally the use, regeneration, protection, conservation,and management of populations of plants and animals including rare and vanishing species and their natural habitats are being regulated by the Law on Flora (adopted in 23.11.1999) and the Law on Fauna (adopted in 03.04.2000), Armenian Red Book, as well as by the International Union for Conservation of Nature (IUCN) Red Data Book and the IUCN Red List of Threatened Species, which highlights those plants and animals that are facing a higher risk of global extinction and are therefore listed as critically endangered or vulnerable. Some species are officially recognized as endemic to Yerevan however, due to the fact that they are ubiquitous for Yerevan city area and surrounding regions they are not registered as special protection needed species.

86. Along Road link 3, according to the Yerevan Master Plan, there is an undisturbed site with potentially relativelly high biodiversit that may host protected species (registered in Armenian Red Book, Armenian endemic, original ecosystems). The semi-desert site of Red Hill is located approximately 1km north of the Project alignment on the northern bank of the Hrazdan River. At this same location there is a site described as the cave of Red Hill which is designated in the Yerevan Master Plan as an area of special significance for the protection of 2 species of rare bats: the Schreiber's Long -Fingered Bat (Miniopterus schreibersi) and Mehely's Horseshoe Bat (Rhinolophus mehelyi). There are also small caves 50 m away from the location of the proposed bridge. Those caves were recently investigated and do not show any signs of bat's presence. (See Annex 11).

87. The Northern end of Road link 3 has been profundly modified by urban development and activities. At the Northern end of Road link 3 the right-of-way will cross an area containing tons of deposited construction rubbish and hazardous material such as asbestos. The vegetation cover here is scarce comprising common weeds and grass; close to Hrazdan River banks the vegetation that comprises shrubs and small trees that has grown naturally there, is typical of river banks.

D.3. Social and Cultural Resources

88. In 2001-2006 34.3% of the Armenian population lived within Yerevan's 12 districts. Following independence in 1991 and the subsequent economic decline, the population had fallen mainly as a consequence of labor migration, a decreased birth rate, and a slight increase in the mortality; which has since led to a static population in Yerevan. After a period of double digit economic growth of 12% between 2001 and 2007, the country was harshly hit by the global crisis in the last quarter of 2008. As a result, GDP dropped by 14.1% in 2009. In 2011, 35% of the overall population was poor as compared with the 27.6% prior to the crisis in 2008, nearly 19.9% of them are very poor and 3.7% are in extreme poverty.

89. The current macroeconomic situation has greatly improved compared to the 2009 crisis, and the economy is set on the path of recovery. It gradually picked up from 2.1% in 2010 and 4.6% in 2011 to 7% in 2012, driven mainly by the mining sector, agro-industries and remittances from abroad. The projection for GDP growth is 6.2% in 2013.

90. Remittances from migrant workers grew by 11% in 2012 constituting 14% of GDP. According to National Statistical Service, unemployment reached 6% in 2012. Inflation has come down to 2.6%

(2012). Armenia was included in a list of countries with high degree of economic freedom in 2012.

91. The medium-density areas Nerkin Shengavit and Noragavit are located along the alignment. This includes pockets of residential areas and businesses, a large manufacturing/industrial area and open land. Within the right-of-way of the Shirak Street extension are approximately ten affected private residences, reportedly built without Municipality approval. On the north-western side of Artashat Highway is the area of Noragavit, - business establishments are located next to the road, some also reportedly built without Municipality approval.

92. At the Karmir Blur site, a preliminary archaeological investigation was undertaken, including fieldwork over three days. The investigation identifies two archaeological sites or settlements, Old Argavand and Karmir Blur. Although the investigation identified finds in the area of the Old Argavand settlement on the western side of the Hrazdan River, the scientific value of the settlement has been lost as the area has been destroyed by modern urban construction activities (building housing and utilities). The investigation concludes that there is no need for protection or recovery excavations as well as for preparation of SEin the Old Argavand area prior to the start of construction activities.

93. Karmir Blur is named after the color of the local reddish sediments used to make the mud bricks for structures in the Urartian period. It occupies an area of approximately 50 hectares. The archaeological features associated with Karmir Blur, which are listed as protected by the MOC, are:

(i) Teyshebaini-Karmir Blur archaeological site (Inventory number 1.11.22), where the remnants and constructions of the citadel (Inventory number 1.11.22.2), living quarters of the city (Inventory number 1.11.22.1), and the dwellings of pre-Urartian settlement (Inventory numbers 1.11.22.1.1 -1, 1-2, 1-3) are still visible;

(ii) Karmir Blur cave on the north -western side of the Hrazdan River gorge (Inventory number 1.11.27);

(iii) Umeshin or Ejmiatsin irrigation channel of the 7th century BC (Inventory number 1.7.7), which was rebuilt several times, including at the end of the 17th century; in 1815 and in 1922. This canal is still active.

94. The alignment of the road Project is located along the southern extent of the Karmir Blur site, approximately 250m south/south west of the Karmir Blur citadel, with the foundations of associated outbuildings adjacent to the alignment.

95. During design stage excavation works were implemented in the Karmir Blur. Detailed results of excavation works are provided in the archaeological report (see Annex 9).

96. A Municipal cemetery is adjacent to the southern end of the Road link 3. In Yerevan, cemeteries are designated as ‘special protected areas’ on the Yerevan Master Plan. The ‘Eagle’ monument indicating the western entrance to Yerevan is located near Argavand Bridge within the existing southern clover is listed as a historical cultural monument on the Yerevan Master Plan. The Master Plan indicates that a ‘historical garden territory’, an area of potential archaeological excavation, known as Dalma Gardens is located approximately 700m north-east of the Project right-of-way. There are no cultural heritage or archaeological sites designated by UNESCO located in the vicinity of the site.

D.4. Economic Development

97. On the north bank of Hrazdan River there are a police academy, small military facilities, numerous retail outlets and other commercial operations along the highway. Admiral Isakov Avenue is the highway that connects Yerevan to Zvartnots international airport, approximately 2km south-

west of the Project right-of-way. Near the Project alignment, there are also large commercial precincts and an horse race track located just south of Shirak Street at the southern end of the Road link 3.

98. Utilities found within the Project Right-of-way include above ground gas pipes, large diameter sewers, overhead High-tension electricity lines that pass over the Hrazdan River.The sewer line currently discharges untreated sewage water directly in the river downstream from the Project. Diversions for ground gas pipes and overhead High-Tension electricity lines are planned within the design. Final design shows that there is no need for diversion of large diameter sewers. An operational canal runs along the north bank of the river and a disused underground irrigation channel crosses the Project right-of-way.

E. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

E.1. Introduction

99. The Projects' impacts to the physical, biological, archaeological, and cultural resources (negative and positive), including the workers' and community health and safety, in the Project's area of influence were identified and corresponding mitigating measures proposed based on significance and occurrence throughout the Project cycle from the engineering design, preconstruction, construction to the operation and maintenance period. Mitigation measures are presented in the EMP in Annex 4. (See also Annex 5: Alignment Sheet for localized impacts along the road corridor).

E.2. Positive impacts

100. The purpose of constructing the Project is to provide a link between Argavand Junction to Shirak Street which will form part of the Yerevan West bypass. Completion of this bypass will divert through traffic around the City center and is expected to improve regional air quality due to a reduction in congestion.

101. Positive impacts also derived from the excavated artefacts during excavation works in Karmir Blur archaeological sites that will be preserved and provide new insights for archeologists and historians.

102. It is difficult to predict socio-economic impacts; somehow, temporary employment during construction works may provide additional income to the local community through the short-term local employment opportunities during the Project construction. Some may improve their situation temporarily while working on the Project.

103. The new road alignment will be designed and constructed to standards that result in improved road markings, signage, safety, drainage, culverts and shoulders.

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

105. After completion of the road, the improved road link with the other Yerevan west bypass sections will induce regional economic growth brought about by the enhanced accessibility between the north and south of Yerevan. Also, regional air quality is expected to improve. It is expected that the new road will play a positive role in enhancing economic growth of Yerevan and the country.

a) Positive Impacts Related to the Design

106. The road will be designed and constructed to current high standards, facilitating driver safety. The structural elements of the Project have been designed with consideration to the high risk of seismic activity of the region. Drainage has been incorporated into the road design to control flow, thereby minimizing erosion of soils and local flooding. The design will enhance the sustainability of the project.

107. The Project includes construction of a bridge over the Hrazdan River. The bridge design includes piers outside the 1 in 100 year (1%) flood line, thereby reducing the operational phase

impact on the River hydrogeology and water quality from construction works, camps, obstructions and scour effects. Pier locations on the north-western bank of the river will be positioned to ensure that they do not interfere with the existing irrigation canal.The design includes landscaping on the median and along the shoulders of the road in the form of tree planting, grassing and seeding in order to avoid erosion. Benefits of landscaping include enhancing ecological value, facilitating infiltration of run-off, stabilizing soil structure, enhancing visual aesthetics of the locality and providing some noise reduction. (See annex 10)

108. The Project is anticipated to improve road safety and Yerevan's regional air quality by removing through-traffic from the City and congested local roads. The road will be designed and constructed to current high standards, thereby facilitating driver safety.

b) Economic Benefits

109. The quantified economic benefits of the Project are: (i) savings in vehicle operating costs and (ii) savings in travel time, both due to increases in vehicle average speeds when compared with the existing road network. Additional benefits which may accrue from a reduction in environmental costs and congestion in the existing road network have not been quantified, but are expected to be positive.

110. Average vehicle speeds have been estimated to rise, with a typical increase of 20 km/hour for private cars and 10 km/hour for goods vehicles. Vehicle operating costs as a function of average vehicle speeds have been estimated based on appropriate curves describing the relationship between vehicle speeds and operating costs. The costs savings have been indexed to forecasted real fuel price increases of 2% per annum. Time savings have been estimated using average vehicle occupancy of 1.2 passengers per vehicle for all categories, and an hourly time value of $5.84 for car drivers and $14.60 for goods vehicle drivers. These values are based on GDP per capita, and adjusted according to the particulars of the Yerevan area and vehicle category.

E.3. Negative impacts

a) Impacts due to Location

111. There is no part of the Road link 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).

112. On January and February 2013, a team of local and international environmental specialists with the archaeologist conducted a reassessment investigation in area of Road link 3. The objective was to focus on the appraisal and reassessment of the significance of impacts of Road link 3. It has been confirmed that the Road link 3 impacts on the existing bio-physical environment, physical cultural resources on Karmir Blur archaeological/historical site and to the municipal cemetery were re-assessed and in relation to design and location of the proposed road alignment (see Annex 2).

113. Anticipated impacts on the bio-physical environment of Road link 3(such as soil erosion, increased levels of noise and vibration, air and water quality) and on archaeological/historical site will be temporary and are most likely to occur only during the construction period. The impacts are manageable and can be minimized if not eliminated through timely and proper implementation of the mitigating measures proposed in Environmental Management Plan. Environmental protection, safety of the public and the construction workers as well, and hygiene of workers will be fully complied with Armenian legislative regulations in all phases of the Project.

114. Prior to the start of construction, the occupants of the buildings within the right-of-way will need to be resettled and the buildings demolished. The full social impact of this is being assessed a social analysis report, and resettlement will be undertaken in accordance with the LARP.

E.4. Specific impacts related to Road link 3

a) Impacts on Flora and Fauna

115. On the northeastern bank of the Hrazdan River protected species of bats have been recorded to occur in the area. During the first field investigations of winter 2013 (See Annex 2) it was suspected that there could be endangered Fauna Red Book bat species present in caves located approximately 50m from the Project right-of-way, A recent visit to those caves by a specialist has shown that there are in fact no signs of bat's presence in those caves (See Annex 11).

116. For that impact, in case Bat's are found just before or during the construction activities, specific mitigation measures have been developed and are presented in the EMP (see Annex 4) to reduce and eliminate the Project's unwanted effects.

b) Impacts on historical and archeological monuments

117. These impacts are relevant only to Road link 3.

118. The Project will not be built in any cultural heritage or archaeological sites designated by UNESCO or by the MOC. However, Road link 3 will be located in the buffer zone of Karmir Blur archaeological site in which there are foundations of associated outbuildings. As a consequence, the Karmir Blur archeological site will be directly impacted by the construction of the road.

119. On the other hand the new link road will increase the accessibility to the Karmir Blur archaeological site and give an opportunity to enhance the potential of the site to become a tourist attraction. While preserving the cultural assets of the site, it will allow dissemination of Yerevan's history. And have long-term benefits. Access between the Karmir Blur site and the area further south will be maintained for pedestrians with a designated path that will pass under the proposed Hrazdan River bridge.

120. On January and February 2013, a team of local and international environmental specialists with the archaeologist conducted a reassessment investigation along the alignment of Road links 2 & 3. The objective was to focus on the appraisal and reassessment of the significance of impacts of Road links 2 & 3. It has been confirmed that the Road link 3 impacts the existing bio-physical environment, physical cultural resources of Karmir Blur archaeological/historical site and the municipal cemetery. The impact magnitude was re-assessed and several design changes were proposed on the road design (see Annex 2 and 9). Recommendations are also provided in the EMP to minimize the impact of the Project on archaeology and cultural heritage. (See Physical and Cultural Resources (PCR) Preservation Plan in EMP- Annex 4).

121. To minimize the impact on archeological remains, preliminary archeological excavations were performed during the road design stage in summer 2013. Archaeologists discovered a tomb field with high density of burials. During these excavations about 1,000 items were found. The results of these excavations are presented in Annex 9 including maps and photographs of the excavation.

122. Detailed Archeological Investigations will be performed before commencement of construction works by certified archaeologists. Results will be presented in a report to MOC that will review it.

MOC will grant permission to start construction activities to the Contractor.

123. During Construction, the Contractors will limit the construction site to the strict minimum. Boundaries of the construction site will be marked and no access will be permitted outside the construction site. Chance find procedures will be implemented to make sure that in the event of the discovery of archaeological finds or remains that were not detected previously, MOC shall be notified immediately and no work shall be allowed until decision to resume works is provided by MOC.

124. Mitigation measures are presented in details in the EMP (Annex 4), Table 1.

125. Another cultural site that might be impacted is a cave on the right bank of Hrazdan River gorge. The cave could be damaged by improper dumping of waste or construction material that may result in the blocking of the entrance.

c) Impact on Hrazdan River

126. To prevent discharge of pollutants from the road into Hrazdan River, storm water collected on the bridge will flow through an oil separator beneath the bridge to retain any pollutant from the road to run off directly into the River.

d) Impacts on Soil

127. **Topsoil** in Link road 3 will be stripped in road sections where the new alignment is being constructed from the agricultural areas acquired under the LARP. Special efforts need to be made to strip and conserve topsoil for later use for site restoration and in medians. Topsoil management will be implemented in accordance with Environmental Protection Plan as a part of SEMP, as well as Technical Specifications 1002 Topsoil.

128. **Soil erosion and sedimentation.** Except for the banks of Hrazdan River, the Project is located on a relatively flat terrain. However during the bridge construction the risk of soil erosion will be higher. Silt coming from construction activities can run into the River causing additional sedimentation. Also, soil erosion can be generated from improper stock piling excavated earth and top soil and sand during heavy rainfall events. These eroded materials ultimately may find their way clogging the canals and drainages. The mitigation measures to prevent and control soil erosion and sedimentation are discribed in the EMP.

e) Impact related to Dust, Noise and Vibration.

129. There are no built-up, commercial or residential areas closely adjacent to the alignment of Argavand Junction to Shirak Street and there will be no receptors of the adverse effects of dust and increased in noise levels during construction. However, the vibration levels to be generated during construction works could impact the stability of the cemetery and the immediate vicinities of Karmir Blur archaeological site. Particular care must be exercised to prevent damage from vibration to archaeological/historical/cultural monuments such as the Karmir Blur. Appropriate barriers and other structural measures have been provided into design. Mitigation measures are also provided in the EMP (Annex 4), Table 1.

130. Noise & vibration nuisance will be reduced by strickly complying with the limits of the allowable noise standards of Armenia through minimizing noise & vibration generation at source in accordance with Environmental Protection Plan as a part of SEMP.

E.5. Constructional impacts

131. Activities during the pre-construction, mobilization, and construction phases are outlined below with the potential impacts and the corresponding mitigation measures are recommended. Detailed mitigation measures including the requirement to prepare detailed operating plans for specific aspects are included in the EMP.

132. **Construction Camps.** Locations for any construction camps will be selected by the contractor in consultation with the Engineer's Environment Specialists to ensure minimal impact. The Contractor will develop a Construction Work Camps Plan as a part of Site-specific EMP with measures listed in Annex 4.

133. **Utilities.** There is potential for disruption to both above and below-ground utilities during construction. This might include above-ground gas mains, water mains, sewers, and electricity lines as well as irrigation facilities. Based on the utility consultations that were undertaken during the design phases the Contractor prior to construction shall prepare temporary or permanent relocation and/or protection plan. 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. Management of this issue will be implemented in accordance with Utilities Protection and Relocation Plan in Annex 4.

134. **Safety.** Construction site safety for workers and residents of the nearby communities is of concern to the ADB. The impacts relate to occupational health risks like polycyclic aromatic hydrocarbons (PAHs) released during asphalting, as well as other construction works relevant safety risks. The Contractor shall take all necessary measures for the safety of the public and pedestrians during construction in accordance with the Occupational Health, and Safety Plan as a part of SEMP.

135. **Environmental and Safety Orientation.** An environmental and safety orientation training program will be developed and implemented during all Project cycles. Training program shall include:

(i) Training sessions on ADB Safeguards organized by Engineer for engineering and environmental, health & safety personnel of YM, YMPIU and Contractor.

(ii) Training on environmental and health&safety issues organized by Contractor'sEnvironmental and Safety specialists in accordance with the Safeguard Orientation Plan presented in Annex 4 for all Contractors' Personnel. Engineering staff and workers will be required to attend, an orientation/safety induction course within their first week on Site and regularly held trainings for newly reqruited workers. On-site workers should be made aware of, and trained in standard environmental protection and health& safety requirements and the requirements set in present EIAto comply with ADB safeguards.

136. **Impact on Public.** 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.

137. **Excess Soil.** Some excessive amount of soil material may be generated in both Road links. 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. The Armenian Law on Rates of Environmental Charges (2006), Article 3 provides the environmental charge according to waste categorization these are as follows:

(i) Category 1 first class hazardousness level – $133/t;
(ii) Category 2 second class hazardousness level – $72/t;
(iii) Category 3 third class of hazardousness level – $13/t;
(iv) Category 4 fourth class of hazardousness level – $4/t;
(v) Non-hazardous non-toxic – $2/t); and
(vi) Non-hazardous produced during land excavation and construction – $0.2/t.

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

139. **Solid and Liquid Waste** Generation arising from the Contractor's activities. 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 generated by the Contractor must be collected, stored, transported, and disposed in accordance with RA legislation and MNP regulation.

140. Excessive soil, oil and fuel spillages and other waste issues are addressed in EMP and will be mitigated by Contractor in accordance with Waste and Material Management Plan as a part of SEMP.

141. **Vehicle Movements on Local Roads and Altered Access.** The Project will increase heavy vehicle movements on local roads throughout construction from transport of waste, spoil, and construction materials and machinery. There is potential for disruption to public road access, including diversions where the new highway crosses the existing road, and increased road traffic conflict. It will be the duty of the Contractor to define his traffic movements and access to the site. He will also be responsible for choosing his material and product sources (crushed stone, asphalt etc.).

142. The transportation of material in, from or to the sites of Road Link 3 will include approximately 170 000 m^3 of common excavation, 33 000 m^3 of embankment, 5 500 m^3 of subgrade layer material. Demolition of the existing carriageway and other structures will entail the removal of approximately 1 300m^3 of material. This equates to an additional 20 980 vehicle movements over a period of 18 months also.

143. Due to the size of the Works it is not expected that the Contractor will set up an asphalt plant or open a new quarry as he will rely on existing sources. The bidder will provide all the details on his sources of materials (if any) in the bid documents. The transportation routes will depend on the location of the quarries and the borrow pits that the Contractor will use. The awarded Contractor

shall obtain all necessary permits for traffic movements and shall prepare a Traffic & Access Management Plan as part of the updated EMP. The relevant transportation scheme shall be inserted in the SEMP.

144. Traffic and Access Management Plan will be prepared by the Contractor as part of his SEMP during the mobilization period to set out safe entry and exit points, enforce strict safety on public roads in conjunction with local police forces, specify timing for deliveries, and, in conjunction with local governments, determine routes on local roads to manage traffic and minimize potential conflict. These plans will require approval from the police authorities.

145. Solid and Liquid Waste arising from the Contractor's activities. 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 generated by the Contractor must be collected, stored, transported, and disposed in accordance with RA legislation and MNP regulation.

146. **Site Reinstatement**. By the end of construction phase and prior to handover of the site by the Contractor to the YM, 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 Engineer and other affected bodies. Landscaping activities should include grass- seeding and planting native trees and shrubs as provided in the design. Where possible and subject to local constraints, community trees and shrubs removed from rights-of-way will be replaced with native trees and shrubs at a ratio of 6:1, most of which will be in the vicinity of the alignment consistent with sight distances and available space (e.g. on embankment slopes). All riverside areas should be cleaned from construction wastes/debris. After construction works the banks of the river should be strengthened to avoid possible collapses. The Contractor shall ensure that any plantations are correctly maintained during the works and defects liability period Yerevan Municipality will engage competent companies to maintain the trees and shrubs following construction. Final payment to the Contractor is subject to the site being restored to satisfaction of the Employer and affected local communities.

E.6. Impacts Related to Operations

147. These include (i) impacts that might occure during the construction works implemented for correction defects during the defect liability period, (ii) impacts on air quality and noise levels during the following operation of the road and (iii) impacts on planted trees and other vegetation due to improper maintenance.

148. Impacts that might occure during the construction works are the same impacts related to construction activities that are identified above.

149. **Air Quality.** Measurements from Erebuni airport indicate that background air quality is poor. The slight deterioration in air quality that may be caused by increased traffic due to the Project is expected to be insignificant. During the operation period ambient air quality measurements will be either conducted by Yerevan Municipality or by a contracted specialized company. This is to determine and confirm whether or not the anticipated environmental benefit of the Project in terms of improved air quality is being achieved through the new road network, reduction in traffic congestion. The data and information gathered are important in terms of air quality management of Yerevan and neighboring districts.

150. **Noise.** Operational noise levels are predicted to increase beyond ambient levels that already exceeded the day and night standards in areas close to the highway. It may be recommended that the government agency mandated to control and regulate motorized vehicles and noise pollution should consider checking the acceptable or allowable noise levels for the different types of motor vehicle.

151. **Improper maintenance of re-instated sites** may result in the losses of planted trees, shrubs, grasses and lawns. To avoid this impact, measures are considered in the EMP in Annex 4.

E.7. Cumulative Environmental Effects

152. 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 be significantly mitigated through the implementation of measures discribed in EMP and SEMP. Construction of other road sections of the Yerevan bypass are most likely not going to be constructed simultaneously thus, there will be no adverse combined impacts during construction.

F. ANALYSIS OF ALTERNATIVES

153. 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.

154. The City of Yerevan has been planned and constructed with the central area connected by radial roads to the suburbs. This directs through-traffic into the City center as there is currently no complete link directing through-traffic around the City center. The heavy congestion along the existing sections of road contributes to high noise, vehicle emissions and traffic incidents. A complex transport development scheme for Yerevan was originally included in the Yerevan Master Plan in 1981 and construction of some sections of the scheme began in the 1980's but never completed. The current 2006 Master Plan began to be developed in 2000, at which time the transport development scheme was reviewed, and the proposed scheme essentially remains similar to the original design.

155. This section of road is part of a program of road section upgrades to complete the Yerevan western bypass, aiming to divert transit traffic from Yerevan's City center, which as a result will improve traffic flow and reduce congestion on local roads. More importantly, when considering this project globally it will allow distribution of the road traffic arriving from the west to the southern suburbs of Yerevan to access the part of the City directly and reduce the traffic in the Shengavit neighborhood.

156. Upgrade of this section will complete the Yerevan west bypass to divert through traffic off local roads. This will ease congestion, improve traffic conditions and contribute to improving economic factors, and improve regional air quality.

157. Based on the Preliminary Design and road alignment, alternatives for both the design and road alignment were considered. However, because of physical limiting factors, and the radially designed road network of Yerevan, there are no better and considerable alternatives in terms of spatial location, general alignment, design and construction methodology and the no-go option is not considered viable as the conditions will worsen as traffic congestion increases over time it would run counter to Government planning of comprehensive highway network, of which this project is a vital link.

G. INFORMATION DISCLOSURE, PUBLIC COMMUNICATION, CONSULTATION AND PARTICIPATION

158. The Public communication, consultations and participation shall be carried out in compliance with ADB SPS (2009) and Armenian legislation and in accordance with Public Consultation and Communication plan developed in the scope of the present EIA and EMP and updated by the Contractor.

159. The Public Consultation and Communication plan includes:

(i) Disclosure of Project related Information to raise the awareness of the public on the Project.

(ii) Public consultations implemented to meet the ADB SPS requirements and the requirements of the RA Law on EIA to ensure the participation of the public and APs on the design and EIA and EMP drafting stage. The further public consultations shall be implemented by Contractor with assistance and participation of the Engineer and YMPIU should the design or another significant change in project implementation occure.

(iii) Grievance Redress Mechanism to ensure the everyday permanent communication with APs for prompt response and resolution of complains and suggestions.

160. The Public Consultation and Communication plan and relevant mitigation measures are presented below and in the EMP (see Annex 4).

G.1. Information Disclosure

161. The final EIA including EMP will be posted on the ADB, YM and YMPIU websites and translated into Armenian language for disclosure on the YM and YMPIU websites. This will ensure the disclosure of environmental concerns and proposed mitigation measures and other environmental documents are made available to the public, the relevant authorities and other interested parties.

G.2. Consultation and Participation

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162. Another Public consultation has been organized on February 14, 2014 after the submission of the environmental safeguards document to the ADB to fully comply with the policy requirements on Public Consultation and Information Disclosure.The consultation has been scheduled in coordination with the MNP to comply with the government's EIA requirement on Public consultation as well. Thenotice advertising the public consultation was posted on a daily newspaper. APs that attented in the meeting generaly were interested in Flora and Fauna,specialy bat's survey. Announcement, attendance list and minutes of the public consultation are attached as Annex 12a & Annex 12b.

163. The Public consultation and participation is the opportunity for the Project to incorporate all relevant views of affected people and other stakeholders into the Project design, mitigation measures, and monitoring plan. The process and activities in the conduct of Public consultation (i.e. program schedule, project information handouts, attendance sheet, complaints, issues and concerns raised by participants), its results (e.g. agreements, and resolutions) that will be documented.

164. The Public Consultation procedure under the EIA legislation of Armenia is presented hereafter.

The EIA is to be carried out according to the procedure of Nature Protection Expertise. All steps of the Public consultation to the issuance of expertise conclusion are presented below:

(i) The initiator, who intends to implement any activity, presents the relevant documents (3 copies) to the Ministry of Nature Protection of RA.

(ii) The documents with the instructions made by the Minister are to be transferred to the "Nature Protection Expertise" SNCO within three days.

(iii) Within 7 days after receiving the relevant documents the "Nature Protection Expertise" SNCO" informs the leaders of concerned communities and public about the initiative of implementation of a proposed activity.

(iv) Within 30 days after receiving the documents presented for expertise the "Nature Protection Expertise" SNCO decides whether to implement or not the environmental assessment expertise on the basis of assessments and informs the initiator about the decision.

(v) In case when the implementation of "Nature ProtectionExpertise is necessary the initiator submits all required documents (3 copies) to the "Nature Protection Expertise" SNCO.

(vi) During five working days after receiving the documentation the Nature Protection Expertise" SNCO provides the leaders of marzes and communities, relevant state bodies, concerned community and licensed experts with copies of these documents.

(vii) The Head of the "Nature Protection Expertise" SNCO designates an expert or a group of experts to carry out the process of expertise.

(viii) Within 4 days the "Nature Protection Expertise" SNCO on the basis of normative-legal relevant documents and environmental assessments defines (i) the scale of impact of activity on the environment and concerned communities; (ii) the capacity of expertise process, duration, and the price of services.

(ix) The Head of the "Nature Protection Expertise" SNCO signs a contract with the Initiator on implementation of expertise.

(x) The "Nature Protection Expertise" SNCO provides the leaders of marzes or communities with the documents immediately and then during 30 days studies the documentation and organizes public hearing together with the initiator.

(xi) If the number of concerned communities is more than one, the "Nature Protection Expertise" SNCO defines the place of hearing. (In fact, meetings and hearings are organized by the initiator, while the "Nature Protection Expertise" SNCO defines which communities may be exposed to potential impact).

(xii) "Nature Protection Expertise" SNCO can officially address the state bodies and relevant departments of the Ministry to get professional opinions if necessary.

(xiii) After 30 days, the leaders of concerned community present public and their opinions to the "Nature Protection Expertise" SNCO.

(xiv) If the company does not get any opinion within the established period of time the opinion on documents will be considered as positive.

(xv) If there are gaps and omissions in documentation, and additional information is required for expertise, the "Nature Protection Expertise" SNCO officially requires the initiator to submit revised documents within defined time terms. In this case, the expertise process is considered as suspended.

(xvi) In case the documents are not submitted within the defined time terms, the "Nature

Protection Expertise" SNCO officially informs the State environmental Inspectorate of the Ministry of Nature Protection of RA about it.

(xvii) Within 30 days after receiving a professional conclusion the "Nature Protection Expertise" SNCO provides public hearings.

(xviii) Within 20 days after public hearings the company prepares the draft conclusion of expertise on the basis of professional conclusions and protocols of public discussions and submits it to the relevant ministerial departments. These agencies issue their opinions regarding the draft conclusion of expertise in writing. If there are no opinions presented within defined time terms, it is considered as positive.

(xix) In case of disagreement between various divisions of the Ministry of Nature Protection (MNP), the "Nature Protection Expertise" SNCO organizes preliminary discussion to be attended by the representatives of these divisions, as well as by other experts. Only after achieving the common agreement, the draft decision is to be submitted to the Commission responsible for approval of the decision of expertise.

(xx) The Head of "Nature Protection Expertise" SNCO submits the conclusion to the Minister for approval.

(xxi) After ministerial approval the conclusion of expertise is to be given to the initiator.

165. The consultation with affected people and other concerned stakeholders, including local persons, will be carried out on an ongoing basis throughout the Project cycle to provide timely disclosure of relevant and adequate information that is understandable and accessible to affected people and responsive to the needs of disadvantaged and vulnerable groups; and should enable to incorporate all relevant views of affected people and other stakeholders into the mitigation measures and implementation issues. The consultation process and its results will be documented.

166. The ADB SPS 2009 policy on Public Consultation is a process with a requirement to engage with communities, groups, or people affected by the proposed Project and with civil society. It:

(i) begins early in the Project preparation stage and is carried out on an ongoing basis throughout the Project cycle;

(ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people;

(iii) is undertaken in an atmosphere free of intimidation or coercion;

(iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and

(v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

H. ACCOUNTABILITY & GRIEVANCE REDRESS MECHANISM

H.1. ADB's Accountability Mechanism

167. ADB website presents the Accountability Mechanism (AM) as a forum where people adversely affected by ADB-assisted projects can voice and seek solutions to their problems and report alleged noncompliance of ADB's operational policies and procedures.

168. ADB remains firmly committed to the principle of being accountable for complying with its operational policies and procedures, and solving problems of project-affected people and ensures high standards of accountability, transparency, openness, and public participation. The AM policy of 2012 which, as presented in their website (http://www.adb.org/documents/accountability-mechanism-policy-2012), is designed to:

(i) enhance ADB's development effectiveness and project quality;
(ii) be responsive to the concerns of project-affected people and fair to all stakeholders;
(iii) reflect the highest professional and technical standards in its staffing and operations;
(iv) be as independent and transparent as possible; and
(v) be cost-effective, efficient, and complementary to the other supervision, audit, quality control, and evaluation systems at ADB.

169. The ADB AM executes the tasks via the ***problem solving function*** which assists people who are directly, materially, and adversely affected by ADB-assisted projects to find solutions to their problems. Contractor shall inform the APs on the ADB AM as an alternative opportunity for solving of problems.

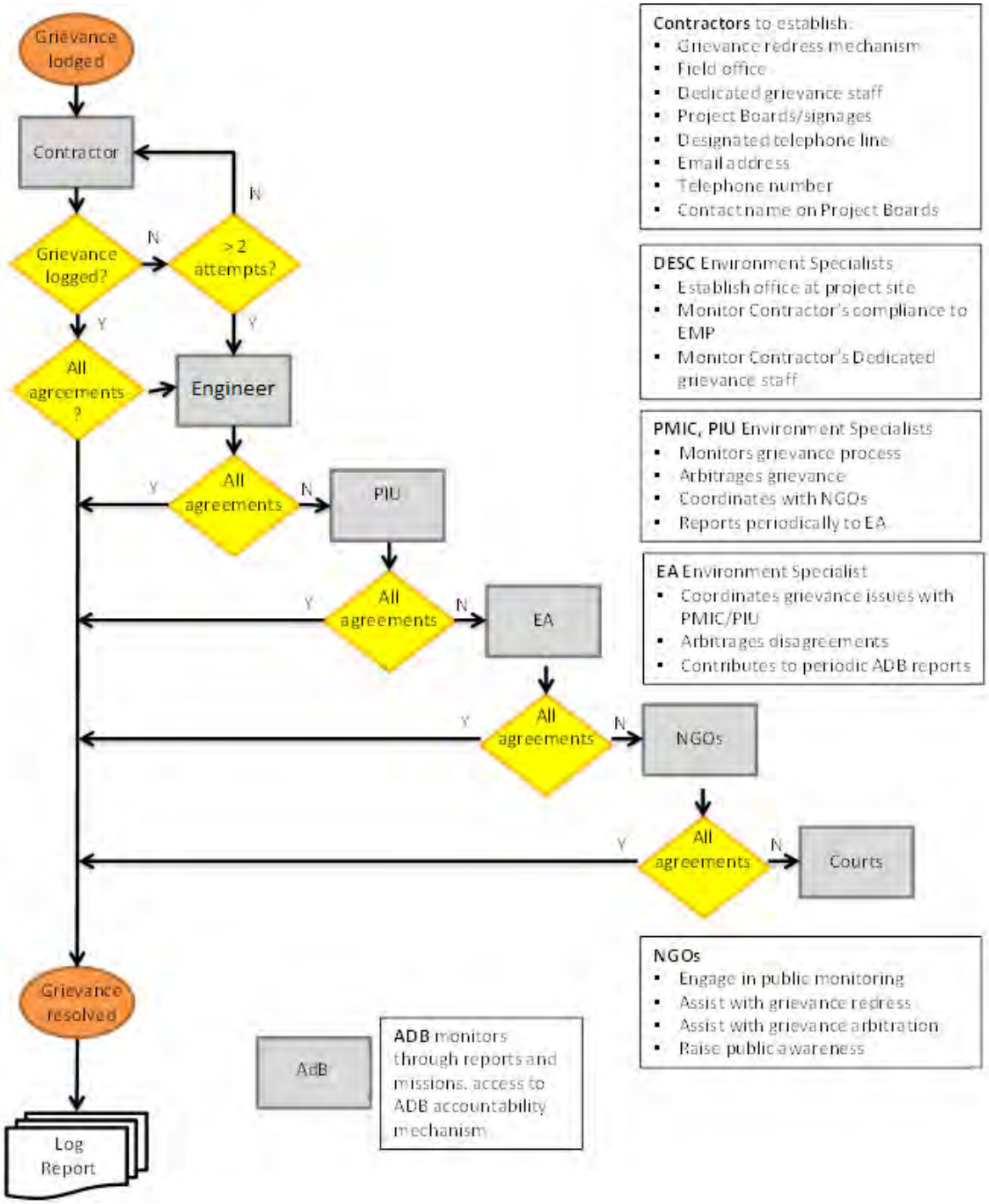
H.2. Grievance Redress Mechanism

170. For receiving feedbacks, concerns and complaints from the APs, a Grievance Redress Mechanism (GRM), inspired by the ***problem solving function*** of ADB's guidelines and policies shall be maintained for the duration of the Project. The Grievance Redress Mechanism 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. The parties potentially involved are: the complainants, Contractor, Engineer, YMPIU, EA, NGOs, and the courts.

171. Public was informed about the GRM during the public consultation held on February 14, 2014. Also information on the existence of GRM and the steps the AP could undertake to raise the suggestions or complains shall be disclosed on the YMPIU website, as well as on the Project informational board installed by the Contractor on construction sites.

172. Figure H-1 on the following page, illustrates the procedural steps of the Grievance Redress Mechanism for the Project.

Figure H-1. Grievance Redress Mechanism Flow-Chart



173. The following are the procedural steps to file a complaint, pose an inquiry on matters relating to project implementation, environmental concerns and other issues regarding the Project.

174. **Step 1**. The person affected by the Project could raise their suggestions/concerns/complaints first of all to the Contractor's dedicated grievance staff that is an attempt will be made to resolve complaints at the local level. In order to maintain transparency and accountability to affected communities and to make information, assistance and grievance resolution services accessible to the Affected Persons, the Contractor will establish the following GRM as a part of the Project's integral GRM:

(i) AP's could approach Contractor's representative (construction foreman, engineer, social or environmental specialist) on-site and/ or register their suggestion /complain into the grievance registerbook kept by Contractor at the field office established in the construction camp located nearby the RoW. The template for recording grievance, content and format of the application shall be specified in the Contractor's SEMP and agreed with Engineer.

(ii) Contractor ensures the provision of contact information (field office location, operating hours, names of responsible contact persons, phone numbers, regular mail and email addresses,etc.) via posters and Project informational boards.

175. **Step 2**. Should the AP be not satisfied with the Contractors' solution of his/her complain, the further opportunities are available. AP could next apply to the Engineer via lodging the complaint within one month after receiving/not recieving the response from the Contractor.

176. The incoming suggestions/ complains shall be considered and classified into environmental and social items. The social safeguard related complains shall be handled in the scope of LARP related GRM by the Engineer and YMPIU LARP specialists. Should the suggestions/ complains be classified as environmental the above mentioned GRM shall be put at AP's disposal.

177. The environmental specialists of the Engineer in collaboration with the Contractor(s) shall establish an office at the Project site where environmental complaints of Projects' AP regarding EMP and project operations' impacts can be lodged. This Project site office will be used for: supervision of construction, including monitoring of the Contractor's compliance to the EMP to ensure the mitigation measures are timely and properly implemented; disclosing all safeguard documents; and receiving and responding to the comments/feedbacks from the community. The Engineer shall respond to the complaint within 15 days.

178. **Step 3**. Should the the Engineer fail to satisfy the complain, AP could apply to YMPIU, YM, EA and ADB AM. All the contact information shall be provided by Contractor on posters and on the Project informational board. Contractor shall provide the necessary explanations and assistance in application to the mentioned entities, if needed through the personal contact with AP.

179. Finally the AP can always seek attention and interference of NGOs and the court. However all the efforts will be made to settle the issues at the Contractor's, the Engineer and YMPIU level.If not possible, attempts will be made to resolve the issues at the EA level to avoid/minimize litigation as much as possible.

180. All complaints regardless of the outcome and solutions will be properly documented and made available for review, monitoring and evaluation purposes.

I. ENVIRONMENTAL MANAGEMENT PLAN

181. The Environmental Management Plan is prepared to ensure compliance with the ADB's environmental safeguard requirements and all applicable laws, regulations and standards for environmental protection in Republic of Armenia. The EMP contains the measures to mitigate and prevent the unwanted effects that may arise during the Project implementation, as well as the monitoring actions to check the compliance of construction works implementation process to the planned mitigation measures through the whole Project cycle: from the engineering design phase, preconstruction, construction through the operation and maintenance periods. The EMP as an integral part of the present EIA will be included in the tender and contract documents. The EMP is attached in Annex 4.

182. On the other hand the Contractor has a duty under his Contract Conditions to determine his construction practices, working methods, schedule and access to the site. To best reflect the changed and modified conditions the Contractor is required to complete and update the EMP with more detailed site-specific and activity specific mitigation measures and prepare the Site-specific environmental management plans (SEMP) 28 days prior to works commencement date. The SEMP willbe considered as consistent part of Contractor's contractual liabilities.

183. Contractor will consult with Engineer and decide how many SEMPs are needed for each Road links area and will prepare the SEMP based on the following outline:

(i) Boundaries of the site the SEMP is relevant for are defined;

(ii) Sensitive receptors and environmental values are identified;

(iii) Site-specific construction activities are specified;

(iv) The risk of impacts is assessed;

(v) Environmental management measures are assigned for the impacts that need to be mitigated as a result of risk assessment;

(vi) SEMP prepared including the sub plans indicated in Annex 4;

(vii) Environmental work plans prepared (maps, drawings,etc).

I.1. Mitigation

184. The purpose of the Environmental Management Plan is to guide the Contractor and Engineer in the prevention and mitigation of environmental impacts related to implementation of the construction works, as well as to serve as a guidance for the Yerevan Municipality and other relevant authorities, including the SEI during operation and subsequent maintenance period, . The Environmental Management Plan will serve as the basis for the following:

(i) Management of the Project's potential impacts and their prevention or mitigation;

(ii) Preparation of SEMPs by the Contractor prior to commencement of pre-construction and construction related activities; and

(iii) Implementation of monitoring program to check compliance with the environmental legislation, regulations and environmental standards.

185. The Environmental Management Plan summarizes the anticipated environmental impacts (as identified in Chapter E). For every identified impact a corresponding mitigation measure is proposed. The mitigation measures will be more specified based on the risk assessment to be conducted

during the preparation of the SEMPs. The environmental monitoring activities, the entities responsible for carrying out those activities and the estimated costs of implementation are also included.

186. The SEMPs will be prepared by the Contractor based on the specificities of the construction contract and updated upon the need to be adapted to possible changing conditions. It shall be submitted to the Engineer for the review and YMPIU approval. Any changes or deviations from the SEMP must first be approved by the Engineer.

(i) According to the recommended Environmental Safeguard Clauses for Civil Works Contracts the Contractor shall undertake the following investigations and activities during the mobilization period:

(ii) Hire a full time environmental specialist (ES) with strong background in health and safety

(iii) Ensure the participation of the ES, engineering and work's supervision staff in the ADB safeguard presentation training organized by Engineer.

(iv) Organize environmental and safety training and orientation for workers

1. Implement a survey of the initial condition of acsess roads Implement the measure on identification and protection of exisiting community trees that might be damaged by construction activities in accordance with SEMP;
2. Protection and/or relocation of water mains, sewers, electricity lines and other utilities;
3. Surveys for collection of baseline data for air quality (dust), noise and vibration, 21 days prior to commencement of works or recognition of the data provided in the present EIA as a baseline for the regular monitoring, section D1 Table D-1 and Annex 6.

(v) Submit for approval by the Engineer 28 days prior to start the works the Site-specific Environmental Management Plan.

187. Beside the above mentioned Contractor will:

(i) Provide access to the site and to facilities for the ES.

(ii) Allow access to the site for any environmental monitoring and inspection at any time requested,

(iii) Ensure the everyday implementation of the SEMP, including undertaking of regular monitoring, maintenance, reporting, etc.

(iv) Execute upon work completion, all the work necessary to reinstate all the used areas of the site close to its original condition to the reasonably acceptable level. This will be approved by the Engineer in written certification of reinstatement.

188. The provisions set out in the EMP will be implemented by the Contractor and monitored by the Engineer under supervision of YMPIU Environmental Specialist.

189. The EMP provides general principles and common mitigation measures and includes the following sub-plans:

1. Occupational Health, and Safety Plan
2. Public Consultation and Communications Plan
3. Vegetation Clearing Plan

4. Utilities Protection and Relocation Plan
5. Environmental Protection Plan
6. Construction Work Camps Plan
7. Site Management Plan (Quarry and borrow pit, dumping sites, concrete batching and asphalt plants)
8. Traffic and Access Management Plan
9. Emergency Response Plan
10. Waste and Material Disposal Plan
11. Site Reinstatement, Landscaping, and Revegetation Plan

a) Occupational Health, and Safety Plan

190. The main purpose of this Plan is to document all the ADB and Armenian legislation requirements to the General Contractor (GC)[1] and the subcontractors (SCs) to ensure environmental and occupational safety and health protection through the Project implementation.

191. Contractor will charge the health & safety specialist or environmental specialist with responsibility to design and implement the orientation program on the topics detailed in Annex 4.

192. Contractor shall take all measures necessary to safeguard the health, safety and welfare of all persons entitled to be on the Site and shall ensure that the Works are carried out in a safe and efficient manner.

193. The implementation of the Occupational Health, and Safety Plan will require the environmental, archaeological, and occupational health and safety orientation for the whole involved construction personnel. The personnel at all levels have a degree of responsibility in relation to environmental, archaeological, and occupational health and safety issues. As such, orientation for all personnel in relation to environmental issues and the implementation of the EMP aiming to raise awareness and enhance the skills of the construction workforce will be crucial to ensure the effectiveness of the EMP.

194. Requirements for worker to wear personal protective equipment including hard hats, safety boots, high-visibility vests, gloves, eye-glasses and ear defenders and PAH masks or equivalent, as required.

b) Public Consultation and Communications Plan

195. The purpose of this plan is to document all measures the GC, SCs, are to implement to maintain the project information disclosure and the communications with the stakeholders, the project affected people, NGOs and other interested groups about the project in compliance with the ADB SPS 2009 and with the Armenian legislation.

196. The plan aims to raise public awareness and interest and stakeholders' involvement through dissemination of information about program including construction works' and related activities' timetable, employment opportunities and benefits of the project.

197. This plan is developed with the intention of maintaining the constant communication with

[1]The general contractor (GC) is the entity who enters into a contract for the works with the IA and who is responsible, by contract, for the work and conduct of its subcontractors (SCs).

stakeholders, members of the community where the project is located and to the general public in whole.

c) Flora & Fauna Protection and Vegetation Clearing Plan

198. The purpose of this plan is to document approach of the GC, SCs, and their workers to minimize impacts on flora and fauna and to protect areas that may contain Red Book or endangered species that might be present in the Project area.

199. A recent site investigation performed by an Armenian Bat specialist have shown that there are no signs of bats using the caves located about 50 m from the Project's alignment (See Annex 11). However, if presence of various species of bat is confirmed before the commencement of works activities by a Bat expert, the Contractor will adapt the implementation and the management of the works according to the expert recommendations.

200. The plan is develpped to comply with MNP policy and the RA Laws on Flora (23.11.2009) and Fauna (03.05.2000), as well as legislative regulations on the use of chemicals for vegetation clearing works.

201. Mitigation measures are presented in EMP (Annex 4 - Table 2 - par. 4).

d) Utilities Protection and Relocation Plan

202. 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 encountered during the construction works.

203. Utility designs have been validated by utility owner. The Utilities Protection and Relocation Plan will be implemented in accordance with Technical Specifications Section 1200: Relocation of Utilities will be taken into consideration.

204. Mitigation measures are presented in Annex 4 - Utilities Protection and Relocation Plan.

e) Physical and Cultural Resources (PCR) Preservation Plan

205. The purpose of this 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 in accordance with Armenian legislative requirements on archaeological and cultural chance finds, as well as to protect the values which are outside but close to the road alignment.

206. The Project will not be built in any cultural heritage or archaeological sites designated by UNESCO or by the MOC. However, given the fact that Road link 3 is close to the protected site of Karmir Blur monument, during construction phase, should any item of cultural heritage or archaeological interest be found, works must be stopped 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 it strictly.

f) The mitigation measures on the protection of the archaeological area adjacent to the alignment are detailed in the Physical and Cultural Resources Preservation in Annex 4.Environmental Protection Plan

207. The purpose of this plan is to document the approach of the GCs, SCs and their workers in the implementation of measures to protect the soil, air and water bodies, from the erosion and sedimentation, dust and other emissions, as well as noise and vibration as a result of the construction activities. The Plan contains mitigation measures to reduce the risk of any impacts to an acceptable level for all the used areas: construction sites, camps, haul roads, quarries, borrow pits, dump sites, etc. (See Annex 4 - Environmental Protection Plan) Particularly the the following aspects are addressed:

(i) Soil erosion and sediment control;
(ii) Air pollution and dust control;
(iii) Water quality and sediment control;
(iv) Noise & vibration control.

208. Technical Specifications SECTION 101 - General Requirements 101.105 Protection of environment and Section 1002 – TOPSOIL are applicable.

209. Soil erosion and sediment control plan prescribes the appropriate organization of works on-site to minimize the exposed areas and to avoid soil erosion and origination of sediment-laden runoff,

210. Plan includes the issues related to topsoil management. Topsoil will be stripped from undisturbed natural landscapes and excavated from embankment areas and borrow sites. Topsoil will be salvaged and temporary stockpiled for further use in cut and fill slopes after completing grading operations. Top soil will be stored for site restoration and in medians. Excessive remaining part of the topsoil not used in road construction will be disposed in the sites designated by YM.

211. The management measures are developed to minimize potential health and nuisance impacts and air pollution to control dust and gaseous emissions resulting from the construction activities.

212. Water quality and sediment control plan is designed to protect the Hrazdan River and other natural and manmade water bodies from pollution with construction waste, residues, sedimentation and other pollutantys that may affect water quality.

213. The purpose of the noise & vibration control is to minimize and manage the potential impacts of increased levels of noise & vibration causing health and pproperty risks like noisuances, hearing impairment which can impact both construction workers and the nearby leaving residents.

g) Construction Work Camps Plan

214. The purpose of this 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 implemented in or near the right-of-way taking into consideration that the right-of-way is mostly located in a highly populated residential district.

215. 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 avoid nuisances to adjoining communities and maximize worker health, safety and amenity. The main criteria/principle for the location of facilities for the Contractor's offices, housing of Contractor's personnel, storage of equipment and vehicles is to minimize soil and ground water

pollution, and disturbance to nearby residents in order to avoid conflict situation with population and local/central authorities.

h) Quarry and borrow pit, dumping site, concrete batching asphalt plants's Management Plan

216. Refer also to the Field inventory/survey/inspection report, Appendix III - Materials Sources Location Plan.

217. The purpose of this Plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to manage the impacts of the construction activities on the quarries, borrow pits, crushing plants, haul roads that may be required for the Works. The management measures in this sub-plan have been developed to minimize potential health and nuisance impacts by incorporating the following principles.

i) Traffic and Access Management Plan

218. The purpose of this 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 traffic management and access plan will be developed by the Contractor as a part of SEMP and will be agreed with YMPIU and YM.

j) Emergency Response Plan

219. The purpose of this Plan is to document the approach of the GC, SCs, and their workers for the transportation, handling, use, storage, and disposal of chemicals and in the implementation of measures in the event of spills or accidental releases of hazardous materials and any other likely incident or accidents that may rise during construction works. The implementation of the measures envisaged in the Annex 4 will allow to reduce the risk of any impacts up to an acceptable level.

k) Waste and Material Management Plan

220. The purpose of this Plan is to document the approach of the GC, SCs, and their workers in the implementation of measures for the management and disposal of wastes and spoil materials produced during construction and for the management of contaminated soil, in case the construction activities interfere with presumably contaminated soil.

221. The key waste management philosophy that is applied in this plan is based on the following hierarchy of waste management approaches (highest to lowest priority):

(i) Avoid waste generation and interference with contaminated soil;

(ii) Minimize waste generation and interference with contaminated soil;

(iii) Reuse as much waste as practical;

(iv) Recycle as much waste as practical; and

(v) Dispose of any remaining waste and displaced contaminated soil in an environmentally suitable manner in locations assigned by the relevant authorities.

222. The management of waste, spoil materials and contaminated soil according to the aforementioned principles using proper collection, segregation, storage, disposal and

education/training methods will ensure the low level of risk associated with waste generation and contaminated soil manipulation. The proposed mitigation measures are listed in Annex 4 and could be completed by Contractor in SEMP.

l) Site Reinstatement, Landscaping, and Re-vegetation Plan

223. Refer also to the following sections of the Technical Specifications: Section 1002: Topsoil, Section 1003: Trees & shrubs and Section 1005: Turf Establishment.

224. The purpose of this plan is to document an approach of the GC, SCs, and their workers in the implementation of site cleaning and restoration including restoration, landscaping, and re-vegetation measures as part of the construction works.

m) Post-construction phase (Operation and maintanance)

225. During the Defect liability period Contractor will be responsible for the environmental safeguards compliance to ADB SPS and Armenian legislation for the time period during which Contractor is implementing defect correcting works on-site. For the rest time period during the whole Defect liability period and the following operation period environmental compliance to the requirements of Armenian legislation will be ensured by YM.

I.2. Monitoring

226. Monitoring within the EMP includes baseline monitoring data collection and regular environmental monitoring.

227. Baseline data collection for soil, air quality, water quality and noise & vibration has been implemented by Engineer during preparation of the present EIA and also will be implemented or confirmed by the Contractor 21 days prior to the commencement of works.

228. Dust, water, noise and vibration monitoring plan as a component of Environmental Management Plan: monitoring will be developed by Contractor and agreed with Engineer for further regular monitoring with clear indication of location of measurement points, schedule of measurements and thresholds relevant for each measurement point for the comparative analysis, The thresholds for the further regular monitoring will be set based on baseline data and Armenian regulation standards and agreed with Engineer. The costs of baseline data survey will be included in Contractor's budget.

229. The regular environmental monitoing contains the planned activities that will guide the Contractor to check and/or compare the effectiveness of the mitigation measures for prevention and control of the negative impacts of the Project. It is also used for measurements and comparative analysis of different parameters whether or not the environmental standards and indicators are maintained or exceeded so immediate and appropriate action can be taken. Environmental monitoring can also point and determine the efficacy of mitigation measures to control unwanted impacts of the Project. It will be monitored by the Engineer in determining if the recommended mitigation measures are being implemented effectively. Environmental monitoring results will be documented to record the signs of adverse impacts which are detected in order to undertake the corrective actions at the earliest time practicable. Where monitoring results do not meet the environmental performance indicators, action taken will also be recorded.

230. Monitoring consists of routine reviews and monitoring to compare the findings with the baseline data and thresholds during:

(i) the construction phase,

(ii) the post-construction phase.

231. Monitoring shall be implemented through the monitoring site visits of environmental specialists of all Project levels. The site visits shall be carried out in accordance with the formal monitoring schedule: Contractor- weekly, Engineer- weekly, YMPIU- monthly. The details of environmental monitoring tasks are described in Annex 4,Table 2.

I.3. Implementation arrangement

232. Implementation schedule, responsible entities and estimated costs of implementation are provided in the EMP (see Annex 4).

a) Environmental Staffing

233. International and national Environmental Specialists will be involved at all Project levels: YMPIU, Engineer and Contractor. The capacity built to ensure compliance of project activities with ADB safeguard policy and Armenian legislation, as well as tasks and responsibilities of environmental units and specialists involved in the Project are also provided in the Annex 4, table 1.

b) Responsibilities, roles, tasks and frequencies related to monitoring

234. Regarding the implementation, the supervision and the monitoring of the EMP, responsibilities, roles, tasks and frequencies are as follow:

(i) The **Contractor** environmental specialist has the following responsibilities, roles and tasks:

- Contractor's supervising team and environmental specialist implement the environmental mitigation measures and their related monitoring activities on a daily basis;
- Environmental specialist supervises baseline data surveys as required in the Technical Specifications and the Environmental Protection Plan;
- Environmental specialist carries on site's visits and inspections on a weekly basis;
- Environmental specialist documents monitoring activities and results in a weekly environmental report;
- In case of inadequate monitoring results, Environmental specialist identifies the necessary corrective actions through a Corrective Action Plan as soon as possible;
- In cases of accidents (fire, explosion, oil spill, bitumen overflow, etc.), the Contractor must notify the Engineer immediately. Initial notification might be verbal, but must be followed by a written report within 24 hours after the incident or accident happened;
- Environmental specialist prepares weekly and monthly environmental report as part of Contractor's monthly progress report.

(ii) The Engineer environmental specialist has the following responsibilities, roles and tasks:

- Supervise, monitor, inspect and coordinate, on a daily, weekly and monthly

basis, the tasks of the environmental, health & safety specialist and the supervising team of the Contractor and the Contractor's construction activities;

- Inspect sites Contractor are intending to use for construction camp (s), facilities, storage, parking, waste dumping, health & safety, etc. prior the start of operation, prepares the reports on the findings of inspection and submits to the YMPIU for approval, as soon as this information is available;
- Review Corrective Action Plans provided by the Contractor and transfer to the YMPIU as soon as possible for approval;
- Inspect and supervise the implementation of corrective actions by the contractor to ensure their effectiveness soon after their implementation;
- Monitor the effectivness of the corrective actions;
- Review the Contractor's weekly monitoring reports to check on proper the data and information of the environmental monitoring activities;
- Review and approve the documents submitted by Contractor based on consultation with YMPIU, updated EMP, report outlines and templates, etc.;
- Prepare a monthly progress report based on contractor monthly progress report, including environmental safeguards and monitoring implementation;
- Prepare annual reports as well as end of phase report for submission to the YMPIU who will in turn submit it to ADB.

(iii) The **YMPIU** environmental specialist responsibilities, roles and tasks are:

- Regularly inspect construction activities;
- Review the monthly environmental safeguards, including monitoring reports submitted by the Engineer;
- Review and approve the corrective action plans and other documents as needed;
- Keep the recording of monitoring data;
- Prepare and submit to ADB bi-annual reports;
- Review and submit to ADB end of phase report prepared by the Engineer;
- Other broader tasks assigned to YMPIU include the general management of the EMP and ensuring compliance to Armenian legislation and ADB Safeguard Policy Statement, are presented in section B.4 of this report.

(iv) The **State Environmental Inspectorate** (SEI) of the Ministry of Nature Protection (MNP) have the authority to inspect the Project's compliance with the environmental protection principles and relevant regulations in accordance with Armenian environmental legislation and the conditions that may be imposed by the NPE and with the Project EMP.

(v) The MOE has the responsibility to undertake environmental due diligence.

c) Awareness raising and environmental training

235. The Contractor shall be responsible to arrange general orientation session about project activities and environmental awareness. This session shall focus on the responsibilities for all people/workers working on site about the protection of the environment and the safe handling of social issues during construction period in accordance with ADB SPS (2009), Armenian environmental legislation and present EIA and EMP.

236. A training need assessment will be identified for proper delivery of EMP at field level. Session shall include but not limited to: minimizing waste at source, respecting and protecting wildlife at site, proper handling of the waste, workers' safety measures during work and emergency preparedness in case of incidents, etc. A separate session for nearby impacted communities shall also be arranged to inform on the GRM and to protect people from any incidents during construction period. A special session for truck and machinery drivers shall also be included.

I.4. Costs and sources of funding

237. A specific pay item is included within the Bill Of Quantities to account for the cost for environmental protection estimated at 2% cost of the works. In addition the environmental related costs (supervision, surveys, trainings, communication with public, reporting) are forseen also in Engineer budget in the scope of request for proposal. Costs are related to the implementation of the following actions:

238. The costs for the EMP and its related sub-plans form part of the direct costs for implementing the Project. Thus, costs are estimated by the Contractor as marginal costs of the three general phases of the Project: pre-construction, construction & post-construction operation. Indicative costs are presented in Annex 4, Table 1. The summary table of the costs is presented below:

Table I.1 – Preliminary estimated costs and sources of funding of EMP (subject to revision)

Type of activites	Costs US$	Sources of fundings
Implementing and monitoring of the environmental mitigation measures (including archeological resources) (2 % cost of the works plus cost of of utilities relocation)	454 000	**Contractor** 454 000 US$ Included in total construction cost **Engineer** Remuneration (2 times per week * 4 weeks * 18 months) Surveys are also included in the budget
Strengthening the administration of the EMP including required capacity development and training	83 880	**Contractor** 45 000 $ Included in total construction cost **Engineer** 38 880 $ included in budget
Raising the awareness of the Project staff and workers	2 950	**Contractor** 2 950 $ Included in total construction cost
Total US$	540830	

I.5. Reporting

239. The environmental safeguards compliance of the Project shall be regularly reported on all project implementation levels: Contractor, Engineer YMPIU, YM and ADB.

240. The following environmental reports shall be submitted by the Contractor to the Engineer:

(i) Initial Environmental Baseline Report. - Required environmental baseline data as

specified in the EMP and Technical Specifications.

(ii) Weekly Environmental Reports. – The results and findings from the environmental monitoring activities will be documented in specially developed by Contractor and approved by YMPIU monitoring check list. The weekly monitoring report shall include the environmental performance indicator and assessment of the effectiveness of the mitigation measures.

(iii) Monthly Progress Report- summary environmental report shall be submitted as part of the Contractor's Monthly Progress Report. Monthly reports shall be analytical and provide explanations for anomalies, non-compliance and problems encountered.

(iv) submit to YMPIU end of phase report

241. The Reports shall comprehensively include all relevant aspects in implementing the mitigation measures of the EMP and SEMP (e.g., what type of mitigation, purpose and object(s), site/location, materials and activities involved, others specify) compliance to any environmental regulations and requirements such as training/orientation, permits, license, etc. undertaken during the period covered by the report. The outline of the reports will be agreed with the Engineer and YMPIU and will contain the following parameters to be monitored:

(i) Work sites;

(ii) Work Site safety – Site workers and surrounding communities;

(iii) Material and Waste management and disposal; including hazardous waste;

(iv) Contractor's facilities and equipment;

(v) Quarries, borrow pits and excavated material dumping sites;

(vi) Concrete batching plants; and

(vii) Public communication and grievances.

242. In cases of accidents, (fire, explosion, oil spill and bitumen overflow, etc.), the Contractor must notify the Engineer immediately. Initial notification may be verbal and shall be followed by a written report within 24 hours when the incident or accident happened.

243. The Engineer submits to YMPIU weekly monitoring reports and report on environmental safeguards as part of the Monthly Progress report. Engineer submits monthly environmental safeguards report to YMPIU as a part of the monthly progress report. YMPIU will submit bi-annual environmental safeguards report to ADB. The bi-annual reports shall be disclosed on the YMPIU and ADB websites.

J. CONCLUSIONS AND RECOMMENDATIONS

J.1. Conclusions

244. The potential negative impacts (such as nuisances from noise, dust, traffic and access changes, which are likely to be experienced by nearby communities, the Hrazdan river water pollution, the impact on Flora and Fauna and the impact on the Archeological Site and Monument of Karmir Blur, that are associated with the location and the construction works will be temporary and can be minimized by following the site specific environmental management plan, providing adequate supervision and ensuring the timely implementation of the mitigating measures outlined in the EMP.

J.2. Recommendations

245. The construction contractor will consider the present EIA and EMP as part of the Contract.

246. The Contractor shall prepare based on the EMP (Annex 4) and submit for approval by the Engineer, the Site-specific Environmental Management Plan (SEMP) with detailed operating environmental management and monitoring measures during the mobilization period, prior to the start of construction works, during the entire length of the construction activities and during the defects liability period.

247. The Engineer shall monitor and supervise the implementation of mitigation measures by the Contractor as specified in the EMP and issue non-compliance notice if they are not properly implemented in a timely manner. The non-compliances will be ranked according to the criteria of non-compliance levels specified in Environmental Safeguards Information kit. A penalty system will be applied to Contractor for the Non-compliance Level III: during the Works, the Contractor shall be subject to a penalty of 200 USD per day starting from the day set as the deadline for improvement any of the requirements of the EIA and EMP. The Engineer may also stop all relevant works (at the Contractor's cost) until the requirements of the EIA and EMP have been fulfilled and rectified to the Engineer's satisfaction. Such penalties shall be independent of any penalties imposed by the laws of RoA.

248. The compliance of construction activities to the ADB safeguards and to Armenian legislation shall be checked through regular monitoring carried out by the Contractor, Engineer, YMPIU.

249. Towards the end and prior to the completion of the Project, the environmental monitoring will be handed over to the Environment Unit of the Yerevan Municipality.

250. The Engineer shall engage a specialist to survey with the Contractor the location of community trees and shrubs most likely to be damaged by the construction activities and propose methods to prevent their lost. All trees and shrubs that can be avoided by construction activities but are close to work sites should be protected. All other trees and shrubs that cannot be preserved will be replanted at a 6:1 ratio. The planting of those trees and shrubs for replacement will be performed in locations with suitable soil conditions. Drought and dust resistant local species will be used. The newly planted tree seedlings should be maintained for 1 - 3 years by the Contractor during the defects liability period. Afterward, maintenance of vegetation will be performed by Yerevan Municipality.

251. Contractor shall accept the results of the surveys and investigations (tree identification and counting, environmental baseline data, utilities) of the present EIA and EMP. Contractor will perform a baseline data collection for Air Quality, Water Quality Noise & Vibration, 21 days prior to the commencement date of construction works.

ANNEX 1

Rapid Environmental Assessment (REA)

Road link 3 - Argavand Junction to Shirak Street urban link road

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: Armenia / Yerevan Sustainable Urban Transport Project
Arshakuniats Avenue-New Shirak Street-Artashat Highway

Sector Division: Roads and Highways

Conducted by / date: Arman Vermishyan and Klaus Schonfeld, 26 Jan 2010
Naomi Hull and Klaus Schonfeld, 10 Feb 2010
Naomi Hull, Davit Yavruyan, and Klaus Schonfeld, 17 Mar 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	
2. Protected area		X	
3. Wetland		X	
4. Mangrove		X	
5. Estuarine		X	
6. Buffer zone of protected area		X	

7. Special area for protecting biodiversity		**X**	
B. POTENTIAL ENVIRONMENTAL IMPACTS			

SCREENING QUESTIONS	Yes	No	REMARKS
Will the Project cause…			
1. Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		X	
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	
4. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker- based camps and chemicals used in construction?		X	
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	X		Land Acquisition and Resettlement Plan (LARP) refers.
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 this kind of 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	

SCREENING QUESTIONS	Yes	No	REMARKS
12. Dislocation and compulsory resettlement of people living in right-of-way?	X		LARP refers.
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 road surface alignment, improved signages, and controls (traffic lights) are expected to reduced accident risks.
14. Increased noise and air pollution resulting from traffic volume?	X		Routine mitigation during construction as set out in EMP.
15. Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		X	No surface water bodies. B.13 also refers.

ANNEX 2

Environmental Evaluation and Verification in Support of the EIA Report

Subproject Road link 3 - Argavand Junction Highway to Shirak Street urban link road

[28.01.2013] Armine Yedigaryan and Marcelo Caleda Egis International
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The SUDI Program to be funded by the Asian Development Bank (ADB) under the Multitranche Financing Facility is required to update and finalize and submit to ADB the safeguard documents (e.g. EARF, LARP, EIA, IEE, the EMP and Monitoring Plan) for review prior to the loan approval.

The review and the required updates to the IEE reports (Project 1, Road link 3: Argavand Junction Highway – Shirak Street) were made within the context of project compliance to ADB's Policy on Environmental Safeguard, the main activities and inputs to the IEE report, EMP and Monitoring plan are:

I. Validation of environmental classification of Project;
II. Reassessment of potential impacts of road construction on the physical environment, flora and fauna, archaeological, historical and cultural resources;
III. Updating the Environmental Management Plan (EMP) and monitoring plan to ensure environmental impacts are fully identified and proper mitigation measures are provided to prevent and control unwanted effects most likely to be generated by the project;
IV. Ensure compliance of the project to the safeguard policies of the ADB.

In compliance to said requirements, a desk review of all environmental assessment reports (IEE report for Project 1, EMPs and EARF document) and other related project documents (Project TOR, Inception Report, Progress Reports, Yerevan City Master Plan Vol.5, (2006), etc.) were undertaken. Subsequently, the project site 3 was visited on 29 January, and 05 and 12 February 2013. The field visits and investigations were undertaken by a team of local and international environmental specialists with the archaeologist. The objective was focused on the validation and reassessment of impacts of Road link 3. These activities are needed for the revision and updating of the final EIA reports, the EMPs and monitoring plans of Road link 3. This environmental report supplements the report on the ecological and archaeological investigations for Road link 3.

The environmental and archaeological investigation and reassessment of Road link 3 was conducted in 2 - 25 February 2013 by the archaeologist together with the local and international environmental specialists. The objectives were:

- to identify potential impacts of the proposed Subproject Road links 3 road

alignment on Physic al Cultural Resources (PCR) of the Karmir Blur sites, structures, and natural features and the landscapes that have archaeological/historical significance;

- to provide archaeological input to the EIA report and to the Environmental Management and Monitoring plan (EMP); and

develop recommendations on mitigation measures

With the Projects' EIA and EMP reports, maps and other relevant documents regarding Road link 3 in hand, the field visits to the project sites were undertaken and focused on gathering additional data and information with the purpose of validating the findings and reassessment of projects' potential impacts on the existing physical conditions of the environment (e.g., Soil erosion and sedimentation of surface water, blockage of waterways, water quality, etc.), biological resources (e.g., vegetation and trees, Red Book species of flora and fauna) and to Karmir Blur archaeological/historical site.

The validation of data and information and reassessment of the potential impacts were based in relation to the engineering design and location of the new and preexisting road alignments. Likewise, the impacts of the proposed bridge construction at the Hrazdan River to the caves and to the occurrence of protected species of bats (Schreiber's Long- Fingered Bat and Mehely's Horseshoe Bat) listed under the Armenian Red Book were investigated to verify and confirm the occurrence and presence in the project site then the potential impacts to the species of bats will be re-assessed of the also.

For Road link 3, the location and the road design was also evaluated in relation to road alignment. The project road is pre-existing, aside from the project's impact on the physical and biological components of the environment the field validation and re-assessment was also focused on such information which will be included in the bidding document and contractor's construction contract as well.

The highlights of the desk review and visits to the project sites for validating project data and information and reassessment of potential impacts are summarized as follows.

1. Environmental categorization of Road link 3.

The desk review of the IEE report and subsequent field evaluation and reassessment of Road link 3, and review of the project's REA checklist, ADB's ***Environmental Assessment Guidelines*** (2003) and Policy on ***Safeguard Policy Statement*** (2009) served as the basis for the determination of the environment category of Project 1.

According to the ADB's ***Environmental Assessment Guidelines*** (2003) and the ***Safeguard Policy Statement*** (2009), Paragraph 50, Environment Categorization states that 'A proposed project is classified as Category "B" if the potential adverse impacts are less adverse than those for Category "A" projects. These impacts are site specific, few if any of them are irreversible and in most cases mitigation measures can be designed more readily than for category "A" projects.

Road link 3is classified as Category B as the likely impacts are site specific and are unlikely to spread beyond the Road link footprintor to directly impact on either the archaeological site or the bat caves. Mitigation measures for the impacts have been designed and included in the EMP.

In consideration of the above mentioned conditions and criteria to determine the environment category of a project, it is deduced that Road link 3 is Category “B” projects. Moreover, The Category “B” status of Project 1 was confirmed by the ADB.

2. Investigation of Flora and Fauna listed in the Armenian Red Book

Three visits were conducted for Road link 3 to confirm and verify the probable presence and occurrence of important species of flora and fauna especially those listed in the Armenian Red Book. In SubprojectRoad link 1 alignment down to Hrazdan River and adjacent areas, the vegetation is limited to the common weeds, low lying species of grass and shrubs. The species of birds encountered in the area were limited to the common sparrow, crow and the magpie. Throughout the whole alignment and the adjacent area, there are no rare, endangered or protected Flora and Fauna listed in the Armenian Red Book. However, there are ten important species of fish recorded in Hrazdan River. To safeguard these species of fish, the EMP included measures to prevent the degradation of the water quality from discharging effluents and garbage coming from construction works and construction camps.

The no encounter of any flora and fauna listed in the Armenian Red Book in project site does not negate the mitigation measures for the protection of flora and fauna that has been recorded in the project sites.

ANNEX 3

PUBLIC CONSULTATION - 19 MARCH 2010

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ՀԱՆՐԱՅԻՆ ԽՈՐՀՐԴԱՏՎՈՒԹՅՈՒՆ՝ ՇՐՋԱԿԱ ՄԻՋԱՎԱՅՐԻ ՊԱՀՊԱՆՈՒԹՅԱՆ ՎԵՐԱԲԵՐՅԱԼ

Երեւանի կայուն քաղաքային տրանսպորտի ծրագիր

ՀՀ Կառավարությունը եւ Երեւանի քաղաքապետարանը ոլանավորում են իրականացնել քաղաքային տրանսպորտի ծրագրեր՝ Երեւան քաղաքի երթեւեկության շարժունակությունը բարելավելու եւ տրանսպորտային համակարգի ծանրաբեռնվածությունը նվազեցնելու նպատակով:

Ասիական զարգացման բանկը Ֆինանսական աջակցություն է ցուցաբերում Երեւանի քաղաքապետարանին՝ հետեւյալ աշխատանքներն իրականացնելու համար:

Մոտակա ժամանակներում առաջարկվում է իրականացնել հետեւյալ չորս նախագծերը՝

Նախագիծ 1 - Դավիթաշենի կամուրջ - «Աշտարակի մայրուղի» ճանապարհի արդիականացում
Նախագիծ 2 - Արգավանդի մայրուղի - «Շիրակի փողոց» ճանապարհի արդիականացում
Նախագիծ 3 - Շիրակի փողոց - «Արտաշատի մայրուղի» ճանապարհի արդիականացում
Նախագիծ 4 - «Երիտասարդական» մետրոյի նոր մուտքի կառուցում (Աբովյան փողոց - Սայաթ-Նովա պողոտա խաչմերուկ)

Դուք հրավիրված եք մասնակցելու հանրային խորհրդակցության, որտեղ կարող եք առավել մանրամասն տեղեկություններ ստանալ նշված նախագծերի վերաբերյալ եւ հնարավորություն կունենաք փոխանակել Ձեր կարծիքները եւ քննարկել Ձեզ հուզող հարցերը տեխնիկական թիմի հետ, մասնավորապես՝ խնդիրը վերաբերում է շրջակա միջավայրի պաշտպանությանը :

ժամը՝ 11.00-ին
Ուրբաթ՝ 19 մարտի, 2010թ.
Վայրը՝ Երեւանի քաղաքապետարան, առաջին հարկ

Հասցե՝
Երեւանի քաղաքապետարան
Արգիշտիի փ. 1
Երեւան 0015
Հեռ. (+374) 10 514187
էլ.փոստ՝ contacts@yerevan.am

ՍՀԲ - Հայաստանյան Գստավայր
Վազգեն Սարգսյան փ. 26/1
«Էրեբունի Պլազա», Բիզնես կենտրոն
Երեւան 0010
Հեռ. (+374) 10 546371, 546373
էլ.փոստ՝ adbarrm@adb.org

Տեխնիկական աջակցության համարը՝ TA: 7340
Ծրագրի համարը՝ 42417-01

Attendance list – translated

Note that the actual attendance lists contain repeat names and does not include several attendees.

No.	Name	Position	Address/organization
1.	Karen Avetisyan	Coordinator	Association for Sustainable Human Development, NGO forum on ADB
2.	Karine Danielyan	President of NGO, Representative of environmental ADB Armenian Office Public Alliance	Association for Sustainable Human Development NGO
3.	Abrahamyan Tamara	President of NGO	"Araza" NGO
4.	Andranik Tevosyan	Citizen	
5.	Ashot Mnatsakanyan	Advisor to the Mayor	Yerevan Municipality
6.	Mushegh Burnusuzyan	Yerevan Municipality Staff Transport Department Main Specialist	Yerevan Municipality
7.	Diana Yeritspokhyan	Ecologist	Yerevan Municipality
8.	Basencyan Frunz		Yerevan Municipality
9.	Tadevosyan Rudik		Yerevan Municipality
10.	Ofelia Sivonyan		Yerevan Municipality Information Department
11.	Hayk Abelyan	Deputy of the Head of District	Ajapnyak Administrative District
12.	Gevorgyan Gagik	Land Usage Town Department Head	Davitashen Administrative Region Deputy Director
13.	Vardanyan Vardan		Shengavit Administrative District
14.	Felix Afyan	Deputy Director	PIU
15.	Ruben Srapyan	Leading specialist	PIU
16.	Levon Hakobyan	Yerevan Building Investment PIU Director	PIU
17.	Gohar Aleksanyan	Journalist	
18.	Hasmik Gregorgyan	Journalist	ArmenPress
19.	Anahit Avagyan	Journalist	Public radio
20.	Areg Barseghyan	ADB Representative	ADB Armenian office
21.	Anna Avagyan	Translator	ADB Armenian office
22.	Klaus Schonfeld	Environment Specialist	ADB
23.	Lanfranco Blanchetti	Resettlement Specialist	ADB
24.	Anjela Arakelyan		"AdInfoSys" CJSC
25.	Milena Babaeva	Translator	"AdInfoSys" CJSC
26.	Liana Mkhitaryan	Social and Resettlement Specialist	"AdInfoSys" CJSC
27.	Vahe Tunyan	Transport Specialist	"AdInfoSys" CJSC
28.	Qristine Araqelyan		"AdInfoSys" CJSC
29.	Arman Vermishyan	Environment Specialist	"AdInfoSys" CJSC
30.	Paul Holmes	Project Manager	Mott MacDonald
31.	Naomi Hull	Environment Specialist	Mott MacDonald
32.	Tom Streather	Resettlement Specialist	Mott MacDonald

Attendance list – actual (1 of 3)

ՀՀ	Անուն	Հասցե/կազմակերպություն	Ստորագրություն
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Attendance list – actual (2 of 3)

ՀՀ	Անուն	Հասցե/կազմակերպություն	Ստորագրություն
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.		ASHD, NGO Forum on AUB coordinator	
11.			
12.			
13.			
14.	Anna Avagyan		
15.			

Attendance list – actual (3 of 3)

№	Ազգանուն	Անուն	պաշտոն	աշխատավայր
1	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	
3	[illegible]	[illegible]	[illegible]	ASHD
4	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	ADB
9	[illegible]	[illegible]	[illegible]	
10	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]		
13	[illegible]	[illegible]	[illegible]	McDonald's
14	[illegible]	[illegible]	[illegible]	[illegible]

ANNEX 4

Environmental Management Plan (EMP)

Road link 3 - Argavand Junction to Shirak Street urban link road

1. The Environmental Management Plan (EMP) provides the set of mitigation and monitoring measures to be undertaken during project implementation in order to avoid, reduce or mitigate the adverse environmental impacts. It presents the identified potential impacts and their locations or occurrences, proposed mitigation measures, the entities responsible for mitigation and their monitoring activities including the estimated costs.

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

(i) Project Activities addressed in the EMP;
(ii) Potential environmental impacts (including impacts on archeological resources);
(iii) Mitigation measures during pre-construction, construction and operation phases of this Project;
(iv) Monitoring activities during pre-construction, construction and operation phases of this Project;
(v) Responsibilities of various entities in the implementation of mitigation and monitoring measures; and
(vi) Indicative costs of environmental management and mitigation.

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
PRE-CONSTRUCTION PHASE				
1. Baseline monitoring surveys (Air quality, Water quality, Noise & Vibration) Public utilities protection and relocation	Missing baseline information for monitoring during construction phase Interruptions of services due to relocation of utilities	1. Update EMP to reflect baseline monitoring surveys information, detail design and incorporate in tender and contract documents 2. Include specific requirement in tender and contract documents:	Engineer Update EMP and include appropriate clauses in tender and contract documents **YMPIU** Evaluate the bid and award contract documents **ADB** Be informed on YMPIU decision	Costs of these activities are accounted in the Construction phase
2. Archeological Excavation works for the Argavand Junction in Karmir Blur Archeological Monument	Loss of archaeological and cultural heritage resources	1. In summer-autumn 2013, a first round of Archaeological investigations has been performed in the Project right of way. 2. In spring 2014, before commencement of construction, a detailed archeological investigation will be performed to determine the boundaries of the tomb field discovered during summer-autumn 2013. A third systematic excavation of the tomb field will also be performed.	EngineerContract with "Scientific research center of the historical and cultural heritage" (SNCO) for Preliminary Archeological Investigation and Manage those investigation **YMPIU** Manage Detailed Archeological Investigations **ADB** Be informed of YMPIU decision	Costs of Preliminary Archeological Investigations performed during summer-autumn 2013 were: **US$ 45 000** Cost of Detailed Archeological Investigations that will be performed before commencement of construction works are estimated at: **US$ 42 000** Cost of the third systematic excavation of the tomb field will also be estimated if needed.

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
3. Preparation of tender and contract documents	EMP requirements are not taken into consideration in the detailed design leading to adverse environmental impacts during both construction and operation of the Project	1. Develop Technical Specifications based on mitigation measures defined in the EMP and incorporate environmental clauses into Particular conditions of the tender and contract documents.	**Engineer** Develop Technical specifications and update the tender and contract documents to include appropriate environmental clauses **YMPIU** Review tender and contract documents **ADB** Be informed on results of YMPIU's review	Costs are accounted in the **Engineer** budget

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
CONSTRUCTION PHASE				
4. Orientation and environmental training	Contractor's non-compliance to the EMP leading to insufficient environmental controls and environmental degradation,	1. Contractor hires one Environment and Health & Safety Specialist to manage environmental issues and mitigation. 2. Provide training to all staff on Environment and Health & Safety (See sub-plans below for more details).	**Contractor** Provide specialist (s) and train staff **Engineer** Monitor the Contractor, construction workers, environmental parameters and reports to YMPIU **YMPIU** Issues non-compliance notices	**Contractor** Cost of 1 HSE Specialist available full-time during the 18 months construction period is estimated at: **US$ 45 000** **Engineer** Remuneration for 18 months included in budget is estimated at: **US$ 38 880** Cost of 1 day induction training program on Health, Safety and Environment for 50 construction workers at US$ 50 per day plus the fees of 3 days of a trainer at US$ 75 per day, is estimated at: **US$ 2 950** **Engineer** cost of 1 training session on Health, Safety and Environment at US$ 500 per session, 5 training sessions during 18 months, is estimated at: **US$ 2 500**
5. All site construction activities (including	Environmental degradation, Nuisance from dust, air	1. Prepare and submit, within mobilization period, a SEMP including the following environmental management sub-plans: 2. Occupational Health and Safety Plan 3. Public Consultation and Communications Plan	**Contractor** Prepare and implement **Engineer**	Costs of those plans are accounted for each of the Construction Plans detailed below.

Table 1: Environmental Management Plan: Mitigation
Argavand Junction

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
activities in Right of way, Borrow pits, Dump sites, Construction camps)	pollution noise & vibration Safety and health hazards to workers and community residents	4. Flora & Fauna Protection and Vegetation Clearing Plan 5. Utilities Protection and Relocation Plan 6. Physical and Cultural Resources Archeological Preservation Plan 7. Environmental Protection Plan 8. Construction Work Camps Plan 9. Site Management Plan (Quarry and borrow pit, dumping sites, concrete batching and asphalt plants) 10. Traffic and Access management Plan 11. Emergency Response Plan 12. Waste and Contaminated Soil Management Plan 13. Site Reinstatement, landscaping and Revegetation Plan	Review, approve and monitor implementation **YMPIU** Supervise the Contractor and the Engineer	
		1. Occupational Health, and Safety Plan		
6. All site activities	Lack of information on EMP and applicable environmental regulations for the Project may lead to environmental degradations Sickness, injury, or death of workers, road users and other people near the site caused by exposure to	1. Occupational Health & Safety orientation trainings on the following topics: • General rules and regulations to be followed on the construction site and camps • Construction activity-specific rules and regulations including working on bridge, working with electrical tools, digging pits, etc. • General health and safety awareness program for educating construction workers on sexually transmitted diseases and HIV/AIDS. • Illegal trafficking: workers should be made aware that trafficking of humans, wildlife, endangered species, and illegal substances through the road corridor will not be tolerated and be advised of a progressive penalty	**Contractor** Implement the Plan and Prepare the orientation program **Engineer** Review plan and assist monitor implementation Review incident logs **YMPIU** Review plan and assist the DESC	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 4 above. Cost of PPEs for 50 workers at US$ 250 per worker is estimated at: **US$ 12 500** Information on health risks and illegal trafficking is included in the training session accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	hazardous substances; slips, trips and falls; and falling objects.	scheme up to and including dismissal. 2. Take all reasonable precautions (tape fencing, guard points, etc.) to prevent unauthorized entry to the Site 3. Exclude unsafe working practices and unsafe tools from the construction-site. 4. Fire-extinguisher is available and easily accessible in all operating machinery and in all sections of the construction site. 5. Regular medical check-ups of worker's health; Contractor may hire or contract required medical professionals 6. Available and easily accessible first aid kits in all operating machinery and in all sections of the construction site 7. Season- fit uniform and other PPE provided to workers and other staff. Incentive measures and penalties to enforce the use of PPE. 8. Health & safety incidents to be recorded and reported on to the DESC and to relevant authorities when needed.		
		2. Public Consultation and Communications Plan		

Table 1: Environmental Management Plan: Mitigation
Argavand Junction

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
7. Public consultation, awareness raising and grievance	Lack of information and understanding by communities of administrative districts and affected parties about the planned works activities and schedule of implementation can lead to frustration and complaints, which in turn could result in delays for the Project.	1. Develop an application form for public complains and suggestions and receive **Engineer** approval. 2. Install posters or project informational boards with relevant information for the Public: field office location, operating hours, names of responsible contact persons, "hot line" phone numbers, postal address and email addresses, etc. 3. Keep a grievance register book available at the field office or in any other easily accessible location for affected people. 4. Maintain a register of complaints (name, description of the problem, incoming date, response date, further follow-up action and resolution status). 5. Allocate personal responsible for dealing with issues raised by the Public and APs. 6. Organize regular meetings with community members to discuss newly arisen issues if any. 7. Make sure that mechanism of prompt forwarding complains and suggestions to **Engineer** are in place. The Grievance Redress Mechanism is described in detail in section H of the EIA report.	**Contractor** The HSE specialist hired by the Contractor implements awareness and grievance redress program of the Plan **Engineer** Review plan and monitor the implementation **YMPIU** Supervise the **Engineer**	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		3. Flora & Fauna Protection and Vegetation Clearing Plan		
8. Earthworks and other construction works	Disturbance and degradation of flora and fauna habitat, especially Red Book species Clearing of vegetation at times detrimental to fauna habitat	1. Undertake a survey to identify all trees and shrubs which are located close to construction site and could be damaged by construction works; 2. Put in place measures to protect trees and shrubs that may be affected (marking them foe being easily recognizable for workers; regulation of traffic movement, waste disposal, etc.) 3. Notify the **Engineer** and obtain an approval prior to start right-of-way clearing (Trees and shrubs cutting) 4. Strictly perform vegetation cutting and clearing works in accordance with Technical Specification Section 401 - Clearing and Grubbing and Section 1003 – Trees and shrubs 5. Stop the works in the area where unknown species are encountered and clarify whether these are Red book listed, rare or endangered species 6. Inform the **Engineer** environmental specialist for future actions in case rare species are discovered, including ; the case when the bats in athe cave located on the Northern bank of the Hrazdan River, at about 50 m of the project alignment. will be nevertheless encountered. In the unlikely event that bats inhabit this cave, the Bat specialist will provide directives to protect the bat colony that may include fencing at the cave entrance and restricted working	**Contractor** Hire a local Fauna and Flora specialist to assess the occurrence of Red Book species in the project area and provide recommendations to minimize the impact for the protection of those species and monitor the results of those recommendations **Engineer** Specialist to design the tree planting or replacement. Review plans and monitor the implementation Report results monthly **YMPIU** Supervise the **Engineer**	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 4 above. Cost of hiring during 10 days a local Fauna and Flora specialist at US$ 75 per day, is estimated at: **US$ 750** Cost for protection of existing community trees along Road link 3 for an estimated 10 trees at US$ 25 per tree is estimated at: **US$ 250**

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		hours at the proximity of the cave. 7. Inform the **Engineer** in case of an injured animal is found. 8. Undertake the vegetation removal and site clearing preferably during late autumn and/or winter. 9. A register of cut trees and shrubs is created and kept available for review. 10. For vegetation clearance purposes use only the pesticides that are not listed in the Government decree N293 of 17 March 2005 and exclude the use of POP containing chemicals. 11. Ensure that workers are using PPE when using pesticides or other vegetation clearing chemicals. 12. Transport cut vegetation to approved waste dump within 2 days. 13. Temporarily heap cut vegetation in designated location within the Project right-of-way before transportation to waste dump. 14. Cut vegetation shall not be burned.		
		4. Utilities Protection and Relocation Plan		
9. Utilities protection and relocation	Disruption of services provided by utilities causes	1. Implement the protection and relocation of utilities in accordance with Technical Specifications, Section 1200: Relocation of Utilities 2. Identify with utility owner the exact location of	**Contractor** Survey utilities and prepare plan prior to construction	Cost of protecting and relocating utilities cannot be strictly accounted as environmental mitigation measures. But for information purposes, the evaluated costs

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	impact on APs	services and if necessary carry out trial pits. 3. Schedule and implement the works to minimize the temporary disturbance of services 4. Notify the potentially APs prior to the start of works that disturbance to services may occur. 5. Protect or relocate utilities discovered during construction works that were not identified during the Design stage. Relocation expenses will paid by the Contractor. 6. Contractor shall restore or compensate all the costs should the undiscovered utilities be found or the existing ones damaged during construction works.	Liaise with local representatives, and service providers Hire approved contractors **Engineer** Review plan and monitor implementation. Assist with liaison with local representatives and service providers **YMPIU** Monitor the **Engineer** and review	of construction activities related to utilities is estimated at: **US$ 700 000 (incl. VAT)**
		5. Physical and Cultural Resources (PCR) Preservation Plan		
10. Road and bridge construction activities at immediate vicinities of archeological or historical site of Karmir Blur Monument	Damage to archaeological, historical and cultural resources of Karmir Blur Monument	1. Restrict construction works activities to the road right-of-way by fencing. 2. A certified archeologist will be present just before works commence in the archeological zone to make sure that fencing is put in place at the right location to avoid any damage to archeological resources. 3. In the vicinity of the Karmir Blur Monument, ban any constructions activities, material deposit or vehicles parking outside of designated construction areas. 4. Ban dumping and disposal of waste, garbage and construction debris in the Karmir Blur Monument site.	**Contractor** Wait end of detailed Archeological Investigation before beginning construction activities. **Engineer** Modify road design to integrate recommendations of detail Archeological Investigation if any. Review recommendations and	**Contractor** Included in total construction cost, estimated to be maximum 2%. **ADB** Included in the corporate environmental due diligence cost

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		5. During construction, secure the site outside of the construction area from heavy equipment and construction materials. 6. Prohibit the use of soil from the archeological site for construction needs. 6. In the event of archaeological fortuitous find, the Contractor follow the hereunder procedure: • stop works immediately; • notify the **Engineer**,YMPIU; • isolate the site; • document and photograph the find and the area immediately around it; • inform the MOC's and hire an experienced and qualified archaeologist to determine whether and how the chance-find should be preserved; • when advised and as directed by YMPIU, the Contractor ensure proper implementation of chance-find procedures; employ the services of an archaeologist or appropriate company to provide and ensure proper archaeological excavation procedures in coordination with the concerned government agencies; • Obtain necessary approvals from MOC to proceed with construction works where archaeological excavations are finished and recommendations have been provided.	monitor implementation. Assist with liaison with local representatives and service providers **YMPIU** Monitor the **Engineer** and review	

Table 1: Environmental Management Plan: Mitigation
Argavand Junction

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		7. During construction, secure the entering of workers into archeological cave on the right bank of Hrazdan river, as well as ban dumping and disposal of waste, garbage and construction debris in the cave.		
		6. Environmental Protection Plan		
11. Earth works Materials hauling Roads works Hauling and transport of materials Other construction activities	Erosion of soil Excessive dust and air pollution due to vehicle emissions Excessive noise and vibration due to construction activities	Environmental Protection Plan is developed as a part of the SEMP. Location and frequency of regular monitoring of Dust, Water, Noise & Vibration are specified below: ***Soil erosion and sediment control*** 1. Implement the erosion control in accordance with Technical Specifications Section 1001 – Erosion Control 2. Preserve existing soil layer where practicable. 3. Provide temporary cover such as fast-growing grass species in areas where soil layer is removed and the ground is exposed for a long period. 4. Take the necessary measures to prevent soil erosion and to ensure slopes stability. 5. Perform the topsoil stripping and stockpiling in accordance with Armenian legislation and Technical Specifications Section 1002 - Topsoil 6. Manage topsoil to keep its chemical and biological qualities. Reuse it for planting trees, shrubs and for other landscaping needs. 7. Seed grass on surfaces where topsoil is exposed to	**Contractor** Prepare Environmental Protection Plan Collect baseline data for dust, noise, & noise prepare Dust, Water, Noise &Vibration Plan. Coordinate disposal of surplus soil and excess topsoil with heads of local communities Hire local water trucks for dust control Report results monthly **Engineer** Review and approve Plan developed by the Contractor and monitor implementation **YMPIU** Monitor the **Engineer** and review	The following costs are related specifically to the protection of the environment: a) Cost treating sediment-laden runoff generated by construction activities prior discharge into Hrazdan River is estimated at; **US$ 5 000** b) Cost of the installation of an Oil separator is estimated at: **US$ 12 000** a) Cost of extraction, stockpiling and reuse of approximately 400 m^3 of topsoil at US$ 3 par m^3 is estimated at: **US$ 1 200** b) Cost of seeding grass on 13 000 m^2 of barren ground where risk of erosion and growth of undesirable adventive plants is high, at US$ 1 par m^2 is estimated at: **US$ 13 000**

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		erosion risks (steep slopes, high embankments, etc.). 8. Seed grass as soon as possible to avoid long period during which the ground is barren. ***Air pollution and dust control*** 1. Minimize dust emissions through regular water spraying of construction works surfaces; 2. Minimize the amount of excavated material held on site and cover all materials wherever possible to prevent dust emissions. 3. Regulate the speed level of vehicles and machinery to minimize dust emissions. 4. Use electricity or battery power where possible (or practical) for hand tools rather than diesel. 5. Avoid the use of diesel or petrol powered generators where practicable 6. Provide to workers and vehicle drivers with dust protective masks and ensure they are using it.; 7. Regularly collect baseline data on dust emissions at sensitive receptors and collect data from the same location to describe changes in Air quality. 8. Sensitive receptors are identified in Annex 5 – Alignment Sheet and on Figures C.2 and C.3 of the main EIA study report. They will be confirmed by the Contractor in its SEMP. ***Water quality and sediment control*** 1. Schedule construction activities being performed in close vicinity to the Hrazdan River during the low water		c) Cost of spraying water on barren ground and construction tracks to prevent dust emission during 6 months (180 days) out of the 18 months of the construction timeline, at US$ 100 per day is estimated at: **US$ 18 000** d) Cost of hiring a specialized contractor for collecting baseline data for surface water, air, noise & vibration levels is estimated at: **US$ 5 000**

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		period (1st May to 30th September); 2. Locate Works, facilities and equipment generating pollution and dust as far as possible from the Hrazdan River and other water bodies. 3. Construct oil- and other substances –separators to strictly control the discharge of solid and liquid wastes into the River; 4. Prevent untreated discharge of storm water from all construction sites.; 5. Regularly monitor water quality of Hrazdan River.- Locate Monitoring points approximately 50 m upstream and 50 m downstream from the construction works site. 6. Prevent run off from all construction sites including: construction camps, quarries, crushing, and concrete batch plant, waste disposal site, etc. 7. Treat runoff flows originated by construction activities to clean from sediments prior discharge into Hrazdan River; 8. Install netting or sheeting beneath the bridge during construction to catch any materials that may be dropped 9. Install an oil separator facility at Bridge drainage outlets to prevent discharge of pollutants from the road into Hrazdan River 10. Regularly inspect, repair or maintain drainage structures to avoid sedimentation especially after rainfall events. 11. Clean ditches, drains and culverts from sediments coming from construction activities. 12. Perform concrete casting, joints sealing, application		

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		of water-proofing paint or protective systems, curing agents, etc. during the dry season to avoid pollution of water bodies 13 Clean all operating machinery and undertake refueling at safe distance from water bodies 14. Install petrol/oil Interceptors at each outfall. 15. Install penstock or similar restriction devices at all facilities to prevent pollution in the event of accidental spillage. 16. Provide sufficient stream flow in Hrazdan River to ensure that fish can swim unrestricted . 17. Build a bund along the River on 10m distance from the water stream to control suspended soils laden runoff from construction. 18. Install sediment catching mats at streams outflow in order to reduce risk of discharge of silt laden runoff water to the streams. ***Noise & vibration control*** 1. Comply with construction activities related noise & vibration national legislation. 2. Avoid locating construction activities, camps, machinery and equipment near sensitive receptors such as poorly insulated houses, schools, other public and residual areas. 3. Schedule noisy activities towards the middle of the day whenever it is practicable. 4. Regularly collect baseline data on noise and vibration at sensitive receptors and collect data from the same location to describe changes in Noise levels.		

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		5. Sensitive receptors are identified in Annex 5 – Alignment Sheet and on Figures C.2 and C.3 of the main EIA study report. They will be confirmed by the Contractor in its SEMP. 6. Ensure that all pieces of machinery are equipped with proper silencers and exclude those that are improper state for minimizing noise generation at source. 7. Ensure workers and drivers are provided with appropriate PPE including ear protective equipment. 8. Ensure that vibration levels at sensitive receptors (Poorly insulated houses, schools, archeological remains) are regularly controlled.		
		7. Construction Work Camps Plan		
12. Accommodation of workers, equipment, material storage, machinery and parking	Adverse health effects on work force Nuisances on nearby residents Soil compaction of temporary parking areas Pollution of groundwater Dirtying of	1. Obtain an approval of official authorities and YMPIU for camps' locations prior to their establishment. 2. Locate camps as far as possible from residential areas to avoid disturbing people living along the Project. 3. Avoid installing construction site buildings, vehicle and machinery parking and other facilities on undisturbed natural landscape and on surfaces covered with vegetation. 4. Ensure that workers and other staff have access to proper comfort stations (toilets, hand sinks, showers, etc.), canteen and offices.	**Contractor** Prepare plan **Engineer** Review plan and monitor implementation. **YMPIU** Monitor the **Engineer** and review	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	ambient environment	5. Sewage water will be collected and transported to appropriate sewage treatment facilities. 6. Collect garbage and dispose at designated and approved dumps. 7. Ensure the safety and the cleanliness of the camp. 8. Restore the natural surfaces that have been compacted after removal of construction facilities.		
		8. Quarry and borrow pits, dumping site, concrete batching and asphalt plants's Management Plan		
13. Quarrying Concrete batching and asphalt plants	Noise and dust related nuisance, Impacts on Physical Cultural Resources (PCR) include impacts by the project on the environment and on archaeological, historical, cultural sites and monuments, losses to aesthetics, disruption of local livelihood and	1. Develop this Plan before starting site implementation 2. Give preference to existing quarries, concrete batching and asphalt plants, instead of opening new ones. 3. Obtain all permits and approvals from relevant authorities and YMPIU for using the site for operation of quarries; borrow pits, dump sites, concrete batching and asphalt plants. 4.Obtain approval of MNP on nature protection expertise on operation of quarry and borrow pit, dumping site, concrete batching asphalt plants when needed; 5. In the event, that new quarries, concrete batching and asphalt plants are required, the appropriate agreement/license and nature protection expertise approvals shall be obtained from the Ministry of Nature Protection and Ministry of Energy and Natural	**Contractor** Prepare plan **Engineer** Review plan and monitor implementation. **YMPIU** Monitor and review the **Engineer**	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	communications patterns, presence of and interaction with the construction work force, pressure on surrounding natural resources and human services. Other direct impacts such as erosion and sedimentation, road damage, spoil and other waste disposal, noise and dust generation.	Resources prior commencement of operation. 6. In the event, that new concrete batching and asphalt plants are needed, the potential impacted receptors will be identified and mitigation measures developed based on the risk assessment. 7. In the event, that concrete batching and asphalt plants are opened; they will be implemented by the Contractor, as far from residential areas as possible to avoid disturbing the local population. 8. Avoid installing concrete batching and asphalt plants on undisturbed natural landscape and on surfaces covered with vegetation. 9. Apply all the mitigation measures planned above to minimize impact on air, water quality, flora and fauna, drainage and other utilities, as well as population of nearby residential areas. 9. Prepare Traffic management plan for access and operation of machinery. 10. Prepare waste management plan to address all the issues related to waste generation. 11. Prepare and submit for YMPIU approval the Method statement of works for operation of quarries and borrow pits, dumping sites, concrete batching asphalt plants.		
		9. Traffic and Access Management Plan		

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
14. Vehicle movements on and off construction site	Non fluidity of traffic Hazards and safety issues related to traffic Damage to roads by construction heavy equipment and vehicles Dust, Noise & vibration Dirt and mud carried onto public roads,	1. Organize the movement of vehicles and machinery in a manner creating least interference to the flow of traffic. 2. Provide a temporary passage way for general traffic 3. Ensure 24h/24 access of public to houses, shops, business, etc. 3. Maintain accessible pedestrian passage ways at all times ***Vehicle management on and off-site*** 1. Obtain approvals from Yerevan Municipality for the construction traffic routes. 2. Locate entrances and exits of the construction sites so that they cause minimal disturbance to general traffic and that they do not compromise public safety. 3. Undertake a Pre-Construction Road and Property Condition Survey to document the condition of the road and possible affected properties. 4. Train drivers on TMP and safety 5. Locate parking of machinery in designated sites only. 6. Implement an appropriate construction signage scheme including direction signs, markings, traffic signals, lighting, clearly visible solid barriers to channel traffic, flagmen and maintenance of diversions. 7. Reinforce speed limits. 8. Schedule the movement of vehicles to avoid rush	**Contractor** Prepare, implement and manage the plan **Engineer** Review plan, monitor implementation and management **YMPIU** Monitor the **Engineer** and review	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Cost of spraying water on construction dirt roads and tracks is already accounted in point 10 above.

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		hours where practicable. 9. Ensure that the vehicles are provided with and are using covering loads when carrying sand, soil, spoil and waste material and when leaving construction site, 10. Ensure that vehicles are equipped with exhaust attenuators, silencers, 11 Check that vehicles are regularly maintained to prevent fuel and oil leakages and to meet national regulative requirements. 12. Stop the operation of leaking machinery and replace with those in proper working condition. 13. Provide measures on cleaning the tires (graveled surfaces and vehicle wash facilities at site provided with suitable runoff protection) before the leaving of the construction site to prevent the construction dirt and mud be spread out 14. Check regularly dirt and mud accumulation coming from the construction sites on adjacent roads. Sweep and clean whenever is required and when it is safe to do so. 15. Set speed limits on construction sites to prevent any safety issue and for controlling dust emission.		
		10. Emergency Response Plan		
15. Handling hazardous substance	Leakage or spillage of diesel fuel, oil or other	1. Provides to the DESC the list of substances which contain hazardous elements e.g., diesel, waste oil, paints, herbicides, etc.	**Contractor** Prepare plan	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction

Table 1: Environmental Management Plan: Mitigation
Argavand Junction

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
s and other emergency situations (incidents, accidents, etc)	toxic substances entering soil, and groundwater.	2. Develop and implement procedures to ensure safe handling and storage of hazardous substances, Keep the material safety data sheets, posters with emergency response procedures, and clean-up tools readily available on site and train the workers on their proper use. 3. Store equipment for cleaning up spillages properly to ensure it is easily available when needed. 4. Ensure that the ERT and all personnel handling chemicals and hazardous substances receive hazard and risk management training. 5. Clean the area of spillage immediately to prevent potential contamination of soil and groundwater using a dedicated absorbent material. Remove the pollutant, together with the contaminated soil and the absorbent materials and discard to a site approved by MNP. 6. Manage hazardous wastes in accordance with Armenian regulation. 7. Use chemicals, hazardous substances, and fuel only when necessary. Those substances should be stored on site, within a covered, secure and naturally ventilated area with an impervious floor and impervious bund around it. The bund should have a capacity of at least 150% of the capacity of the largest tank. 8. Locate the storage area away from drainage lines and danger areas. 9. Designate an Emergency Response Team (ERT) as a part of the Environmental team response-ready at any time.	Dispose of Hazardous Materials per MNP directive **Engineer** Review plan & Monitor implementation **YMPIU** Provide liaison with MNP. Review and monitor the **Engineer**	costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 3 above. Cost of 3 days of training of the 10 members of the Emergency Response Team at US$ 50 per day, plus the fees of 3 days of a trainer at US$ 75, is estimated at: **US$ 1725**

Table 1: Environmental Management Plan: Mitigation
Argavand Junction

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		10. Ensure that the ERT receives emergency response training. 11. Provides all construction sites with emergency contact information, responsible persons & safety officer name(s), telephone numbers, etc. 12. Develop an Accident report form with the DESC. 13. Inform the DESC on any accidents (incidents) immediately and report by filling in the accident report form.		
		11. Waste and Material Disposal Plan		
16. All site activities Road construction sites and construction camps	Spoil disposed in inappropriate locations. Waste and materials pollutants entering drainage system and/or infiltrating groundwater Potential safety hazards related to construction materials not cleared from the construction site	1. Develop the WMP as a part of the SEMP. 2. Record in the waste register, at the beginning of every month, the type and the quantity of waste generated by the construction activities. 3. Organize a training program on waste management for the Contractor's Personnel. 4. Remove construction waste, garbage and rubbish from the site regularly to avoid dust and long-term accumulation of the litter. The frequency of removal as a threshold for monitoring purposes will be specified by Contractor in the SEMP. 5. Hold sewage in sealed tanks for proper disposal. 6. Categorize, spoil and other construction wastes by types: solid, liquid, dangerous and hazardous, as well as recyclable material. 7. Apply to the Waste Research Center SNCO in MNP for categorization of the construction wastes, as well as	**Contractor** Prepare plan, **Engineer** Review plan & monitor implementation **YMPIU** Provide liaison with MNP. Review and monitor the **Engineer** .	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		for obtaining licenses when needed. 8. Obtain all permits for waste and contaminated soil disposal and dispose only in permitted sites. 9. Obtain the hazardous waste and contaminated soil disposal approvals from MNP. 10. Apply to the **Engineer** for waste and contaminated soil disposal dump sites investigation and approval. This sites should be approved also by YMPIU. 11. Install special containers for garbage collection which are timely emptied. Construction waste should be removed from the site daily or even more frequently to avoid any stockpiles that may become impediment for the traffic. No waste should be left on site by the end of the working day. Facilities for rubbish and garbage accumulation and removal are installed and emptied regularly. 12. Keep a waste register available on-site for all types of waste (concrete, asphalt, soil and sand) and allocate responsible personnel. 13. Transport waste, contaminated soil and materials in accordance with the Traffic and Access Plan. 14. Spoil should be disposed of in locations approved by YM and local authorities. 15. Collect wastewater in special reservoirs and properly treat it from oil and fuel before entering the water bodies. 16. Collect excessive amounts of oil, lubricants and fuel to avoid spillages and to dispose of in proper disposal sites. Solvents and volatile materials shall be handled according to the procedures prescribed by EMP,		

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		Armenian legislative orders and best international practices.		
		12. Site Reinstatement, Landscaping, and Re-vegetation Plan		
17. Site re-instatement of all areas Re-vegetation, and landscaping	Construction waste and materials are not removed and are left on construction sites Refers to construction sites, constructor's camps and facilities, dump sites, borrow pit and quarries, concrete and asphalt plant areas Cleared vegetation and trees are not fully recompensed by vegetation restoration works.	1. Develop the Site Reinstatement, Landscaping, and Re-vegetation Plan as a part of SEMP. 2. Remove all construction-related materials and equipment from the site including machinery, wastes, unused materials, fencing etc. 3. Reinstate natural drainage and other utilities. 4. Restore the soil layer and loosen soil caused by heavy machinery. 5. Clean the construction site from the litter and traces of oil and fuel spillages if any. 6. Restore the state of construction tracks up to the previous state. 7. Implement check-list prepared for final sign-off by YMPIU. 8. Perform the vegetation restoration works according to the Landscaping plans specifically developed for each site. 9. Requirements for re-vegetation work which includes planting, maintenance and monitoring to ensure high survival rate and fast growth of trees, shrubs, other plants and lawn are presented hereunder. Requirements will be provided in the	**Engineer** Provide landscaping design **Contractor** Hire approved landscape contractor to implement plan **Engineer** Review plan and monitor implementation. Monitor tree and other plants survival during works and defects liability **YMPIU** Monitor the **Engineer** and monitor trees and other plants survival	Costs are related to community trees and shrubs only. Costs of private trees, shrubs and crops affected by the Project are compensated as part of the LARP. According to the survey performed in November 2013 on trees and shrubs that will be potentially cut down due to the road extension and the construction activities (see appendix 8), 10 trees and 4 shrubs Cost of planting 60 seedlings of Trees at US$ 50 and 24 seedlings of Shrubs at US$ 5, is estimated at: **US$ 3120**

Table 1: Environmental Management Plan: Mitigation Argavand Junction				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		landscape design or instructed by the **Engineer**. (See also Annex 10 Landscape design at Concept design stage) • Species should be relatively easy to propagate and to maintain • Replant trees, shrubs and bushes according to the landscape design provided by the **Engineer** and agreements with heads of affected community. • Plant seedlings of trees / shrubs at a ratio of 1:6 i.e. 10 seedling trees / shrubs for every single community tree or shrub cut down in the project right of way. According to the survey performed in November 2013 on trees and shrubs that will be potentially cut down due to the road extension and the construction activities (see appendix 8), 10 trees and 4 shrubs are concerned, therefore 84 seedlings of trees and shrubs should be planted of which 71% of trees (60 u.) and 29% of shrubs (24 u.) should be planted to respect the ratio between existing trees and shrubs affected by the Project. • Maintain tree and shrub seedlings as well as other plants during the construction. After the defect liability period the maintenance responsibility shall be transferred to the YM. (Note that defect liability period will continue through the initial period of the Operation phase).		
POST-CONSTRUCTION PHASE				

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
(Operation and maintenance)				
18. Defect correction works	All the impacts identified in Construction Phase	1. Activity-specific mitigation measures envisaged in the Construction Phase	**Contractor** Implements the EMP and SEMP for the time period the Contractor has implemented defect correction works and provides environmental safeguard reports to YM **YM** Implements works on road maintenance ensuring cleanliness and safety	Cost of long term monitoring by the Contractor cannot be evaluated at the moment.
19. Water run-off from bridge into the Hrazdan River	Road pollutants are discharged into the Hrazdan River	1. Maintain an oil separator facility at bridge drainage outlets to prevent discharge of pollutants from road into Hrazdan River	**Contractor** During the time period when defect correction works are being implemented **YM** Maintain the facility during the rest of the defect liability period and during operation phase	Cost of long term monitoring by the YM cannot be evaluated at the moment.
20. Re-vegetation	Vegetation does grow as expected	1. Include plants implemented for the Project in Municipality of Yerevan vegetation maintenance operations. 2. Monitor the growth and health state of trees, shrubs, other plants and lawn. Replace any death damaged or unhealthy specimens. Reseed incorrectly grown surfaces of lawn.	**YM** Maintain trees shrubs and lawns during the defects liability and operation phase	Cost of long term maintenance by the YM cannot be evaluated at the moment.

Table 1: Environmental Management Plan: Mitigation **Argavand Junction**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
21. Environmental Audit		1. Post-construction environmental audit will be prepared and submitted to ADB	**YM/YMPIU**	Cost of environmental audit will be included in YMPIU budget

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
CONSTRUCTION PHASE **(To be updated by the Contractor with the assistance of the DESC Environment Specialist prior to begin construction and thereafter, as required)**						
1. Work opportunities for local workers, unskilled workers and women	local workers, unskilled workers and women hired	All Construction sites (Including Right of way, Borrow pits, Dump sites, Construction camps)	Documentation review including number of effective job postings intended to local workers, unskilled workers and women by Contractor	Number of local workers, unskilled workers and women that have been hired on the project.	**Contractor** Development of an hiring program for local workers, unskilled workers and women **Engineer** Environmental Specialist reviews the Contractor's hiring program. Supervision cost will be included in **Engineer** budget **YMPIU** Supervise the **Engineer** Supervision cost to be included in PMIC budget	Shall be set when the Contractor is planning its recruitment for Road link 2 Review in the ramp-up phase of construction activities
2. **Occupational Health and Safety**	Trainings on Health & safety provided Uniform and safety equipment provided	All construction sites	Inspection of Occupational Health & Safety Documentation Inspection of construction sites Inspection of Register of incidents and/or accidents	The Occupational Health & Safety Plan is available on every construction sites List of attendees to the training session is available Reports of Construction sites' inspections are available Reports describing incidents and/or accidents is available	**Contractor** Development of the Occupational Health & Safety Plan Monitoring cost to be included in Contractor's budget **Engineer** Environmental Specialist reviews and monitors the Occupational Health and Safety Plan Monitoring cost to be included in DESC budget **YMPIU/PMIC** Supervise the **Engineer**	According to regular monitoring schedule Plan must be developed and validated prior the commencement of construction activities

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
3. **Public Consultation and Communication**	Information of the General Public about construction stages Information of APs about Project's grievance redress mechanism	All construction sites	Documentation review Construction sites' inspections Public consultations Review of the register of complaints	The Public Consultation and Communications Plan is available on all construction sites A Grievance Redress Mechanism has been implemented which follows requirements, procedures and indicators described in section H of the EIA Minutes of Meetings organized by Contractor's HSE specialist with Community representatives are available at the Contractor's field office	**Contractor** Development and management of the Public Consultation and Communication Plan **Engineer** Environmental Specialist reviews and monitors the Public Consultation and Communications Plan Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**	According to regular formal monitoring schedule The Plan must be developed as a part of SEMP and validated prior the commencement of construction activities
4. **Flora & Fauna Protection Vegetation Clearing**	Vegetation clearing is minimized to the extent possible. Vegetation near Works' sites is protected	All construction sites	Review of all documentation related to vegetation clearing Construction sites' inspections	The Vegetation Clearing Plan is available Mitigation measures are put in place for protecting Fauna or Flora species discovered just before construction activities commence. The register of cut trees and shrubs is available	**Contractor** Development of the Flora & Fauna Protection and Vegetation Clearing Plan as a part of SEMP Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews and monitors the Flora & Fauna Protection and Vegetation Clearing Plan **YMPIU** Supervise the **Engineer**.	According to regular monitoring schedule The Plan (with schedule of works) must be developed and validated prior to commencement of construction activities
5. **Utilities Protection and**	Cases of disruption of	All construction	Review of all documentation	The Utilities Protection and	**Contractor** Development of the Utilities Protection and	According to regular

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
Relocation	services impacting end users Re-located of utilities is implemented where needed	sites	related to Utilities Protection and Relocation Construction site(s) inspections Review register of complaints	Relocation Plan is available Number and severity of complaints logged in the Register of Complaints Utilities discovered during constructions works did not lead to interruption of service to end users	Relocation Plan as a part of SEMP Monitoring cost to be included in Contractor's budget **Engineer** Environmental Specialist reviews and monitors the Utilities Protection and Relocation Plan Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**	monitoring schedule The Plan must be developed, validated and implemented prior the commencement of construction activities
6. **Protection of the Environment**	Erosion and weed invasion of barren ground Sediment run-off Topsoil stockpiles Emission of dust & other air pollutants Noise & Vibration level Water Pollution	All construction sites Sensitive receptors for Dust, Water, Noise & Vibration located at 50 m or less from construction activities Monitoring points identified in Dust, Water, Noise & Vibration baseline data and regular	Visual review through the construction sites' inspections Review of the register of complaints Air quality instrumented measurements Noise instrumented measurement Vibration instrumented measurements Water quality instrumented	The Environmental (Dust, water, noise and vibration) Protection Plan is available Number and severity of complaints logged in the Register of Complaints Visits of construction sites sensitive to erosion, drainage sedimentation, as well as topsoil stockpiling sites Hydro-chemical analysis of the Hrazdan River water quality. Monitoring points are located approximately 50 m upstream and 50 m downstream from the construction works site Dust emissions, noise & vibration measurements nearby sensitive receptors located at 50m distance from	**Contractor** Development of the Environmental Protection Plan. Monitoring cost to be included in Contractor's budget **Engineer** Environmental Specialist reviews and monitors the Environmental Protection Plan and follows Contractor's actions to protect the environment. Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**	According to monitoring schedule specified by Contractor in Dust, Water, Noise &Vibration monitoring plan The Plan must be developed and approved by YMPIU prior to the commencement of construction activities Baseline data to be collected 21 days before works commencement date. Measurements of dust emissions at

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
		monitoring plan	measurements	the construction sites. In the case asphalt or concrete plant operation measurement points located at nearby residential and public buildings Dust emission levels are within current Armenian regulative standards (RA law on Atmospheric Air Protection of 1994, amended in 2007) Noise and vibration levels are within current Armenian regulative standards (RA decree N° 138 of 2002) Water pollution is within the baseline data level		least every two weeks and more frequently during dry conditions, depending on complaints received from APs Measurements of water quality parameters at least every two weeks and right after storm water events Measurements of noise & vibration at least every two weeks, or based on complaints received from APs at their dwellings
7. **Construction Work Camps**	Location, layout and management of work camps	Work camps	Documentation review Work camps' visits	The Construction Work Camps Plan is available. The location and the layout of the Construction Work Camp(s) comply with location and layout that has been previously agreed by authorities Number and severity of complaints logged in the	**Contractor** Development of the Construction Work Camps Plan Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews and monitors the Construction Work Camps Plan Supervision cost to be included in **Engineer** budget **YMPIU**	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
				Register of Complaints	Supervise the DESC.	
8. **Quarry, borrow pit, concrete batching, asphalt plants and dumping site**	Location, layout and management of Quarry, borrow pit, concrete batching, asphalt plants and dumping site Nuisances to affected communities	Quarry, borrow pit, concrete batching, asphalt plants and dumping site	Documentation review Sites' visits	The Sites Management Plan is available The layout of the Construction Work Camp(s) complies with specifications of the Plan Number and severity of complaints logged in the Register of Complaints	**Contractor** Development of the Sites Management Plan Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews and monitors the Sites Management Plan Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**.	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities
9. **Traffic and Access management**	Itineraries and accesses location Nuisances and safety issues related to communities Damages to road and utilities (mainly drainage)	Roads use for transportation of equipment, and material Accesses to the construction site	Documentation review Sites' visits	The Traffic and Access management Plan is available for review Itineraries and access locations and layouts complies with specifications of the Plan Number and severity of complaints logged in the Register of Complaints	**Contractor** Development of the Traffic and Access management Plan Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews and monitors the Traffic and Access management Plan Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**.	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities
10. **Handling**	Accidental or	All	Documentation	The Emergency Response	**Contractor**	According to regular

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
hazardous substances	chronic leakage or spillage of diesel fuel, oil or other toxic substances	Construction sites	review Sites' visits	Plan is available for review Accident report forms are completed whenever an accident happened All accidents are treated in compliance with the Plan The Emergency Response Team members have received their training	Development of the Emergency Response Plan Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews the Emergency Response Plan Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**	formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities
11. **Waste and other material**	Management of waste and construction material during construction	All Construction sites	Documentation review Sites' visits	The Waste and Material Management Plan is available Waste Research Center SNCO in MNP has provided the categorization of the construction wastes. DESC has approved waste disposal sites and all permits for waste disposal are obtained Garbage, rubbish and improper construction materials are managed in compliance with Plan's instructions. A waste register has been developed and is correctly completed	**Contractor** Development of the Emergency Response Plan Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews the Emergency Response Plan Supervision cost to be included in **Engineer** budget **YMPIU** Supervise the **Engineer**	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities The waste register and eventually the Plan itself, is updated at the beginning of every month

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
12. **Site Reinstatement, Landscaping, and Re-vegetation**	Construction site is cleaned, no material and waste is on-site Restoration of all surfaces (including quarries and borrow pits) that were used temporarily during construction Site is re-vegetated	All Construction sites	Sites' inspections	The Site Reinstatement, Landscaping, and Revegetation Plan is available All surfaces (including quarries and borrow pits) that were used temporarily during construction are restored to their original state Site Reinstatement check list is approved by YMPIU Location and number of trees and shrubs planted is complies with the landscape design documents Trees and shrubs seedlings have survived the liability period. No dead trees, shrubs and other plants. More than 90% of correctly grown lawn	**Contractor** Development of the Site Reinstatement, Landscaping, and Re-vegetation Plan Restoration of all surfaces Vegetation restoration works Maintain landscape areas over the period specified in the contract Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews Site Reinstatement, Landscaping, and Re-vegetation Plan Monitors vegetation developments Supervision cost to be included in **Engineer** budget **YMPIU** Supervises the **Engineer**	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities Restoration of all surfaces must be finished before the project is handover to YM Health state and growth of shrubs and trees is checked twice every year, in late spring and early fall during the liability period

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
13. **Records and reporting**	Site inspection checklists, Site inspection minutes, Register books Consultation records, Training records, Licenses, and Permits	Recorded information	Review	All available, recorded correctly, any follow-up has been carried out as required	**Contractor** Completes and monitors checklists, logs, consultation records, training records Obtains Licenses, and Permits **Engineer** Ensure compliance, Report to YMPIU **YMPIU** Review the **Engineer** reports Report to ADB	The Contractor transfer documents monthly at minimum **Engineer** submits a weekly monitoring report and a monthly progress report YMPIU prepare a bi-annual report to ADB

Table 2: Environmental Management Plan: Monitoring Argavand Junction						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
OPERATION PHASE **(To be updated by the Contractor with the assistance of YMPIU Environment Specialist prior to start operation and thereafter, as required)**						
14. Traffic movements	Noise impacts Air and Water pollutants from vehicle emissions Water pollution from accidental discharge.	Project right of way	Complaints from sensitive receptors Noise meter Vibration meter Air quality sampling Water quality sampling	Review of Complaints from sensitive receptors Perform Noise & Vibration monitoring, Air Quality and Surface water samplings to check compliance of levels with RA legislation	**Contactor** collects and analyses Noise & Vibration, Water and Air Quality data Monitors specialized monitoring company Report to YM The cost of monitoring will be included in contractor budget **YM** Report to ADB	Control Noise & Vibration, Water and Air Quality at least once a year or depending on complaints received from APs
15. **Landscaping**	Normal growth of trees, shrubs and lawn	All surfaces where landscaping works were performed	Site's visits	Sanitary state and growth of trees, shrubs and lawns	**Contractor** Monitors the state of landscaping and checks the sanitary state and growth of trees and shrubs during the defects liability period. The cost of monitoring will be included in Contractor's budget Report to YM **YM** Landscaping control the sanitary state and growth of trees and shrubs during the operation period. Report to ADB	As required at the end of works and defects liability until signed off as acceptable

ANNEX 5
Alignment Sheet

Road link 3 - Argavand Junction to Shirak Street Urban link road

The following alignment sheet provides an overview of environmentally sensitive hotspots and receptors alongside the Road link 3: Argavand Junction**,** with reference to the project chainage. The alignment sheets serve as a base for identifying localized impacts of the project from the road construction and operation.

No.	Location	Km	Issue	Parameters to be checked during Construction and Operation
1.	Argavand **Junction**	0+500	New bridge construction over Hrazdan river may cause river water pollution	Water quality (See EMP for parameters to be measured during construction activities)
	 			
2.	Argavand **Junction**	0+500	New bridge construction over Hrazdan river may impact a cave, located 50 m away from the alignment, which is likely to be inhabited by rare species of bat.	Disturbance of Bats' habitat (See EMP for parameters to be measured during construction)
				

No.	Location	Km	Issue	Parameters to be checked during Construction and Operation
3.	Argavand **Junction**	0+800 - 1+240	Construction of the Project near Karmir Blur archeological site	Damage to archeological remains (see instructions given on that matter in the EMP - Annex 4)
	 			
4.	Argavand **Junction**	0+800 - 1+150	Accumulations of construction wastes at Karmir Blur archaeological site	Additional waste accumulation on the archeological site (see instructions given on that matter in the EMP - Annex 4)
	 			
5.	Argavand **Junction**	0+800 - 1+250	Construction of the new road near Charbakh cemetery	Damage to archaeological site (see instructions given on that matter in the EMP - Annex 4)

No.	Location	Km	Issue	Parameters to be checked during Construction and Operation
				

No.	Location	Km	Issue	Parameters to be checked during Construction and Operation
6.	Argavand **Junction** (Southern end roundabout)		Nuisances from the noise and vibration to the high school N115 and adjacent residential buildings near the new road right of way	Noise and dust (See EMP for parameters to be measured during construction).
				

ANNEX 6

Results of Noise & Vibration surveys

Road link 3 - Argavand Junction

Conclusion, Point 1

In accordance with the Contract signed by us in two points of the Shirak Street, in Yerevan, measurements of noise and vibration levels were taken. The measurements have been taken by Sergey Karapetyan, Head of Sanitary-Hygienic Department of "Disease Control & Prevention Center" CJSC, M. of HC, RA and by Moses Yeritsyan, an engineer of the same department. In taking measurements first-class OKTAVA 110A MAXIMA sound level meter of 2009 production was used. Every year including 12.11.2012 it was calibrated by the National Institute of Metrology of Ministry of Economics, RA, which has been entitled to carry out activities of the kind.

Selection of measurement points has been made by taking into account the sections which most typify noise and vibration levels of the given road. The measurements have been taken 24 hours incessantly which allows us to come to an average conclusion with respect to traffic volume. In the given sections there were 1000 vehicles per hour during daytime on the average (40% less during night hours).

Based on the survey results, noise measurements performed in 09.10.2013-10.10.2013, at the following address: city Yerevan, Shirak street, building 72 and adjacent areas, all indexes including the level of sound pressure in octave layers with average geometrical frequencies, equivalent sound levels LAeq dBA and maximum sound levels dBA Lmax exceed the requirements specified in the sanitary-hygienic norms /SN N 2III-11.3/, subpoints 4 & 9, Table 3, point 5.

Vibration measurements in the same point have shown that vibration level in octave layers with average geometrical frequencies (Hz) and adjusted levels are consistent with the requirements defined in ՀՆ N 2.2.4-009-06 sanitary-hygienic norms. Organizational, urban development, architectural, traffic regulatory and other measurements can be taken toward the end of improving noise level, which can also incorporate road widening and improvement works which are foreseen.

Attached you will find the results of measurements.

Sergey Karapetyan

MINISTRY OF HEALTH CARE
THE REPUBLIC OF ARMENIA

March 6, 2002 N 138

c. Yerevan

DECREE

ON APPROVING OF N2-III-11.3 SANITARY-HYGIENIC NORMS FOR "NOISE IN WORKPLACES, RESIDENTIAL AND PUBLIC BUILDINGS AND RESIDENTIAL BUILT-UP AREAS"

Table 3

THE PERMISSIBLE LEVELS OF VOICE PRESSURE OF PENETRATING NOISE, NOISE LEVELS, EQUIVALENT AND MAXIMUM SOUND LEVELS IN RESIDENTIAL AND PUBLIC BUILDINGS AND RESIDENTIAL AREAS

N	Significance of buildings and areas	Time of the day (time)	Level of sound pressure in dB octave layers with average geometrical frequency, Hz									Sound levels Lmax and sound equivalent levels Laeq, dBA	Sound levels Lmax, dBA
			31.5	63	125	250	500	1000	2000	4000	8000		
4.	Rooms of apartments, resorts, house-interns for the elderly and disabled, residential areas, bedrooms of kindergartens and school-interns	6^{00} - 22^{00}	79	63	52	45	39	35	32	30	28	40	55
		22^{00}- 6^{00}	72	55	44	35	29	35	32	20	18	30	45
9.	Adjacent/neighboring areas of residential buildings, polyclinics, dispensaries, resorts, house-interns for the elderly and disabled, kindergartens, schools and other educational institutions and library buildings	6^{00} - 22^{00}	90	75	66	59	54	50	47	45	44	55	70
		22^{00}- 6^{00}	83	67	57	49	44	40	37	35	33	45	60

Note
2. In hotels and hostels and areas adjoining main streets of urban and rural significance and railway lines, 2m away from structures enclosed by residential areas, which are protected from noise, equivalent and maximum noise levels caused by car and railway traffic on dBA is permitted to receive 10 dBA more than the quantities mentioned in Table 3, lines 9 & 10 (correction =+10dBA).

THE PERMISSIBLE LEVELS OF VIBRATION IN RESIDENTIAL ROOMS, HOSPITAL ROOMS AND RESORTS

Octave layers with average geometrical frequency Hz	Permissible values on X_0, Y_0 and Z_0 axes	
	Acceleration of vibration	
	m/sec $.10^{-3}$	dB
2	4	72
4	4,5	73
8	5,6	75
16	11	81
31,5	22	87
63	45	93
Adjusted values and equivalent adjusted values and their levels	4	72

1. During daytime it is allowed to exceed the permissible level by 5 dB.

2. There is correction for permissible levels of non permanent vibration, which becomes 10dB, and and absolute values are multiplied by 0,32.

3. For hospital rooms, resorts, infant and pre-school organizations it is necessary to reduce the permissible levels of vibration by 3dB.

9. Area drawing with reference to source of noise/vibration (of the site, hand-guided tools)
Sequence numbers of measurement points

Conclusion:

As a result of measurement the noise level in italicized points, in octave layers of sound pressure the equivalent and maximum sound levels exceed requirements specified according to sanitary-hygienic norms /SN N 2III-11.3/

Note:

When summing up the results of measurements, traffic intensity was taken into account (day time, on the average 1000 cars/per hour, night time- 600 cars/per hour), SN N 2III-11.3 sanitary norms, table 3 of point 5, subpoints 4 and 9 and point 2 of the note

Sanitary doctor Head of the Dep. of San.hyg. S. Karapetyan
(name, middle name, surname, position)

signature

RA Ministry of Health Care		Medical Document
Name of Institution		

Protocol

Of

Noise Measurement

09.10.2013 – 10.10.2013

1. Location of measurement: **Yerevan, Shirak 72**
(Name of the object)
(Address)

2. The measurements have been taken in presence of the representative of the object surveyed
(position, name, middle name, surname)

3. Means of measurement: OKTAVA-110A MAXIMA Sound Level Meter
(name, mark)

N 3292
(inventory number)

4. Information on state control
(date)

N 009069 as of 12.11.2012, is in force untill 12.11.2013
(certificate number, reference)

5.Normative-technical documents, according to which measurements have been taken and conclusion was drawn
SN N 2 III -11.3 ՍՅ N 43-001-07

6. Main sources of noise and its description
Traffic

8. Results of noise measurements

z/z	Measurement location	Noise Description							Time of day at the moment of measurement	Level of sound pressure (dB) in octave layers with average geometrical frequency (Hz).									Sound levels (La) and equivalent sound levels Laeq dBA	Maximum sound level dBA (Lmax)
		According to spectrum		According to time description						31,5	63	125	250	500	1000	2000	4000	8000		
		widely spread	tonal	constant	fluctuating	intermittent	impulsive	traffic												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Marginal Permissible values for residential areas									06^{00}-22^{00}	***79***	***63***	***52***	***45***	***39***	***35***	***32***	***30***	***28***	***40***	***55***
									22^{00}-06^{00}	***72***	***55***	***44***	***35***	***29***	***35***	***32***	***20***	***18***	***30***	***45***
Marginal Permissible values for adjacent areas									06^{00}-22^{00}	***90***	***75***	***66***	***59***	***54***	***50***	***47***	***45***	***44***	***65***	***80***
									22^{00}-06^{00}	***83***	***67***	***57***	***49***	***44***	***40***	***37***	***35***	***33***	***55***	***70***
1.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	18^{00}-20^{00}	74,48	**78,80**	**74,95**	**69,51**	**67,95**	**65,61**	**62,26**	**56,17**	**49,49**	**70,54**	**84,62**
2.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		48,95	58,57	**53,60**	**50,48**	**50,36**	**48,21**	**45,32**	**36,84**	**28,79**	**52,79**	**69,11**
3.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	20^{00}-22^{00}	75,45	**79,30**	**75,42**	**69,82**	**68,20**	**65,70**	**62,25**	**56,14**	**49,56**	**70,78**	**85,09**
4.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		49,05	59,40	**54,64**	**49,88**	**50,20**	**48,20**	**41,82**	**34,09**	27,85	**52,02**	**70,19**
5.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	22^{00}-24^{00}	67,59	**75,81**	**70,13**	**66,82**	**65,14**	**64,89**	**60,46**	**51,48**	**41,80**	**67,57**	**80,39**
6.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		47,77	**58,11**	**53,54**	**48,68**	**48,95**	**46,84**	**40,35**	**32,80**	**26,67**	**50,72**	**67,33**
7.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	00^{00}-02^{00}	64,07	**72,67**	**67,49**	**63,19**	**61,06**	**60,97**	**57,61**	**47,09**	**37,33**	**63,08**	**75,67**
8.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		37,65	44,45	39,14	**39,14**	**40,78**	**37,27**	**33,39**	**23,99**	17,20	**41,19**	**50,44**
9.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	02^{00}-04^{00}	62,09	**70,66**	**64,12**	**60,52**	**59,33**	**56,54**	**52,19**	**42,18**	**33,27**	**58,77**	64,22
10.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		37,28	43,51	37,65	**38,04**	**37,64**	**35,21**	**30,58**	**21,08**	16,59	**39,35**	**47,61**

11.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	04^{00}-06^{00}	62,25	**69,24**	**65,09**	**60,54**	**60,69**	**57,47**	**53,09**	**43,08**	**34,28**	**59,89**	64,08
12.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		38,29	43,58	38,54	**38,95**	**38,05**	**35,55**	**31,41**	**22,04**	18,09	**40,46**	**47,99**
13.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	06^{00}-08^{00}	66,63	72,95	**72,40**	**65,42**	**62,64**	**60,83**	**56,22**	**50,76**	41,02	**65,54**	77,58
14.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		47,05	50,39	44,92	44,23	**42,33**	**40,81**	**37,88**	28,29	23,71	**45,17**	54,48
15.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	08^{00}-10^{00}	74,34	**78,94**	**75,71**	**69,77**	**67,13**	**64,32**	**61,58**	**55,70**	**47,88**	**69,85**	**81,33**
16.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		54,77	60,11	**55,54**	**50,68**	**50,95**	**48,84**	**42,35**	**34,80**	**28,67**	**52,22**	**66,77**
17.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	10^{00}-12^{00}	74,98	**77,63**	**77,12**	**68,41**	**68,34**	**63,64**	**60,81**	**54,32**	**47,07**	**70,29**	**85,19**
18.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		55,83	59,30	**55,28**	**51,13**	**50,57**	**48,12**	**42,04**	**34,18**	**29,75**	**52,47**	**68,77**
19.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	12^{00}-14^{00}	73,80	**79,88**	**76,88**	**70,52**	**68,10**	**64,71**	**61,95**	**56,43**	**47,83**	**70,52**	**87,20**
20.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		56,52	61,07	**57,29**	**52,09**	**52,50**	**50,14**	**43,36**	**36,05**	**30,19**	**54,08**	**68,09**
21.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	14^{00}-16^{00}	74,31	**79,16**	**75,33**	**69,85**	**68,28**	**65,79**	**62,41**	**56,34**	**49,80**	**70,79**	**85,71**
22.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		55,77	62,90	**58,00**	**52,94**	**52,41**	**49,10**	**43,01**	**36,93**	**29,28**	**52,85**	**68,28**
23.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+						+	16^{00}-18^{00}	72,49	**79,30**	**76,22**	**70,13**	**67,52**	**64,45**	**61,62**	**55,96**	**47,88**	**70,09**	**83,33**
24.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+						+		54,71	62,65	**58,93**	**53,27**	**53,87**	**51,26**	**43,31**	**36,23**	**28,87**	**52,77**	**65,49**

Measurement is performed by Engineer M. Yeritsyan Signature

(position and full name)

9. Area drawing (of the site, hand-guided tools) with reference to source of noise (vibration). Sequence numbers of measurement points.

Conclusion

As a result of measurement the vibration acceleration level in octave layers with average geometrical frequencies (Hz), the adjusted levels are consistent with the requirements of sanitary-hygienic norms /ՀՆ N 2.2.4-009-06/

Note

When summing up the results of measurements, traffic intensity was taken into account (day time, on the average 1000 cars/per hour, night time- 600 cars/per hour), ՀՆ N 2.2.4-009-06 sanitary norms, table 7 of point 6.

Sanitary doctor — Head of the Dep. of San.hyg. S. Karapetyan
(name, surname, middle name, position)

Signature

RA Ministry of Health Care		Medical Document
Name of the Institution		

Protocol

of vibration measurement

09.10.2013-10.10.2013

1. Place of measurement: Yerevan, Shirak 72
(Name of the object)

(Address)

2. The measurements have been taken in presence of the representative of the object surveyed
(position, name, second name, middle name, surname)

3. Means of measurement: OKTAVA-110A MAXIMA Sound Level Meter
(name, mark)

N 3292
(inventory number)

4. Information on state control
(date)

N 009069 as of 12.11.2012, is in force untill 12.11.2013
(certificate number, reference)

5. Normative-technical documents, according to which measurements have been taken and conclusion was made

ՀՆ N 2.2.4-009-06

6. Main sources of vibration and its description

means of transport/traffic

8. Results of vibration measurements

z/z	Measurement location (for industiral location to speicfy type, model and other passport details of machinery/equipment)	Type of vibration				Time of day at the moment of measurement	Adjacent level of vibration acceleration (dB) in octave layer with avarage geometrical frequency (Hz).						Adjustment level of vibration acceleration, dB
		total			local		local						
		traffic	Transport-operating /processing	operating /processing			2	4	8	16	31,5	63	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				18^{00}-20^{00}	75,07	67,70	61,89	61,14	59,13	56,23	77,74
2.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					71,18	57,16	55,59	55,97	58,71	54,44	68,25
3.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				20^{00}-22^{00}	75,69	67,49	62,48	62,54	60,01	57,44	78,08
4.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					69,45	60,92	55,25	56,26	58,72	55,39	69,76
5.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				22^{00}-24^{00}	65,11	61,25	57,05	55,35	57,72	56,79	72,01
6.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					61,92	54,77	55,71	54,53	58,34	53,32	64,68
7.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				00^{00}-02^{00}	63,22	59,88	55,21	53,26	54,98	54,38	68,01
8.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					58,08	51,46	54,44	52,39	56,81	51,19	63,87
9.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				02^{00}-04^{00}	59,26	58,49	54,64	55,89	55,29	53,36	66,28
10.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					56,36	54,73	54,03	54,72	51,09	50,11	62,71
11.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				04^{00}-06^{00}	58,69	57,49	55,29	56,08	55,68	53,33	66,01
12.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					57,28	55,19	53,68	54,49	52,01	51,52	63,08
13.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				06^{00}-08^{00}	65,11	63,83	57,05	53,35	55,72	57,79	73,40

14.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					64,21	57,18	55,62	56,21	58,79	55,86	67,82
15.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				08^{00}-10^{00}	67,08	65,23	61,68	56,12	57,93	55,27	74,81
16.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					62,70	58,90	56,25	55,41	58,62	54,78	68,45
17.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				10^{00}-12^{00}	68,79	66,02	60,79	56,74	58,69	56,69	76,35
18.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					57,32	55,86	55,91	55,64	56,16	54,73	68,58
19.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				12^{00}-14^{00}	69,17	68,34	60,79	61,01	58,88	56,79	77,54
20.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					63,45	60,92	55,25	56,26	58,72	55,39	69,76
21.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				14^{00}-16^{00}	71,26	68,53	62,43	62,32	59,73	57,90	75,73
22.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					65,28	61,41	55,01	56,45	58,04	54,87	68,67
23.	Shirak 72 (adjacent area) 40° 08'58,29" 44°27'05,33"	+				16^{00}-18^{00}	75,26	69,34	63,35	66,44	59,37	56,92	76,68
24.	Shirak 72 (2-nd floor) 40° 08'58,29" 44°27'05,33"	+					66,64	62,06	56,14	57,01	58,79	55,21	69,01

Measurement is performed by M.Yeritsyan
(position and name)

Signature

ANNEX 7

Results of Water quality analysis of Hrazdan River (24.10.2013)

Road link 3 - Argavand Junction

Name of Employer: **"Egis International"** organization
Sampling Date: 10.10.2013.
Date of issuing results 24.10.2013.

Results of hydrobiological survey of the Hrazdan River according to macroinvertebrates

Category	Class	Family	Species	Number of Animals
Insecta	Ephemeroptera	Baetidae		450
Insecta	Trichoptera	Hydropsichidae		100
Insecta	Diptera	Tipulidae		33
Insecta	Diptera	Chironomidae		500
Insecta	Diptera	Simulidae		600
Moluscs	Gastropoda	Gyraulus		60
Moluscs	Gastropoda	Planorbidae	Ancylus	70
Moluscs	Gastropoda	Physidae		90
Malocostraca	Amphipoda	Gammaridae	Gammarus	40
Annelida	Hirudinea	Rhynchobdellida	Haemopidae	300

Deputy Head of Scientific Affairs L. Margaryan

Name of Employer: "Egis International" organization
Sampling Date: 10.10.2013
Date of issuing results: 24.10.2013.

Results of hydrobiological survey of the Hrazdan River according to phytoplankton

	Measurement Unit	Determined Quantity
Bacillariophyta		
Stephanodiscus	cell/liter	208.000
Diatoma vulgare	cell/liter	68.000
Navicula	cell/liter	140.000
Pinnularia	cell/liter	40.000
Surirella	cell/liter	20.000
Cymatopleura elliptica	cell/liter	12.000
Cocconeis	cell/liter	12.000
Cymbella	cell/liter	4.000
Diatoma hiemale	cell/liter	12.000
Nitzschia	cell/liter	4.000
Roicoshenia	cell/liter	24.000
Cyanophyta		
Gloeocapsa sanguiena	cell/liter	16.000
Aphanoth. Clatrata	cell/liter	28.000
Spirulina abbreviata	cell/liter	32.000
Microcystys	cell/liter	4.000
Chlorophyta		
Scenedesmus quadricauda	cell/liter	84.000
Scenedesmus acuminatus	cell/liter	16.000

Name of Employer: "Egis International" organization
Sampling Date: 10.10.2013
Date of issuing results: 24.10.2013.

Results of hydrochemical analysis of the Hrazdan River

#	Measured Index	Unit	Value measured	Method used
1	Water temperature	^{o}C	13,92	Electrochemical
2	Permeability	cm	31	Visual
3	suspended particles	mg/l	3,0	Gravimetric
4	Color	Degree	10,00	Visual
6	Dissolved oxygen	mg/l	7,10	Electrochemical
7	Oxygen saturation	%	69,00	Electrochemical
8	Index of hydrogen	pH	7,96	Potentiometric
9	Rigidity	mgeq/l	6,58	Computation/calculation
10	Hydrocarbonate ion	mg/l	225,77	Retrospective titrate
11	Sulfate ion	mg/l	230,65	IC
12	Chloride ion	mg/l	62,92	IC
13	Nitrate ion	mg/l	21,81	IC
14	Nitrate ion	mg/l	1,1879	Spectrophotometric
15	Ammonium ion	mg/l	3,5772	Spectrophotometric
16	Phposphates	mg/l	12,003	IC
17	Sillicium	mg/l	25,732	Spectrophotometric
18	TDS_5	mg O_2/l	4,370	Electrochemical
19	Bichromatic oxidation	mg O/l	32	Bichromatic oxidation
20	Specific electroconductivity	միկրոսիմ./cm^2	1105	Electrochemical
21	COD mineralization	mg/l	719	Electrochemical
22	Li	mg/l	0,0241	ICP-MS
23	Be	mg/l	0,000014	ICP-MS
24	B	mg/l	0,3969	ICP-MS
25	Na	mg/l	122,718	ICP-MS
26	Mg	mg/l	30,706	ICP-MS
27	Al	mg/l	0,0838	ICP-MS
28	P	mg/l	0,8273	ICP-MS
29	K	mg/l	9,629	ICP-MS

30	Ca	mg/l	80,49	ICP-MS
31	Ti	mg/l	0,0125	ICP-MS
32	V	mg/l	0,02536	ICP-MS
33	Cr	mg/l	0,00282	ICP-MS
#	**Measured Index**	**Unit**	**Value measured**	**Method used**
34	Fe	mg/l	0,14526	ICP-MS
35	Mn	mg/l	0,03925	ICP-MS
36	Co	mg/l	0,00036	ICP-MS
37	Ni	mg/l	0,00184	ICP-MS
38	Cu	mg/l	0,00236	ICP-MS
39	Zn	mg/l	0,00398	ICP-MS
40	As	mg/l	0,00421	ICP-MS
41	Sr	mg/l	0,9391	ICP-MS
42	Mo	mg/l	0,0093	ICP-MS
43	Cd	mg/l	0,00001	ICP-MS
44	Sn	mg/l	0,00005	ICP-MS
45	Sb	mg/l	0,00045	ICP-MS
46	Ba	mg/l	0,03428	ICP-MS
47	Pb	mg/l	0,00057	ICP-MS

Method used: IC-ion chromatography, ICP-MS- Inductively coupled plasma mass spectrometry

Heads

Deputy Head of Scientific Affairs L. Margaryan

Head of Data Analysis and Preservation Department A. Hovhannisyan

TDS- Total dissolved solids
COD -chemical oxigen demand

Name of Employer: **"Egis International"** rganization
Sampling Date: 10.10.2013.
Date of issuing results 24.10.2013.

Determined Value of Chemical Indexes in the floor sediments of Hrazdan

#	Measured Index	Unit	Value measured	Method used
1	Li	g/kg	0,0062	ICP-MS
2	Be	g/kg	0,001383	ICP-MS
3	B	g/kg	0,0890	ICP-MS
4	Na	g/kg	8,701	ICP-MS
5	Mg	g/kg	0,112	ICP-MS
6	Al	g/kg	26,0607	ICP-MS
7	P	g/kg	0,7947	ICP-MS
8	K	g/kg	15,708	ICP-MS
9	Ca	g/kg	0,47	ICP-MS
10	Ti	g/kg	6,6013	ICP-MS
11	V	g/kg	0,11351	ICP-MS
12	Cr	g/kg	0,07300	ICP-MS
13	Fe	g/kg	33,21309	ICP-MS
14	Mn	g/kg	0,52472	ICP-MS
15	Co	g/kg	0,01557	ICP-MS
16	Ni	g/kg	0,05607	ICP-MS
17	Cu	g/kg	0,05325	ICP-MS
18	Zn	g/kg	0,08616	ICP-MS
19	As	g/kg	0,00671	ICP-MS
20	Se	g/kg	0,00713	ICP-MS
21	Sr	g/kg	0,1093	ICP-MS
22	Mo	g/kg	0,0029	ICP-MS
23	Cd	g/kg	0,00036	ICP-MS
24	Sn	g/kg	0,00426	ICP-MS
25	Sb	g/kg	0,00232	ICP-MS
26	Ba	g/kg	0,09739	ICP-MS
27	Pb	g/kg	0,01085	ICP-MS

Method used: IC-ion chromatography, ICP-MS- Inductively coupled plasma mass spectrometry Heads

Deputy Head of Scientific Affairs L. Margaryan
Head of Data Analysis and Preservation Department A. Hovhannisyan

ENVIRONMENTAL IMPACT MONITORING CENTER

STATE NON COMMERCIAL ORGANIZATION

Name of Employer: "**Egis International"**
Date of sampling: 10.10.2013.
Date of issuing results 24.10.2013.

Results of hydrobiological survey of water of the Hrazdan River according to macrophytes data

The macrophyte coverage in the coastal zone of the investigated area is 30%, along the shore is 40%. The following types have been discovered:

1. Chara vulgaris L. (as a predominant type)
2. Lemna trisulca L.
3. Lemna minor L.
4. Phragmites australis (Cav.) Trin. ex Steud.
5. Polygonum amphibium L.
6. Sagittaria sagittifolia L.

Deputy Head of Scientific Affairs L. Margaryan

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ANNEX 8

Results of the counting of community trees and shrubs (18.11.2013)

Road Link 3 - Argavand junction

Armine Yedigaryan
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Tel: +374 91 727245

In order to confirm the number of trees that were counted during the site visit of January 2013 (see annex 2) and for the final version of the EIA study report of Project 1 – Road link 3, a site visit was organized on 18 November 2013 with an social specialist of Egis international. Project 1 road alignments are located within highly-modified urban and industrial areas.

Street trees are providing important benefits for the community such as improvement of the microclimate of the street (shade in the summer), protection from wind and snow accumulation and improvement of the visual aspect of the streetscape.

A total of 10 small to medium trees (10cm to 40cm at DBH), 4 shrubs were counted along the Argavand Junction to Shirak Street. Trees and shrubs species found include poplar, willow, ash, maple, beech, oak.

Mitigation measures presented in the EMP emphasize the fact that tree cutting should be minimized and recommend to “bole out” trees and replant to the adjacent areas. In cases where there is no option but to cut down trees and remove shrubs, a replanting scheme with the ratio of 6:1 native trees and shrubs seedlings for each tree or shrubs that has been cut down will be implemented.

ANNEX 9

Kamir Blur Archeological Report (August.2013)

Road link 2 - New Shirak Street and Artashat Highway urban link roads
Road link 3 - Argavand Junction to Shirak Street urban link road

"SCIENTIFIC RESEARCH CENTER OF HISTORICAL AND CULTURAL HERITAGE" SNCO
MINISTRY OF CULTURE

RESULTS OF EXCAVATIONS OF KARMIR BLUR

Current Report on works carried out in August, 2013

Director: H.E. Simonyan

Yerevan 2013

Since the beginning of August, 2013 the expedition of scientific research center of historical cultural heritage undertook excavations of the Karmir Blur settlement. The expedition included H. Simonyan (the head), H. Badalyan (Deputy Head), V. Margaryan, L. Mkrtchyan, M. Melkonyan, S. Manoukyan (heads of units), architect K. Ghafadaryan, anthropologist R. Mkrtchyan and more than 50 excavating laboreres.

The settlement of Karmir Blur is situated in the west and south of the citadel, to the south of the canyon of the Hrazdan River. The ancient settlement occupies an area of more than 40 hectares. It was protected by an enclosure in the eastern part, which reached the south inclining 300 m under right angle. The enclosure ended with a huge tower, which most probably had an entrance[1].

Since 1940's extensive excavations have been carried out both in the citadel and in the settlement. As a result of excavations carried out in the settlement a number of structures such as "The multi-section house", "The house of a famous Urartian" and othere structures were opened.

At present the cemetery of "Verin Charbakh" is located in the southern part of the settlement. According to the Project of Yerevan Municipality a new, asphalted road shall be constructed here and a bridge shall be constructed on the Hrazdan canyon, which is one of the roads to bypass the center of Yerevan. With this aim of road building works the expedition is carrying out reconaissance excavations and research in order to avoid possible damage and demolition of the monument.

For the excavations 10 reconaissance sites have been outlined, each having 4x16 m area. The sites were divided into squares of 4x4 m area. In August, in the first phase of excavations, we carried out excavations in 5 sites simultanously, 3 of them will be excavated further in September as well. In each site an archeologist, a head of unit and 10 excavating laborors are working. Two workers are engaged in cleaning and disposing the unearthed finding (pottery) in clean sacks. Excavation works are implemented with small tools such as small pickaxe, trowels and brushes. The whole unearthed ground with volume of 10 m^3 was indispensably sifted by small sieves specially made for excavations thus excluding loss of any archeological finding. A great number of (like

[1] B. B. Piotrovskiy, Karmir Blur II. Results of excavations, 1949-1950, page. 79

ten trucks) stones were displaced in carts and disposed in separate areas, far from the site. As a result of those works in two of the sites we had considerable achievements, which are elaborated on below:

SITE N 1

Site N 1 is located to the south of site N 2 and has a direction of north-east-south-west. The northern part of the site was ruined and was full of contemporary rubbish-heap. There was a pipe in the square IV of the north-eastern part. When installing that pipe upper layers and layer I of the site (Table 1, picture 1) were destroyed.

During excavations of Upper layers and layer I a great number of archeological materials (pottery, obsidian scobs, scales, etc.) were discovered. The pottery (ceramics) were basically different parts of black and grey, plain kitchen vessels, including some fragments of ornaments. The most interesting finding from the Upper layer was the flat, button-like bead with a hole, made of reddish-orange sardion found in square IV (Table 2, picture 5).

During the excavations of Karmir Blur, in August the first serious finding was the discovery of a tomb N 1 in the center of site N 1. The tomb was in cromlech, which was preserved almost completely. It was basically made of small and midium rubbles. Its diameter was 3,5 m (Table 1, picture 3-6). Inside the cromlech, in the center, at the junction of square I and II tomb-cell was opened. It was a subterranean cell, which had been dug in solidified smooth/flat ground. The tomb-cell which has a north-south direction, has the shape of an oval. In the northern and north-eastern part of the cell there was a preserved segment coming down to the bottom of the tomb. It resembled a rubble masonry. A fill of rubbles with 70-80 cm height was implemented inside the tomb. In the lower layer of 30-35 cm there was a soft, light color alumina without any stone, which covered the deceased and the accompanying materials. Throughout the cell, from upper and lower parts small and medium fragments (parts of edges, bottom, body) were discovered.

It was a catacomb. The walls came down vertically widening in the lower part makig into delves. There were delves in the southern, eastern and northern parts of the tomb. The biggest delve was the northern one. Its depth was 75 cm, the length was 50 cm, the opening was 110 cm. From the northern delve animal and human bones, ceramic fragments (parts of edges, body and bottom) were discovered. They were obvious traces of ashes from both inside and outside, which makes us think that a ceremony of cremation took place there.

In the northern part of the tomb-cell the burial property was set up: pots/vessels in three rows (Table 2, picture 3-4).

Vessel I was in the south-western part of the row. It was a jug having no handle, with narrow aperture, narrower neck, spherical trunk, black surface. On the trunk, under the neck some ornaments were preserved.

Vessel II was in the middle of the two jugs. It was a pot with wide opening, short and inflated trunk and with no handle. On the trunk of black surface nail ornaments were depicted.

Vessel III was in the north-eastern part of the row. It was like the first jug having no handle, with narrow neck and opening. But it was different in its size; it was smaller. The trunk of this jug was also decorated by ornaments.

In the tomb-cell two people had been buried.

The first skeleton was in the center of the cell towards north-south. The deceased lied huddled on the leftside with his legs bent like a V form. The left hand was bent from the part of elbow and wrist, and was in the direction of the collarbone, towards the eastern wall. The left wrist was directed to the right wrist tightly huddled from the left side of the face. The right hand was sagged upwards in the elbow joint. The deceased was liying with his head towards the north with a small inclination toward the north-east (with his head towards the east). On the right leg there were two complete rib bones and a femur (thigh bone) of a cattle (a large corneous/horned animal). Under the conjunctures of the thumb of the left leg a tooth of a cattle was detected. The existence of the bones of a cattle testifies that a sacrifice had been made there, but not all the parts of the animal were placed in the tomb-cell. The deceased was a heavy-set female, in her forties (Table 2, picture 3-4).

On the phalanx of the fourth finger of her left hand a flat and wide bronze ring was found. Another ring was detected on the right foot. Near the eye orbits, about 15 cm away from the eastern wall an iron thing was found, which resembled an arrow. Among the metal stuff were the bronze ring with its ending being thinner. It was probably an earring (Table 2, pictures 7-8). Besides these things, button-like and barrel-formed beads made of reddish-umber sardion were also discovered from the ground of the tomb-cell. (Table 2, pic. 6):

The second deceased was lying in the direction of east-west with his head toward the west. Most of the skeleton was in the southern delve. The legs of the deceased were tightly bent towards the face. The legs were crossed with the knees leaned on the face. The hands and fingers of the deceased were disjointed. Probably the head had also been disjointed. The neck vertebraes, the breastbones (sternum), collarbones of the skeleton were missing. The relics and one of the hipbones were insitu. The deceased was a teenager[2] of about 14-16 age. The carcasses/skeletons and the materials were discovered in the depth of 95-105 cm.

So, in the tomb of a common civilian dating to Urartian era, in the 8-6 centuries B.C. we see burials most likely being accompanied by the ceremonies of cremation, corpse laying, and dismemberment of a corpse. The first one was the burial of the woman, the second was that of the teenager and the third was done in the delve. The excavations of the third one have not been finished yet and further studies/research will either approve or refute this hypothesis.

---

[2] The bones have been studied onsite by an anthropologist R. Mkrtchyan.

Authors H. Badalyan, M. Melkonyan

1

2

3 

4 

5 

6 

Table 1, 1-2 Overall picture of Site N 1 after the excavations of layer I. The cromlech of the tomb opened in Site 3-6, N 1 from the East, West and North. The tomb-cell before excavations.

1 

2 

3 

4 

5 

6 

7 

8 

Table 2, during the excavations of the tomb-cell N 1 of Site 1-2 N 1. In 3-4 it is a burial of a woman with accompanying materials. Beads discovered from Site 5-6 and the tomb. Earring discovered from Tomb 7-8.

SITE N 2

Excavation site N 2 is situated a few meters away (to the East) from the excavation site N 3. It has a small slope/curvature towards south-west. It consists of 4 squares.

On the first day the grass cover and the debris of the area were removed, later on removal work of turf was started. Under the turf there was a dense layer of stones throughout the area of the excavation site. They were boulders; only the stones of square III were different. They were bigger in size and there was a pile. A few fragments of black pottery (ceramics) were found. From square IV, segment b they found a bottom of ceramics divided into two parts.

During the next day a great number of huge pieces of oxidized iron, obsidian scobs, broken rocks and a few fragments of ceramics were found.

After removing the soil and the small stones it turned out that the pile of stones was basically in the segment a of square III and in the segment b of square IV. After removal of the turf we got to the layer I. On the second day of the excavations, from the top of the stone pile in segment b of square IV we found a heavy metal bowl/ball, with a groove line lengthwise crossing its ceter. On the same day in Square IV stone semicircles were delineated, which were covered with fills. On August 11 the turf was removed from all the 4 squares and they were ready for photography. During the same day in the square b8 the upper part of the handle of a small macadam vial was detected, which had been merged with the crown in the upper part. A small fragment of a bronze was found in segment a7, square IV. In the square III there are also rotten stumps of a tree. Throughout the whole site rotten roots of a tree are dispersed. On August 12, from the top of the stone pile of Square III, segment a5 a thick /pot or jar/fragment of ceramics was found which was reduced to ashes. During the next two days broken rocks, obsidian and colored glass were found. The gloss layer on the glass is coming out easily. Since August 16 we have started to sift the soil; soil excavation of each square is sifted separately. Besides small pieces of ceramics, edges of earthen vessel are coming out. A round obsidian bowl came out from Square II, segment a3. It was completely covered with sediment. You will sporadically find there stones resembling stone tools, which will be reasearched further to find out what they had been used for. On August 17 a coin with the image of Stalin was discovered from Square I, segment a1, from 14 cm of depth. It testifies that we had not reached a clear cultural layer. On the same day a small part of a handle of a macadam vial was found from 12 cm of depth, in Square IV,

segment a8. It was like the finding detected on August 11. There was a big pile of stones in Square IV, segment b and a filling was implemented in segment a. A big basalt stone was found in Square I.

A piece of bronze was discovered from 22 cm of depth, in Square III, segment b6. From 26 cm of depth a frontal tooth of lower part of a denture was found and from 20 cm of depth a cheek tooth was found. On August 24 another tooth was found from square IV, segment b7. A complete handle of a earthen vessel (ceramics) was found from 50 cm of depth in Square III, segment b6. Since August 25 the quantity of ceramic fragments has increased in square IV, segments a7, b7, Square III, segments b6, a6. In the same places bones were found during the next days of excavations.

A great number of ceramics and bones were found from a small corner of segment b2, Square I. It turned out that an animal sacrifice had been made in that place next to the basalt cobblestone.

On August 25 throughout the site excavatation works of layer II started. On August 26 Square II was enlarged/magnified, since a possible tomb near the cobble had to be excavated completely. The new square V (2×3) is located next to square I.

The bone found from 31 cm of depth in Square III, segment a6, is a tibia (shinbone) of a human leg. Another complete handle was found in square IV, segment b7. It had an overhead semicircle with a small hole in the middle.

On August 31 the cromlech/tomb which was located in square IV was clearly opened. The external part from the south is left out of the square. The central part is completely located in segment a7 of the square. The diameter of the external area of the cromlech is 3 m 45 cm. The inner area, which is covered by a cement-like solid material, has 97 cm of width, but from the upper part of the area the head of the cromlech can be seen.

From the south-west part of the external area a large fragment of a black vessel edge was found which had been sunk under the the stones of the area /27 cm of depth/.

The fragments of an earthen vessel (ceramics) discovered so far are mainly black and dark grey. Sporadically fragments of Urartian red vessels can be found, small fragments of brown earthen vessels (ceramics) are very rare.

Author S. Manukyan

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Table 3, overall picture of the Site 1-2 N 2. A child's funeral found out in Site 3-4, II. A compressed vessel discovered from excavations 5-6.


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Table 4, 1-4, fragments of an earthen vessel (ceramics) discovered in Site N 2. 5-6, dimpled stone. 7, a cromlech opened in Site II.

SITE N 3

Site N 3 is located in the western part, next to site N 2. Like all other sites it is a rectangular having 16x4 m area, which was also divided into squares of 4x4. The site of excavations was 3000 locus.

The upper layer (about 10 cm of thickness) of the Site was covered with plentiful dry vegetation. A great number of stones could be seen in the soft mold. In the south-western part of the site, square I there was a hill of contemporary household and construction debris; its height was up to 1-1,2 m. During excavations of the upper layer contemporary things (mainly household and construction waste, metal stuff, a great number of huge asphalt and concrete pieces, etc) were found.

However from the upper layer and all squares of the site archeological materials were discovered, which are chronologically divided into two groups: urartian and late medieval eras.

Among materials of the Urartian era pottery ware (ceramics) is prevailing. They were discovered in the form of fragments; they are parts of different kitchen, common pots and jugs, which have black and grey surface and are product of the local culture. Also bones of different animals (mainly those of small cattle), obsidian scobs, scales and a nucleus were found.

The next group of materials discovered from this layer are fragments of late medievel glazed pottery (ceramics) and plain pottery. Glaze is basically of dark green color and plain pottery has yellowish and umber color. Both fragments of glaze-covered pottery and plain pottery belong to medium and large kitchen and storage vessels.

The structure of the soil didn't change in layers II and III and in all squares of up to 60 cm depth contemporary household and construction debris could be seen. Here different iron pieces and parts of tools were found.

A cement-concrete pipe was found in layer II, square II. In this layer cement-concrete and asphalt pieces were continually detected. In the northern and southern parts of square II two round pits of ash layers were opened. They were full of contemporary things. It's worth mentioning that except for square IV, where the depth of mixed soil layer reached 40-45 cm, in all other squares it continued up to 60 cm, after which the main cultural layer was opened in layer IV. Excavations of that layer will continue in September.

From these mixed and destroyed layers and different squares of the site fragments of pottery (ceramics) dating to Urartian and late medieval eras and other things were discovered.

Author H. Badalyan

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Table 5, 1-2 Site N 3 after the excavations of layer I. 3-4, traces of contemporary pipe in Site III. 5-6, after the excavations of layer III.

SITE N 4

In August of 2013 arcehological excavations were carried out in site N 4 of Karmir Blur, which is located in the north-western part of Urartian multi-section structure[2].

Pic. 1 Site N4 is marked in red.

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[2]In Site N 4 excavations were carried out by Levon Mkrtchyan (head of the unit), students of YSU, Faculty of History, Hayk Gyulamiryan, Astgh Poghosyan, Narine Sargsyan, Anahit Poghosyan, Anahit Safaryan, Amalik Saryan, Ruben Minasyan, an engineer from YSECU, Davit Petrosyan and by a volunteer Narine Petrosyan, who lives in Russia (10 people).

Site N 4 (16x4 m) had been previously divided into 4 parts (4x4 m) with a result of 4000 locuses according to 60 Locus accretion. Since the excavations were to be carried out adjacent to the Urartian multi-section structure, so we had great expectations concerning cultural findings. To make the process of giving locuses to the findings easier, the sections previously divided into 4 parts were in their turn divided into 4 parts. The site was divided into 2 parts lengthwise: **a** and **b**. We got the following picture for starting excavations.

8	7	6	5	4	3	2	1
4840	4720	4600	4480	4360	4240	4120	4000Loc.
4900	4780	4660	4540	4420	4300	4180	4060

N

Pic. 2 Diagram for Site N 4

It's woth mentioning that before excavations Site N 4 was an area with heterogeneous earth cover (various kind of fills) and non flat surface (with sporadic hillocks). We believe that the above-mentioned hillocks are the (sifted) fills of soil mass from excavations carried out in previous years (1947-1958).

During cleaning and removal of the upper layer, the condition of earth cover became visible, where new fill with sand and layer of ash was conspicuous in part b, segment b1 and partially in b2. This mass of approximate 5 cm of depth was over in a graveled surface. The biggest hillock was in segments a 7, 8 b 7, 8, from where about 60-65 cm soil layer was removed. It was a fragile mass which was easy to dig.

During removal works of the first layer (August 13-20) in segments b 1, 2, 3 and 4 a gravelled surface was opened. It was necessary to find out dispersion of the gravelled surface in the site, which could be the end of actual cultural activities. Therefore leaving ledged cuts in b 1, 2 we delved into a 1 and 2 segments, where dark soil mass could be discerned. From here fragments of ceramics continued to come out. A similar dark colored soil mass could be seen in segments a 5 and 6. From here during removal works of soil layers a segment with more solid surface was opened, which resembled a floor/bottom at first sight. The issue was whether the opened rigid mass is a bottom and in what direction it extends.

During removal of the second layer (August 20-23) it was clearer that we are handling with a floor/bottom, which extended towards segments a 7 and 8. Working force of the unit was focused on segments a 1 and 2, b 1 and 2 to find out how long the dark layer of soil extends and what is its correlation with graveled segments of previous layers. In segments a 7

and 8, b 7 and 8 where fragile layer was still there we wanted to find out how long the opened floor in adjacent segment extends in these segments. In segments a 1 and 2, b 1 and 2, where ledged and cut delves continued, it turned out that the graveleed surface extends for more than 4 meters. Here fragments of pottery (ceramics) were not discovered.

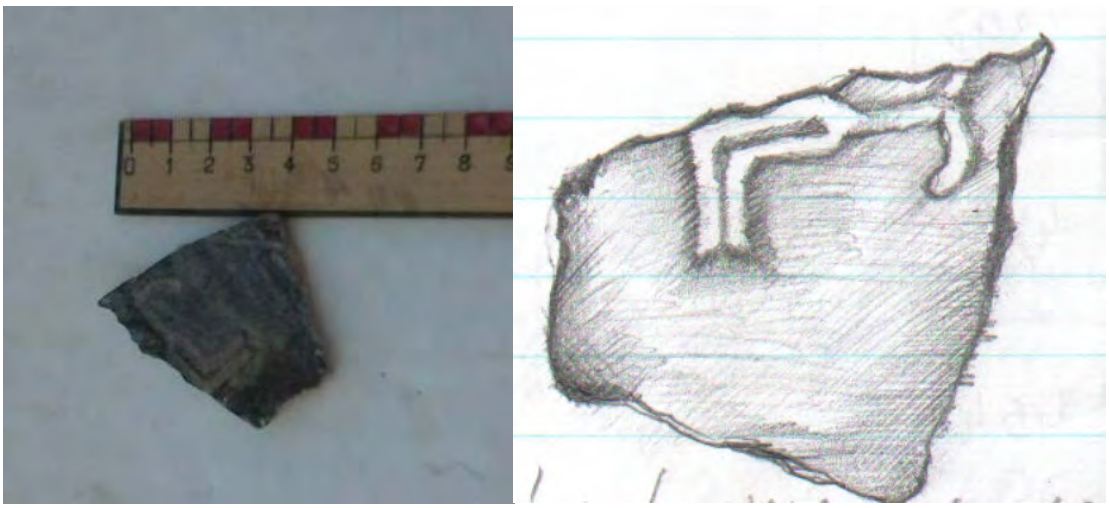
Removal activities of the third layer (August 23) were also focused on the above-mentioned segments. In segments a 1 and 2, b 1 and 2 still could be seen the graveled surface and in segments a 7 and 8, b 7 and 8 the soil was again fragile. Here the floor that opened in the adjacent segment and extended towards this segment, became complete. It continued to extend towards the south of the site, had inclination and looked like a semicircle.

The main reason of removing the fourth layer was to finalize if segment a 1 has traces of cultural activities or no. Here the delving was done with a thicker layer; about 15 cm and the final result was finally to get to the gravelled surface. The same happened in segment b 8 where we also got to a gravelled surface.

Pic. 3 The diagram of the site after the fourth layer

Generally speaking we delved in this site for about 1 m. We took picture of each layer after removing it and cleaning the whole area with a brush.

The main cultural material was the pottery (ceramics); there were few broken fragments with noticably cultivated parts which resembled stone tools. The pottery was mainly dark and reddish which is basically typical of the Urartian period. Those that are considered pre-urartian were not few at all. We came to this conclusion based on the ornament, preparation tecnique, for example ceramic fragments with nail ornaments, which are typical of early iron age. A piece of pottery with a goat diagrammatic picture was a very important finding. (pic. 4).



Pic. 4

As a summury of the above-mentioned we documented that as a result of the excavations a syncronous cultural layer of an Urartian structure with a gravelled surface was

opened, which most probably served for the structure as a yard. The opened floor-like mass had the same shape/outline as the hill. Based on that we assume that it must have served as a subsidiary facility to fortify the marginal sections of the yard and to make movements easier. Unfortunately as a result of excavations we couldn't find any archeological thing in situ except for the above-mentioned floor, and the hillocks of the site and the upper layers with fragile soil mass were predominantly results of the soil fills taken out during the excavations of the adjecent structure.

Author L. Mkrtchyan

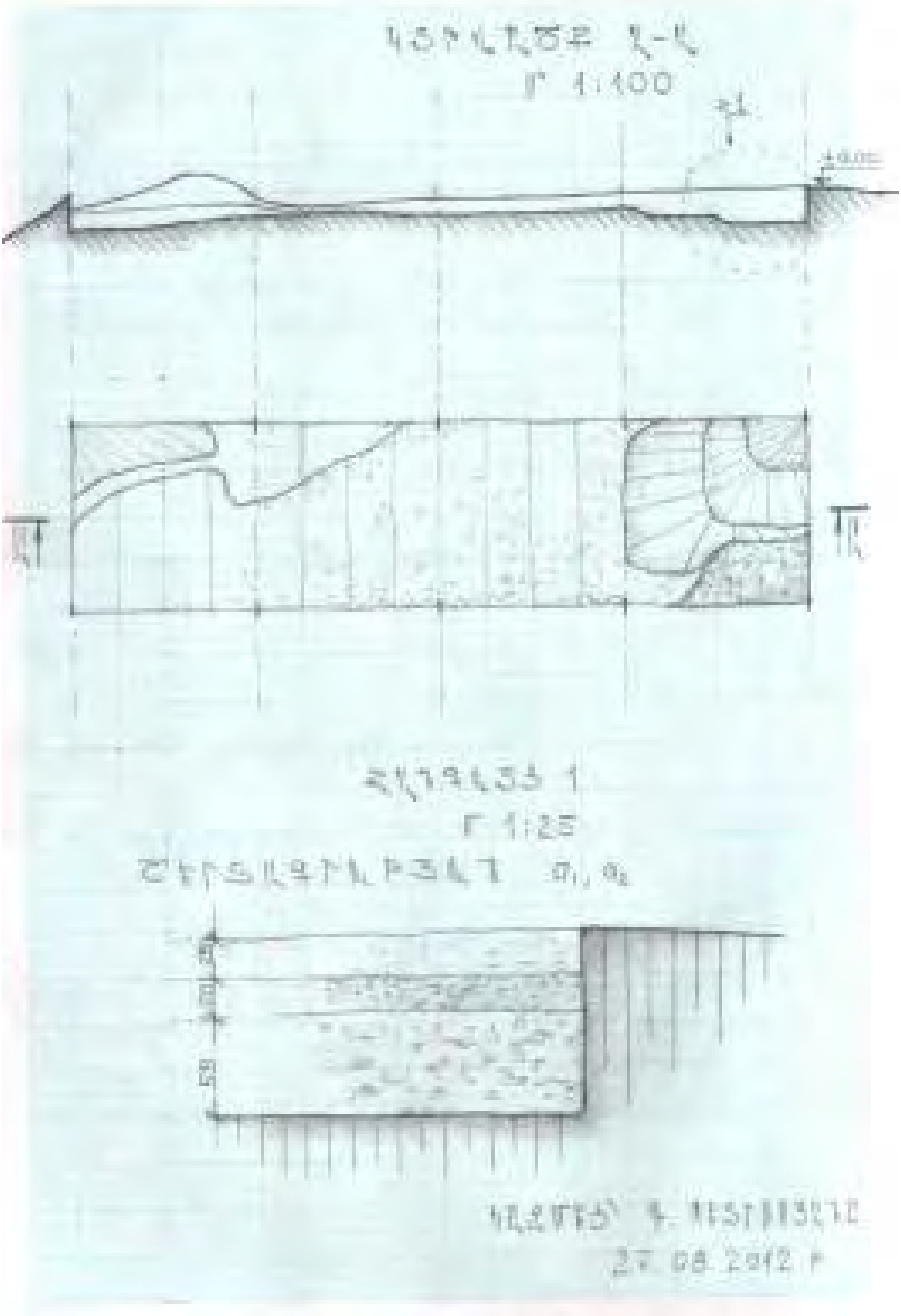


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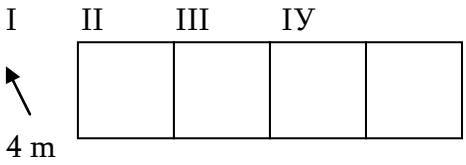
Table 6, 1-2 Site N 4 after excavations of layer I. Site 4-6 after completion of excavations.

SITE N 5

Excavations commenced on Friday, August 9, 2013. My team was dedicated to excavation N5 near southwest corner of building of the southwest quarter of the Urartu fortress in VII-VI centuries. Excavation of 16m x 4m size is oriented from east to west in a 2m to the south corner of the building with a decline of about 10° towards south. Excavation is splitted into 4 squares 4m^2 each. The numbering of the squares is done from the west to the east. Locus is from 5000.



5000 5240 5480 5720 (loci)

First, the upper layer of soil was removed from the surface of the squares. In the surface layer, except the II-nd square, findings were not discovered. In the II-nd square were excavated approximately 30 fragments of pottery, mostly black, from the Early Iron and pair of thin brown shards, similar to Urartu type. A few pieces of obsidian and 2 stone tools –polishers. Later, findings extracted mainly from II-nd and III-rd squares.

At the northern edge of the excavation in all the squares with a depth of 45 -50 cm bared large-pebble bedrock with ground sloping to the south. In the I-st square flat area with depth from 45cm to 55cm at the south-western corner. In the II-nd square from the northern edge of the strip about 2 m steeply to the south up to a depth of -135-140 cm.

In the III-rd square from the northern edge by zigzag type stripe with width from 120 to 200 cm up to the depth of -143 to -147 cm. The bottom of the excavation in this depth has a width of 230 to 170 cm in the longitudinal direction. In IV-th square soil is from 50cm to 65cm towards south, not steep.

Among the findings there are mainly dominated ceramics black, yellow-brown and a couple of pieces of red engobed. Ceramics with nail ornament of the Early Iron, thin Urartu type with zig-zag pattern and many thick up to 2,8cm big piecies of large Karas from II-nd and III-rd square. A handle of ceramic vessel (5x3 cm) with two through holes and a ceramic head spindle (D= 5cm, thickness = 2,7cm) with a hole in the center were

found. A ceramic thing similar to a man's shoe heel, handles, bottoms, and edges of neck of the vessel were found as well.

Very few finding of bones – a couple of joints of sheep, horn approx.13cm, glenoid cup and 2 teeth, most probably pig's.

Among stone tools prevailed are polishers of dark blue stone. There are a triangular-shaped tools, pestles and grindstones, large ellipsoidal rounded instrument similar to a gurney. There were found also rectangular stone of 5x3 cm, which is most probably seal and round pieces of stone cover and wheel. All excavation materials are packed in 32 plastic bags and transported for further flushing.

In the process of excavation works there were made the photos of excavation at different stages of works. Later it became clear that most of the soil remained in the excavation is soil of the dump site from late 60's. This is confirmed by existence of piecies of glass, wires, a round piece of abrasive grindstones and pieces of film, which were found at the depth of 140cm.

At the secon part of the day, August 30, we have started cleaning of the surface of the excavation N-9 with the size of 16x4m, devided into 4 square 4x4m each. Excavation is along designed road in the north-west direction with a decline of about 35 ° to south.
The excavation was photographed before the commencement of works. On the 31st August removal of upper layer was finished in all 4 squares, as well cleaning of the stone shell of the alleged dumping in II-nd square (190x90) across the square from the western edge. The numbering of excavation N-9 is locus 9000, squares I, II, III, and IV from the north of the river, loci 9100, 9200, 9300 and 9400 respectively the numbers of the squares. In the surface layer of the excavation N-9 archaeological material was absent.

Author V. Margaryan

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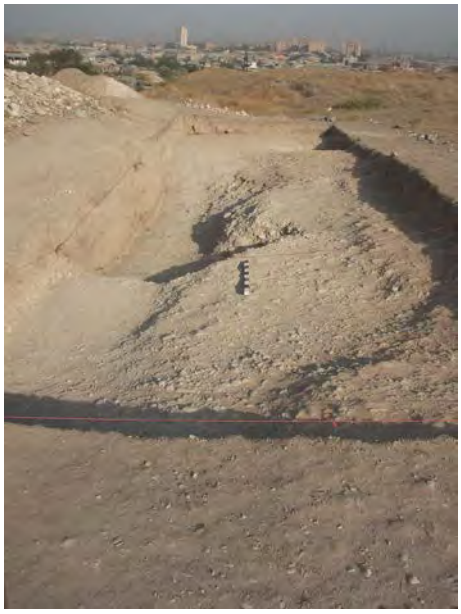

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Table 7, 1-2 Site N 5 after excavations of layer I. Site 3-6 after completion of excavations

ANNEX 9

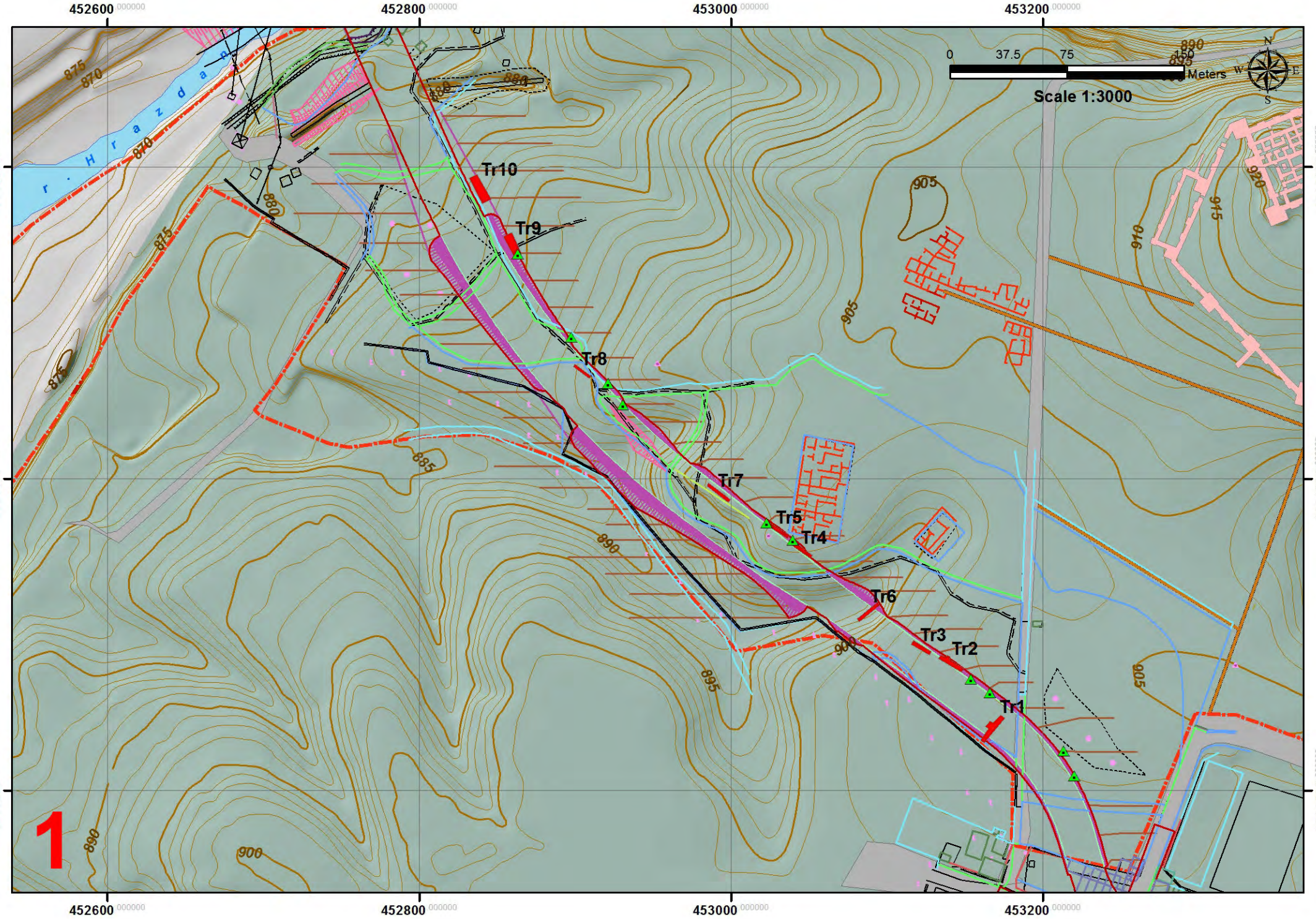
Kamir Blur Archeological Report (August 2013) - Maps

Map 01 - Distribution of excavated sites or test trenches along RoW in Karmir Blur

Map 02 - Excavated sites or trenches N 1-3 (enlargement)

Map 03 - Excavated sites or trenches N 4-7 (enlargement)

Map 04 - Excavated sites or trenches N 8-10 (enlargement)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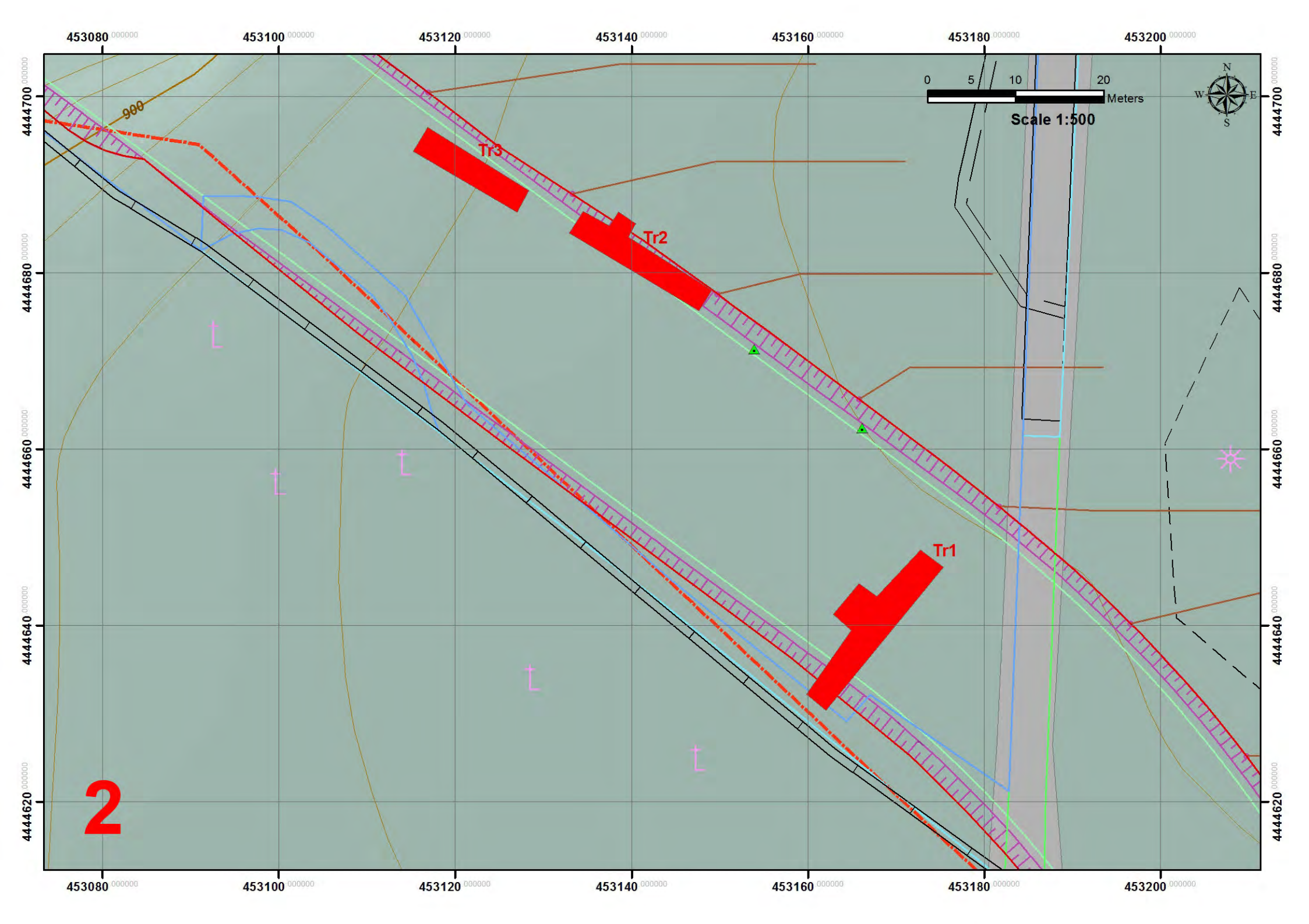
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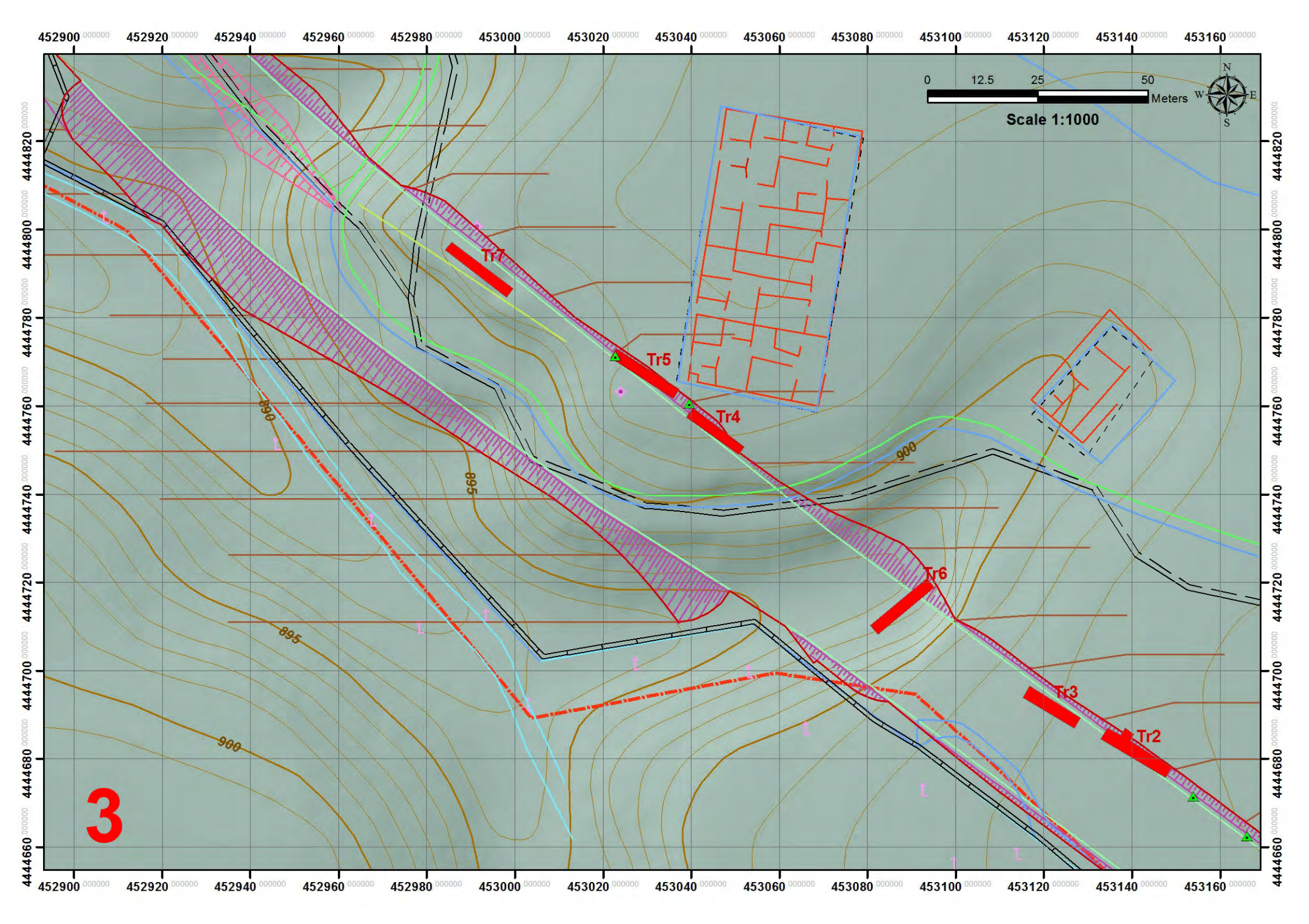
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ANNEX 10

Landscape Concept Design

Road link 3 - Argavand Junction

YEREVAN BYPASS

LANDSCAPE CONCEPT DESIGN

SUMMARY

1. TECHNICAL SPECIFICATION 3
1.1. The landscape designs 3
1.2. The plant list 5

1. TECHNICAL SPECIFICATION

1.1. THE LANDSCAPE DESIGNS

The landscaping of this interchange will allow to structure and a better readability for users of the infrastructure. This important exchange area extends over an area of more than 12 hectares.

The mesh that draws the trees alignment allows, through their essences, the identification of the different distribution lines approaching the exchanger. The location of trees was determined by the relief, they rely on the route of different infrastructures.

Large shrub masses draw the composition of a new landscape, playing with full and empty spaces. This composition created discovery spaces and use of perspectives with the site.

Trees of various species were selected according to their ornamental character: colored in the fall (Acer), their evergreen foliage (Pinus), their majesty (Quercus), or endemicity (Carpinus of Caucase, Quercus of Arménia).

Their composition is based on a layering of species according to their size.

The clumps with a strong growth () will have a planting density of one unit per square meter.

The clumps with a medium growth () will have a planting density of three unit per square meter.

Legend

Grass

Gr Natural prairie

Plantation - Trees

Platanus orientalis
Fagus orientalis
Acer trautvetteri
Picea orientalis
Pinus nigra
Quercus pontica
Acer tataricum
Sorbus aucuparia
Quercus macranthera
Juglans regia
Carpinus caucasica
Cercis siliquastrum
Koelreuteria paniculata
Betula litwinowii

Mixed composition
Cydonia oblonga
Elaeagnus angustifolia
Hippophae rhamnoides
Carpinus caucasica

Plantation - Shrubs

High shrubs size
Medium-size shrubs
Small-sized shrubs
Taxus baccata

Plantation - Ground-cover

Cotoneaster horizontalis
Perennial grasses Stipa gigantea
Perennial grasses Miscanthus sinensis
Perennial grasses Stipa tenuifolia
Perennial grasses Stipa capillata

Mineral

Mineral covering

REPUBLIC OF ARMENIA

YEREVAN MUNICIPALITY

DETAILED ENGINEERING, CONSTRUCTION MANAGEMENT AND SUPERVISION OF THE CONSTRUCTION OF TWO ROAD LINKS OF THE YEREVAN WESTERN RING ROAD CS/01

Loan No. 2752-ARM
MFF Sustainable Urban Development Investment Program, Tranche 1

PROJECT 1

GRADE SEPARATED INTERCHANGE

LANDSCAPE LAYOUT

Compiled by:	-	Project Number	Document Code
Ident. FILE		191144 D	

Date	Rev.	Description	Verified by:	Checked by:	Approved by:	Scale:
07.03.19	00	SUBMISSION				1/1000

CONSULTANTS: egis structures & advisory services

FUNDING AGENCY: Asian Development Bank

IMPLEMENTING AGENCY: Yerevan Municipality

LAYOUT

1.2. THE PLANT LIST

PLANT LIST IN YEREVAN							
CATEGORY	**BINOMIAL NAME**	**COMMON NAME**	**TAG**	**GIRTH SIZE**	**DENSITY**	**HEIGHT**	**NATIVE HABITAT**
Trees							
	Acer cappadocicum	Norway maple		Roots ball in size14-16	Unity	15-20m-align or isolate +++	Caucasia, northern Turkey
	Acer platanoides	Norway maple		Roots ball in size14-16	Unity	20-25m-align ++	Europe
	Acer pseudoplatanus	Sycamore maple		Roots ball in size14-16	Unity	12-30 -align +++	Europe, western Asia (cultivated for centuries)
	Acer tataricum	Tatarian maple		Roots ball in size14-16	Unity	6-7- in grove	sortheast Europe, western Asia
endemic	Acer trautvandteri	Caucasian maple		Roots ball in size14-16	Unity	10-16m- isolate +++	Caucasia, northern Turkey
	Aesculus hippocastanum	Horsechestnut		Roots ball in size14-16	Unity	20-25m-align ++	Greece, Albania
endemic	Armeniaca vulgaris	Apricot		Roots ball in size14-16	Unity	4-6m-verger +++	Armenia
endemic	Betula litwinowii	Caucasian birch		Roots ball in size14-16	Unity	15-20m- ?	
	Betula pendula	Silver birch		Roots ball in size14-16	Unity	15-20 - in grove +	
endemic	Carpinus caucasica	Caucasian hornbeam		Roots ball in size14-16	Unity	3-25m -clump haut +++	Europe, Caucasus
	Cercis siliquastrum	Judas tree		Roots ball in size14-16	Unity	6-10m- +	sorthern Europe, western Asia
endemic	Fagus orientalis	Oriental beech		Roots ball in size14-16	Unity	30-40-isolate and in grove	northwest Turkey, Caucasus, Iran
endemic	Fraxinus excelsior	European ash		Roots ball in size14-16	Unity	30-40-isolate	Europe, sorthwestern Asia
endemic	Junglans regia	English walnut		Roots ball in size14-16	Unity	20m isolate ++	sortheastern Europe to China
	Koelreuteria paniculata	Goldenrain tree		Roots ball in size14-16	Unity	6-8m isolate +	China, Korea, Japan
naturalisé	Malus domestica	Apple		Roots ball in size14-16	Unity	5-10m isolate ++	western Asia
	Melia azedarach	Chinaberry		Roots ball in size14-16	Unity	15-20m isolate- ++	India to China
	Paulownia tomentosa	Empress tree		Roots ball in size14-16	Unity	10-20m isolate +++	China
endemic	Platanus orientalis	Oriental planandree		Roots ball in size14-16	Unity	20-30m	sortheastern Europe, western Asia
	Quercus macranthera	Caucasian oak		Roots ball in size14-16	Unity	20-25m isolate +++	Caucasus, western Asia
endemic	Quercus pontica	Armenian oak		Roots ball in size14-16	Unity	4-6m isolate +++	Caucasus, northeastern Turkey
endemic	Sorbus aucuparia	Morntain ash		Roots ball in size14-16	Unity	8-10m isolate ++	Europe, western Asia
endemic	Ulmus laevis	European white elm		Roots ball in size14-16	Unity	15-20m isolate- ++	Europe to Asia
Conifers							
	Pinus. n. subsp.pallasiana	European black pine		Roots ball in size14-16	Unity	30-40m	Europe to Turkey
	Picea orientalis	Oriental spruce		Roots ball in size14-16	Unity	20-30m	Caucasus, Asia Minor
	Pinus eldarica	Afghan pine		Roots ball in size14-16	Unity	20-30m	?Caucasus, Russia, Afghanistan, Pakistan
	Pinus nigra	European black pine		Roots ball in size14-16	Unity	30-40m	Europe, Balkans, Crimea
	Pinus ponderosa	Ponderosa pine		Roots ball in size14-16	Unity	20-30m	western North America

endemic	Cornus sanguinea	European dogwood	Me.Sh	3L	3 U/m²	2-4m + + + clump	Europe, western Asia
	Forsythia suspensa	weeping forsythia	Me.Sh	3L	3 U/m²	3-4 m -clump +++	China
endemic	Hippophae rhamnoides	seabuckthorn	Me.Sh	3L	3 U/m²	3-4 m -clump +++	Europe to China
endemic	Prunus mahaleb	rock cherry	Me.Sh	3L	3 U/m²	1-4 m clump +++	central Europe to central Asia
endemic	Quercus pontica	Armenian oak	Me.Sh	3L	3 U/m²	4-6m isolate +++	Caucasus, northeastern Turkey
	Ribes aureum	buffalo currant	Me.Sh	3L	3 U/m²	3-4 m -clump ++	North America
	Weigelia florida	old fashioned weigela	Me.Sh	3L	3 U/m²	3-4 m -clump +++	Japan
	Ribes nigrum	black currant	Sm.Sh	2L	5 U/m²	1,5m - small shrubs	northern Europe, northern Asia
endemic	Rosa sp.	Rose	Sm.Sh	2L	5 U/m²	1,5m - small shrubs	
	Spiraea x vanhorttei	Spiraea	Sm.Sh	3L	3 U/m²	1,5m - small shrubs	
	Symphoricarpos albus	Snowberry	Sm.Sh	3L	3 U/m²	1-2m hedge +	USA, Canada
	Buxus sempervirens	boxwood		3L	3 U/m²	,2-5m-hedge ++	sorthern Europe, northern Africa, western Asia
endemic	Ligustrum vulgare	European privand		3L	3,2 U/ml	1-3m trimmed hedge ++	Europe, northern Africa, sorthwestern Asia
endemic	Taxus baccata	English yew		3L	3,2 U/ml	1,5-6m trimmed hedge +++	Europe, northern Africa, western Asia
Grasses							
	Stipa capillata	elderberry		3L	4 U/m²	0,6m	Europe, northwest Africa, sorthwest Asia, western North America
	stipa tenuifolia	Feather grass		3L	4 U/m²	0,5m	
	Stipa gigantea	golde oats		3L	4 U/m²	2,5m	Sorthern Europe
	Miscanthus sinensis	eulaia grass		3L	4 U/m²	1,7m	China

CATEGORY	BINOMIAL NAME	COMMON NAME	FRENCH NAME	TAG	DENSITY	HEIGHT	NATIVE HABITAT
Shrubs							
	Cotoneaster horizontalis	rock cotoneaster	Cotoneaster rampant	Co.ho	5 U/m²	,7 - 1m + clump	western China
	Caragana arborescens	Siberian peashrub	Arbre au pois	Hi.Sh	1 U/m²	3-4 m -clump +++	Siberia, Mongolia
endemic	Cydonia oblonga	quince	Cognassier	Hi.Sh	1 U/m²	6-8m -screen +++	Caucasus
endemic	Elaeagnus angustifolia	Russian-olive	Olivier de bohème	Hi.Sh	1 U/m²	6-8m -screen +++	sorthern Europe, central Asia, Altai , Himalayas
endemic	Punica granatum	pomegranate	Grenadier	Hi.Sh	1 U/m²	5-8 m -clump +++	Caucasus
endemic	Sambucus nigra	elderberry	Sureau noir	Hi.Sh	1 U/m²	3-4 m -clump +++	Europe, northwest Africa, sorthwest Asia, western North America
endemic	Cornus sanguinea	European dogwood	Cornouiller sanguin	Me.Sh	3 U/m²	2-4m + + + clump	Europe, western Asia
	Forsythia suspensa	weeping forsythia	Forsythia	Me.Sh	3 U/m²	3-4 m -clump +++	China
endemic	Hippophae rhamnoides	seabuckthorn	Argorsier	Me.Sh	3 U/m²	3-4 m -clump +++	Europe to China
endemic	Prunus mahaleb	rock cherry	Bois de Sainte Lucie	Me.Sh	3 U/m²	1-4 m clump +++	central Europe to central Asia
endemic	Quercus pontica	Armenian oak	Chêne d'Arménie	Me.Sh	3 U/m²	4-6m isolate +++	Caucasus, northeastern Turkey
	Ribes aureum	buffalo currant	Groseiller doré	Me.Sh	3 U/m²	3-4 m -clump ++	North America
	Weigelia florida	old fashioned weigela	Weigelia	Me.Sh	3 U/m²	3-4 m -clump +++	Japan
	Ribes nigrum	black currant	Cassissier	Sm.Sh	5 U/m²	1,5m - small shrubs	northern Europe, northern Asia
endemic	Rosa sp.	Rose	Rosier	Sm.Sh	5 U/m²	1,5m - small shrubs	
	Spiraea x vanhorttei	Spiraea	Spirée	Sm.Sh	3 U/m²	1,5m - small shrubs	
	Symphoricarpos albus	Snowberry	Symphorine	Sm.Sh	3 U/m²	1-2m hedge +	USA, Canada
	Buxus sempervirens	boxwood	Buis		3 U/m²	,2-5m-hedge ++	sorthern Europe, northern Africa, western Asia
endemic	Ligustrum vulgare	European privand	Troène commun		3,2 U/ml	1-3m trimmed hedge ++	Europe, northern Africa, sorthwestern Asia
endemic	Taxus baccata	English yew	If commun		3,2 U/ml	1,5-6m trimmed hedge +++	Europe, northern Africa, western Asia
Graminées							
	Stipa capillata	elderberry					Europe, northwest Africa, sorthwest Asia, western North America
	stipa tenuifolia	Feather grass			1m clump	1m clump	
	Stipa gigantea	golde oats			,6-1m clump	,6-1m clump	Sorthern Europe

ANNEX 11

Report on bat's survey at projected Hrazdan River bridge location

Road link 3 - Argavand Junction

George Yu. Papov
Yerevan State University, Faculty of Biology
Chair of Zoology, Senior research associate
PHD in biology

Data collection was done in 2013 on 11 of December. The Investigated area a small ravine where in the future a new bridge will be built over the River Hrazdan 257 m long including three spans at 42m. There are two closely spaced grot to directly at the construction site of the bridge. (GPS: N 40.17628, E 44.52122, 1002m above sea level).

Research methods: To obtain data on the species composition of bats and their presence on the territory the following methods were used:

1. study of constant and temporary shelters
2. feces and food residue research
3. using mist nets for trapping bats near the entrance of the grotto
4. definition of species composition of bats during the flight using ultrasonic detector.
5. record of ultrasonic bat calls near shelters

The expedition took place in the daytime, because of which only the following methods were used from all above mentioned: study of constant and temporary shelters and research of feces and food residues. In addition, the study was conducted in the winter, in the period when bats are not active and are in hibernation. Therefore, to obtain the more accurate information, we consider it is necessary to conduct another study in the period of greatest activity of bats - in late May or early June. This study should be realized at night, because at the twilight and dawn the bats are mostly active.

Results: Investigated grottos are not deep and cannot be used as major shelter for bats. Such grottos are mostly temporary shelter for nutrition and rest during migration. (Fig.1). In

the grottos neither droppings nor residues of food were found. It is explained by the fact that the grottos were used as temporary shelters for individuals (in the case of the colonies the amount of guano is large and noticeable), only during their active period. Besides the ravine is too close to residential areas and is exposed to strong anthropogenic influence.

Fig. Grottos in the Argavand

According to the literature data in the researching area the following species can be found (based on the geographic location).

Species	Red book of RA	IUCN Red List
Rhinolophidae		
Rhinolophus. ferrumequinum	-	+ LC
Vespertilionidae		
Myotis mystacinus	-	+ LC
Pipistrellus pipistrellus	-	+ LC
Pipistrellus kuhli	-	+ LC

*LC – Least concern

As the table shows, none of the mentioned species is in the Red Book of RA and in the IUCN Red List.

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3. Ï àïîâ Ã.Þ . – Ýêîëîãî-ôàóíèñòè÷åñêîå èññëåäîâàíèå è âûñîòíîå ðàñïðîñòðàíåíèå íåêîòîðûõ ìëåêîïèòàþùèõ Àðìåíèè. // Êîíä.äèñ., Åðåâàí , 2003, ñ.1-138.
4. ßâðóÿí Ý.Ã., Ï àïîâ Ã.Þ ., Êàçàðÿí À.Ñ. Ê ôàóíå ðóêîêðûëûõ Àðìåíèè è Íàãîðíîãî Êàðàáàãà. // Plecotus et al., Ì îñêâà, 2007, ò . 10, ñ.55–58.
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ANNEX 12a

Public Consultations 14 February 2014

Announcement and Attendance list

Road link 2 - New Shirak Street and Artashat Highway urban link road
Road link 3 - Argavand Junction to Shirak Street urban link road

Հայաստանի Հանրապետություն

ԶԱՆԳԱՀԱՐԵՔ ԵՎ ԱՅՑԵԼԵՔ

ՅՈՒՄ 526974 ԾԱՆՈՒՑՈՒ

ՀԱՆՐԱՅԻՆ ԼՍՈՒՄ

ՔԱՂԱՔԱՅԻՆ ԿԱՅՈՒՆ ԶԱՐԳԱՑՄԱՆ ՆԵՐԴՐՈՒՄԱՅԻՆ ԾՐԱԳԻՐ ՏՐԱՆՇ 1

Նոր Շիրակ-Արտաշատ, Արգավանդ - Շիրակ ճանապարհահատվածների համար

Շրջակա միջավայրի վրա ազդեցության գնահատում

Հայաստանի Հանրապետության (ՀՀ) կառավարությունը փոխառություն է ստացել Ասիական զարգացման բանկից (ԱԶԲ) Քաղաքային կայուն զարգացման ներդրումային ծրագիր, տրանշ 1-ի ֆինանսավորման համար: Բանկի քաղաքականությունը պահանջում է, որ ԱԶԲ կողմից օժանդակվող և ֆինանսավորվող բոլոր ծրագրերը համապատասխանեն Անվտանգության քաղաքականության հայտարարագրի (ԱՔՀ, 2009) պահանջներին:

Ծրագրով նախատեսվում է լրացնել քաղաքային արևմտյան օղակի բացակայող ճանապարհային հանգույցները.

1. Արգավանդի մայրուղի Շիրակի փողոց,
2. Շիրակի փողոց Արտաշատի մայրուղի (ներառյալ Արշակունյաց պողոտայի լայնացումը):

Դուք հրավիրված եք մասնակցելու հանրային լսման (Նոր Շիրակ -Արտաշատ, Արգավանդ - Շիրակ ճանապարհահատվածների համար), որի ընթացքում Դուք կտեղեկանաք բնապահպանական հնարավոր ազդեցությանն առնչվող խնդիրներին, Կարմիր բլուր պատմամշակութային տարածքով անցնող ճանապարհահատվածի կառուցման հետևանքով առաջացած հնարավոր ազդեցությունների վերաբերյալ, ինչպես նաև բարձացնել Ձեզ հուզող հարցերը և խնդիրները:

Հանրային լսումը տեղի կունենա 2014թ. փետրվարի 14-ին, ժամը՝ 16:00-ին, Երևանի քաղաքապետարանի 2-րդ մասնաշենքում՝ Բուզանդի 1/3, 7-րդ հարկ:

Տեղեկությունների համար զանգահարել՝ (010) 520973

Ծրագրի համարը՝ 42417-01

ADB

ՔԱՂԱՔԱՅԻՆ ԿԱՅՈՒՆ ԶԱՐԳԱՑՄԱՆ ՆԵՐԴՐՈՒՄԱՅԻՆ ԾՐԱԳԻՐ ՏՐԱՆՇ 1

Նոր Շիրակ -Արտաշատ, Արգավանդ - Շիրակ ճանապարհահատվածների

Շրջակա միջավայրի վրա ազդեցության գնահատման հանրային լսման մասնակիցների ցանկ

N	Անուն Ազգանուն	Պաշտոն	Էլ հասցե/հեռ.	Ստորագրություն
1	Edita Vardgesyan	PMIC NES	editavard@gmail.com	
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6	Armine Yedigaryan	DESL	aedigaryan@yahoo.co.uk	
7.	Boris Gasparian	PMIC NES	[illegible]	
8.	[illegible]	[illegible]	055 36-92-76	
9	Ս. [illegible]	[illegible]	094870070	
10.	[illegible]	[illegible]	094963606	
11.	[illegible]	[illegible]	haksimon@gmail.com	
12,	Գ. [illegible]	[illegible]	091419397	
13	[illegible]	[illegible]	anna.malikoyan@yerevan.am	

ՔԱՂԱՔԱՅԻՆ ԿԱՅՈՒՆ ՁԱՐԳԱՑՄԱՆ ՆԵՐԴՐՈՒՄԱՅԻՆ ԾՐԱԳԻՐ ՏՐԱՆՇ 1

Նոր Շիրակ –Արտաշատ, Արգավանդ - Շիրակ ճանապարհահատվածների

Շրջակա միջավայրի վրա ազդեցության գնահատման հանրային լսման մասնակիցների ցանկ

N	Անուն Ազգանուն	Պաշտոն	Էլ հասցե/հեռ.	Ստորագրություն
14	Հ[illegible]	[illegible]	094932494	
15	[illegible]	[illegible]	[illegible]	
16	[illegible]	[illegible]	[illegible]	
17	[illegible]	[illegible]		
18	[illegible]	[illegible]	093 54-14-23	
19	[illegible]	[illegible]	[illegible]	
20	[illegible]	[illegible]	[illegible]	

ANNEX 12b

Public Consultations 14 February 2014

Minutes of the meeting

Road link 2 - New Shirak Street and Artashat Highway urban link road
Road link 3 - Argavand Junction to Shirak Street urban link road

ԱՐՁԱՆԱԳՐՈՒԹՅՈՒՆ

Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1-ի շրջակա միջավայրի վրա ազդեցության գնահատման հանրային լսման վերաբերյալ

(Նոր Շիրակ - Արտաշատ, Արգավանդ - Շիրակ ճանապարհահատվածների համար)

Օրը/ժամը. 14 փետրվարի, 2014թ., 16:00 -18:00

Վայրը. ք. Երևան, Երևանի քաղաքապետարանի 2-րդ մասնաշենք՝ Բուզանդի 1/3, 7-րդ հարկ

Մասնակցում էին՝

1. Կարո Այվազյան՝ ՀՀ Մշակույթի նախարարության ներկայացուցիչ,
2. Հակոբ Սիմոնյան՝ ՀՀ Մշակույթի նախարարության «Պատմամշակութային ժառանգության գիտահետազոտական կենտրոն» ՊՈԱԿ-ի տնօրեն,
3. Գագիկ Հարությունյան՝ ճարտարագետ, Շենգավիթ վարչական շրջան,
4. Մոնիկա Երիցյան՝ «Էկոլուր» տեղեկատվական ՀԿ-ի լրագրող
5. Սիլվա Ադամյան՝ «Էկոդաշինք» ՀԿ-ի նախագահ
6. Թ. Ստեփանյան՝ «Էկոդաշինք» ՀԿ-ի ներկայացուցիչ
7. Լորիս Հակոբյան՝ Շենգավիթ համայնքի բնակիչ,
8. Յուրիկ Աբաջյան՝ Շենգավիթ համայնքի բնակիչ,
9. Պավլիկ Պապոյան՝ Շենգավիթ համայնքի բնակիչ,
10. Էդիտա Վարդգեսյան՝ բնապահպանության մասնագետ, խորհրդատու կազմակերպություն (SWEROAD International),
11. Արմինե Եղիզարյան՝ բնապահպանության մասնագետ, խորհրդատու կազմակերպություն (Egis International),
12. Բորիս Գասպարյան՝ հնեաբան, խորհրդատու կազմակերպություն (SWEROAD International),

13. Աննա Խաչատրյան՝ խորհրդատու կազմակերպության (Adinfosys) ներկայացուցիչ,
14. Նորա Մարտիրոսյան՝ ծրագրի ղեկավար, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրի իրականացման գրասենյակ» ՀՈԱԿ,
15. Ռուզաննա Ոսկանյան՝ բնապահպանության մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ,
16. Սիրաք Գյուլբուդաղյան՝ Հողի օտարման և տարաբնակեցման մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ,
17. Վարդան Կարապետյան՝ տեխնիկական մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ-1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ,
18. Տատյանա Սարգսյան՝ մոնիտորինգի և գնահատման մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ,
19. Թագուհի Խաչատրյան՝ հաղորդակցման և հանրային կապերի մասնագետ, խորհրդատու կազմակերպություն (SWEROAD international),
20. Աննա Մալիկոյան՝ հաղորդակցման և հանրային կապերի մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ:

Շրջակա միջավայրի վրա ազդեցության հանրային լսումը ողջույնի խոսքով բացեց Քաղաքային կայուն զարգացման ներդրումային ծրագրի ղեկավար Նորա

Մարտիրոսյանը: Նա ներկայացավ և նշեց, որ հանրային լսումը նվիրված է Նոր Շիրակ-Արգավանդ և Արգավանդ-Շիրակ ճանապարհահատվածների շրջակա միջայրի վրա ազդեցության գնահատմանը (ՇՄԱԳ): Նորա Մարտիրոսյանը տեղեկացրեց, որ ՇՄԱԳ-ի վրա աշխատել են նախագծող , խորհրդատու կազմակերպությունների, ինչպես նաև Քաղաքային կայուն զարգամցան ներդրումային ծրագրի բնապահպանները և հնեաբանները: Նորա Մարտիրոսյանը այնուհետև խոսքը փոխանցեց խորհրդատու կազմակերպության բնապահպանության մասնագետ Էդիտա Վարդգեսյանին:

Էդիտա Վարդգեսյանը ողջունեց ներկաներին, ներկայացավ և նշեց, որ նախագծող կազմակերպության կողմից շրջակա միջավայրի վրա ազդեցության գնահատման փաստաթուղթը ներկայացվել է ՀՀ բնապահպանության նախարարության փրձաքննության: Նշված փաստաթղթի վրա աշխատել է բնապահպանական թիմը: Նա նշեց նաև, որ հանրային լսումն էլ իրականացվում է ՇՄԱԳ-ի շրջանակներում: Էդիտա Վարդգեսյանը ներկայացրեց ծրագրի բնապահպանական անվտանգությունը Նոր Շիրակ-Արգավանդ և Արգավանդ-Շիրակ ճանապարհահատվածների համար: Տեղեկացրեց, որ ծրագիրը իրականացվում է հաշվի առնելով Ասիական զարգացման բանկի (ԱԶԲ) անվտանգության քաղաքականության դրույթները և ՀՀ օրենսդրությունը: Նա նշեց, որ անվտանգության մեխանիզմներն դրույթներ են, որոնց նպատակն է բացահայտել ազդեցությունները ծրագրի սկզբնական փուլում, հնարավորության դեպքում դրանց վերացումը, իսկ եթե հնարավոր չէ վերացնել, ապա գոնե մեղմացնել: Էդիտա Վարդգեսյանը նշեց, որ մինչ շինարարական աշխատանքները սկսելը բացահայտվում են ազդեցությունները, կազմվում է բնապահպանական պլան, որն իր մեջ ներառում է մեղմացնող միջոցառումներ, ինչպես նաև իրականացվում են հանդիպումներ հանրությանը տեղյակ պահելու ծրագրի և դրա հետևանքով հնարավոր հետևանքների վերաբերյալ: Նա տեղեկացրեց, որ հաշվի են առնվել ՀՀ օրենքները ՇՄԱԳ փաստաթուղթը կազմելիս: Խորհրդատու կազմակերպության բնապահպանը տեղեկացրեց, որ 2010թ-ին իրականացվել է նախնական բնապահպանական ուսումնասիրություն, որից հետո 2013թ-ին նշված փաստաթղթի և լրացուցիչ ուսումնասիրությունների հիման վրա իրականացվել է շրջակա միջավայրի վրա ազդեցության գնահատում: Այդ երկու փաստաթղթերն էլ որպես բաղկացուցիչ մաս ունեցել են բնապահպանական կառավարման պլանը: Նա նշեց, որ շինարարը ևս պետք է պատրաստի բնապահպանական կառավարման պլան, որը կկազմվի ՇՄԱԳ-ի բնապահպանական կառավարման պլանի հիման վրա և կլինի ավելի տեղայնացված և մանրամասն: Էդիտա Վարդգեսյանը նշեց, որ ԱԶԲ-ի պահանջն է և Քաղաքային կայուն զարգացման ներդրումային ծրագիրն էլ միտված է, որ շինարարը բնապահպանական կառավարման պլանը չդիտարկի որպես լրացուցիչ գործունեություն, այլ իրականացնի որպես լավագույն փորձի դրսևորում, այսինքն՝ հնարավորինս քիչ վնաս հասցվի

շրջակա միջավայրին: Էդիտա Վարդգեսյանը ներկայացրեց ՇՄԱԳ փաստաթղթի բովանդակությունը: Բնապահպանը տեղեկացրեց դրական և բացասական ազդեցությունների վերաբերյալ. դրական ազդեցությունները ներառում են Երևան քաղաքի կենտրոնի երթևեկության գերբեռնվածության նվազեցումը, ինչը կնպաստի օդի աղտոտվածության նվազեցմանը, Կարմիր բլուր պատմամշակութային նշանակություն ունեցող պեղումների հնարավորությունը, որն այլ պարագայում չգիտես երբ կիրականացվեր, ինչպես նաև կառուցվող ճանապարհը հնարավորություն է տալիս պաշտպանել Կարմիր բլուրն ապօրինի ընդլայնվող գերեզմանատան ներխուժումից, ճանապարհային անվտանգության բարձրացում, որոշ քանակությամբ աշխատատեղերի ստեղծում, Երևան քաղաքի ծայրամասային հատվածների տնտեսական աճի խթանում, կանաչապատում՝ յուրաքանչյուր ծառի դիմաց շինարարի կողմից 6 ծառ է տնկվելու:

ՀՀ մշակույթի նախարարության <Պատմամշակութային ժառանգության գիտահետազոտական կենտրոն> ՊՈԱԿ-ի տնօրեն Հակոբ Սիմոնյանը որպես ծրագրի դրական արդյունք նշեց նաև, որ 20 տարուց ավել Կարմիր բլուրի տարածքում առկա շինարարական աղբի մաքրումը, որը շինարարությունից առաջ մաքրվելու է, ինչը հաստատեց նաև Էդիտա Վարդգեսյանը և հավելեց, որ դա կնպաստի նաև տուրիզմի զարգացմանը:

Էդիտա Վարդգեսյանը տեղեկացրեց, որ ցավոք, ծրագիրն ունենալու է նաև բացասական ազդեցություն, որը ըստ բնապահպանական թիմի ունենալու է ժամանակավոր բնույթ և կառավարելի է: Նա նշեց, որ չկան Կարմիր գրքում գրանցված բուսական և կենդանական աշխարհի հատուկ տեսակներ, քանի որ տարածքը ուրբանիզացված տարածք է և այդ տեսակները արդեն իսկ վերացել են: Բնապահպանը նորից անրադարձավ բնապահպանական պլանին, համաձայն, որի եթե շինարարը հայտնաբերի նմանատիպ տեսակ, ապա պետք է տեղյակ պահի ՀՀ բնապահպանության նախարարությանը: Էդիտա Վարդգեսյանը մեջբերեց, որ նախնական գնահատման ժամանակ ենթադրություն է արվել, որ Հրազդանի կիրճում կան չղջիկների տեսակներ, որոնք գրանցված են Կարմիր գրքում: Նա նշեց, որ 2013թ-ի դեկտեմբերին իրականացվել է հատուկ հետազոտություն և ներկայացվել է հաշվետվություն համաձայն, որի այսօրվա դրությամբ այդտեղ չղջիկներ չկան: Սակայն նշեց, որ չի բացառվում այն փաստը, որ չղջիկները կարող են գալ այդ քարանձավները կեր հայթայթելու նպատակով: Այդ հանգամանքը պարզելու է շինարարության մեկնարկից առաջ: Նա ևս մեկ անգամ նշեց, որ դրանց հայտնաբերման դեպքում նախատեսված են միջոցառումներ բնապահպանական կառավարման պլանով:

Նախագծող կազմակերպության բնապահպան Արմինե Եդիգարյանը նշեց, որ համաձայն հետազոտության եզրակացության՝ չղջիկների կողմից քարանձավը որպես բնակավայր չի կարող օգտագործվել: Չղջիկները քարանձավ հնարավոր է այցելեն գիշերները՝ սնվելու համար:

<Էկոդաշինք> ՀԿ-ի նախագահ Սիլվա Ադամյանը հարց ուղղեց Էդիտա Վարդգեսյանին և ասաց, որ եթե նա մտածում է, որ Կարմիր գրքում գրանցված բուսատեսակներ և կենդանատեսակներ այլևս այդ տարածքում չկան և եթե հետո հայտնաբերվեն միջոցառումներ կիրականացվեն. ինչպես է պատկերացնում ծրագիրն ինչ կերպ է աջակցելու այդ բուսատեսակներին կամ կենդանատեսակների պահպանմանը, եթե արդեն որոշված է, որ ծրագիրն իրականացվելու է: Ինչ է լինելու այն պարագայում, եթե շինարարության ընթացքում բույսերից և կենդանիներից հասկացող մեկը հայտնաբերի նմապատիպ բույս կամ կենդանատեսակ: Նա նաև հավելեց, որ չղջիկների ամբողջ կյանքի ամենաակտիվ ժամանակը դա գիշերն է:

Էդիտա Վարդգեսյանը նշեց, որ համաձայն նախնական բնապահպանական հետազոտության և ՇՄԱԳ-ի չհայտնաբերված բուսատեսակների և կենդանատեսակների հավանականությունը ցածր է, իսկ հայտնաբերման դեպքում միջոցառումներ են նախատեսված բնապահպանական կառավարման պլանով:

<Էկոդաշինք> ՀԿ-ի նախագահ Սիլվա Ադամյանը հետաքրքրվեց, թե ո՞վ է արել բույսերի և կենդանատեսակների ուսումնասիրությունը:

Նախագծող կազմակերպության բնապահպան Արմինե Եդիգարյանը, պատասխանեց, որ կոնկրետ չղջիկների ուսումնասիրությունն իրականացրել է Գեորգի Պոպովը, ԵՊՀ միկրոկենսաբանության ամբիոնի ղեկավարը, ով հանդիսանում է կոնկրետ չղջիկների մասնագետ:

<Էկոդաշինք> ՀԿ-ի նախագահ Սիլվա Ադամյանն նշեց, որ իր կարծիքով անհրաժեշտ է նորից իրականացնել հետազոտություններ, քանի որ ինքն աշխատում է կենդանաբանության և էկոլոգիայի կենտրոնում և իրենց ղեկավարը դոկտոր – պրոֆեսոր Յավրույանն է հանդիսանում ամենալավ մասնագետը Հայաստանում չղջիկների գծով և հավելեց, որ չի կարծում, որ ոմն Պոպովն ավելի լավ կաներ հետազոտությունը: Սիլվա Ադամյանը հայտարարեց, որ նա ներկաների մեջ ոչ մի բնապահպան չի տեսնում , խախտված է հանրային լսումների անցկացման կարգը, քանի որ իրենց հասարակական կազմակերպությունը (ՀԿ) տեղեկացել է հանրային լսման վերաբերյալ ՀՀ բնապահպանության կայքից, որտեղ տեղադրված է մասնակցության հրավերը և ՀԿ-ների անունները: Հանրային լսման կարգն խախտված է այնքանով, որ <Էկոդաշինք> ՀԿ-ն անձամբ մասնակցության հրավեր չի ստացել, այլ

տեղեկացել է ՀՀ բնապահպանության կայքից: Նա ասաց նաև, որ իրենք պարտավոր չեն թերթերն ուսումնասիրել տեղեկանալու համար: Միլվա Ադամյանը հայտնեց, որ ԱՋԲ-ն վերջին երկու տարիների ընթացքում միտումնավոր հասարակական սեկտորի հետ ոչ մի գործ չի իրականացնում:

Քաղաքային կայուն զարգացման ներդրումային ծրագրի ղեկավար Նորա Մարտիրոսյանը պատասխանեց <Էկոդաշինք> ՀԿ-ի նախագահին՝ ասելով, որ ԱՋԲ-ն իրավասու չէ ծրագրի հայտարարությունները տալ: Իսկ այն հարցին, որ լսարանում չկան բնապահպաններ, Նորա Մարտիրոսյանը հայտնեց, որ ներկա են առնվազն 3 բնապահպաններ և 3 հնեաբան:

Էդիտա Վարդգեսյանը, շարունակեց ներկայացնել ազդեցությունները և մեղմացնող միջոցները: Խոսեց Հրազդան գետի վրա ազդեցության վերաբերյալ և նշեց, որ կանխարգելվելու են նստվածքների և հողային հանույթների թափանցումը գետի մեջ, ապահովվելու է ձկների անխոչընդոտ շարժը և իրականացվելու է ջրի որակի մոնիթորինգ: Էդիտա Վարդգեսյանը տեղեկացրեց, որ նոր ճանապարհի կառուցման հետևանքով, որոշակի քանակության բուսահող է հանվելու օտարված տարածքներից, հնարավոր է նաև հողի էռոզիա Հրազդան գետի կիրճում, ինչպես նաև տիղմի և նստվածքների առաջացում: Մեղմացնող միջոցներն առաջին հերթին ՀՀ օրենսդրական կանոնակարգերով նախատեսված միջոցառումներն են համապատասխան բնապահպանական կառավարման պլանի, որի համաձայն կիրականացվի նաև հողի էռոզիայի և նստվածքների հսկողություն: Ազդեցությունը օդային ավազանի վրա լինելու է փոշու և արտանետվող գազերի տեսքով, որոնց մեղմացման միջոցառումները ներկայացված են բնապահպանական կառավարման պլանում: Էդիտա Վարդգեսյանը տեղեկացրեց նաև, որ շինարարության ընթացքում շինարարը կազմակերպելու է շինարարական հրապարակ, պահպանելու է շինարարական հրապարակի մաքրությունը, նյութերի և առաջացող պինդ և հեղուկ թափոնների կառավարում, երթևեկության և շինարարական տեխնիկայի կառավարում, ներկայացրեց աշխատանքի անվտանգության և աշխատողների առողջության ապահովման, հնարավոր բողոքների և առաջարկությունների մեխանիզմները: ՇՄԱԳ-ի ներկայացումից հետո լսարանին տրվեց հնարավորություն տալ հարցեր, սակայն հարցեր չառաջացան:

ՀՀ մշակույթի նախարարության <Պատմամշակութային ժառանգության գիտահետազոտական կենտրոն> ՊՈԱԿ-ի տնօրեն Հակոբ Սիմոնյանը ներկայացման վերջում նշեց որպես դրական արդյունք նաև այն փաստը, որ իր կողմից ղեկավարած պեղումների գործընթացին մասնակցել են նաև ուսանողներ, որոնք վարձատրվել են և հնարավորություն են ունեցել վճարել ուսման վարձը, որը սոցիալական խնդրի լուծում է : ՊՈԱԿ-ի տնօրեն Հակոբ Սիմոնյանը բարձրացրեց նաև Կարմիր բլուրի հարցը, որը

աստիճանաբար փլուզվում է: Նա նշեց, որ պեղումները պետք է ազդակ լինեն, որպեսզի հարց բարձրացվի հուշարձանի վերականգնման վերաբերյալ, հատկապես՝ բազմասեկցիոն տունը:

Քաղաքային կայուն զարգացման ներդրումային ծրագրի ղեկավար Նորա Մարտիրոսյանը ցավով նշեց, որ ծրագրով չի նախատեսվում այդ հուշարձանների պահպանումը, սակայն ծրագիրը պատրաստակամ է հարցը բարձրացնել Երևանի քաղաքապետարանում, որի աջակցությամբ և անունից էլ իրականացվում է ծրագիրը, հնարավորության դեպքում միջոցներ հայթայթել հուշարձանների պահպանման համար:

ՀՀ մշակույթի նախարարության ներկայացուցիչ Կարո Այվազյանը հարցրեց շինարարական աղբի առկայության հարցը ինչպե՞ս է լուծվելու:

Քաղաքային կայուն զարգացման ներդրումային ծրագրի ղեկավար Նորա Մարտիրոսյանը պատասխանեց, որ մինչև շինարարությունը կարատվելու են աղբահանման աշխատանքներ, սիստեմատիկ պեղումներ: Սակայն հուշարձանի տարածքի ամբողջական մաքրում չի իրականացվելու:

Խորհրդատու կազմակերպության հնեաբան Բորիս Գասպարյանը պարզաբանեց, որ պեղման ենթակա տարածքները ծածկված են աղբով և բնականաբար մինչ պեղումները և շինարարությունը սկսելը մաքրվելու է շինարարական առկա աղբը: Նա նշեց, որ ճանապարհը դառնալու է բանուկ և արդեն ավելի շատ մարդ կտեսնի հնագիտական տեղամասը և միգուցե լավ կլիներ շրջակա տարածքը բարելավել:

ՀՀ մշակույթի նախարարության ներկայացուցիչ Կարո Այվազյանը հարցրեց նաև հողահատկացման վերաբերյալ, որին Քաղաքայի կայուն զարգացման ներդրումային ծրագրի ղեկավար Նորա Մարտիրոսյանը պատասխանեց, որ սույն ծրագիրը Երևանի քաղաքապետարանի ծրագիր է և համայնքային հողերի մասով հողի օտարում և տարաբնակեցում չի իրականացվում, քանի որ դա արդեն իսկ հանդիսանում է քաղաքապետարանի հող:

Խորհրդատու կազմակերպության հնեաբան Բորիս Գասպարյանը ներկայացրեց ծրագրի հնագիտական մասը: Նա տեղեկացրեց, որ Արգավանդ-Շիրակ նոր ճանապարհահատվածն անցնելու է Կարմիր բլուր հնագիտական համալիրի սահմաններով: Նա նշեց, որ դրական է համարում ճանապարհի կառուցումը, քանի որ այն կխոչընդոտի գերեզմանատան ապօրինի ընդլայմանը, որը մտնում է հուշարձանի պահպանման տարածք: Բորիս Գասպարյանը որպես դրական արդյունք նշեց նաև տարիներով կուտակված աղբի մաքրումը, որն իրականացվելու է ծրագրի

շրջանականերում: Նա տեղեկացրեց պատմահնագիտական արժեքը փրկելու և պահպանման համար իրականացվող միջոցառումների մասին, որոնք ներառում են նախագծային և շինարարական փուլերը: Բորիս Գասպարյանը տեղեկացրեց, որ նախագծային մասի միջոցառումները ենթադրում են 4 փուլեր. Դրանցից երկուսն արդեն իրականացված են՝ նախնական ուսումնասիրությունն անմիջական ազդեցության գոտում և ստուգողական պեղումները ազդեցության գոտու երկայնքով: Նա հայտնեց, որ հնագիտական պեղումների հատվածները բաշխվել են 3 գոտիների, ընդ որում վստահաբար կարելի է ասել, որ դրանցից երկու գոտիներում հնագիտական արժեք ներկայացող գտածոներ չկան: Հնեաբանը տեղեկացրեց, որ ստուգողական պեղումներն անմիջական ազդեցության գոտում իրականացվել են հետախուզական 10 փոսորակների միջոցով, որոնք բաշխված են ծրագծի ողջ երկայնքով: Առաջին գոտում հայտնաբերվել է դամբարանադաշտ, որտեղ առկա են հնագիտական գտածոներ: Առաջին գոտում պեղումները շարունակվելու են երրորդ և չորրորդ փուլերով՝ հնագիտական արժեք ներկայացնող տեղամասերի հետախուզական պեղումներ և հնագիտական հատվածի սահմանների վերջանկան որոշում և դրանց սիստեմատիկ պեղումներ: Բորիս Գասպարյանը ներկաներին տեղեկացրեց նաև շինարարության փուլում իրականացելիք մեղմացնող միջոցառումների վերաբերյալ:

Արձանագրեց՝

Աննա Մալիկոյան՝ հաղորդակցման և հանրային կապերի մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ

Ստուգեցին՝

Էդիտա Վարդգեսյան՝ բնապահպանության մասնագետ, խորհրդատու կազմակերպություն (SWEROAD International)

Ռուզաննա Ոսկանյան՝ բնապահպանության մասնագետ, Քաղաքային կայուն զարգացման ներդրումային ծրագիր Տրանշ 1, «Երևանի կառուցապատման ներդրումային ծրագրերի իրականացման գրասենյակ» ՀՈԱԿ

PROTOCOL

Of Public Consultation on Environmental Impact Assessment of Sustainable Urban Development Investment Program, Tranche I

(For Nor Shirak-Artashat, Argavand – Shirak Road Sections)

Date/Time. February 14, 2014y, 4:00 -6:00 p.m.

Location City Yerevan, 2-nd Building of Yerevan Municipality, Buzand 1/3, Floor 7

Participants:

1. Karo Ayvazyan: representative of the RA Ministry of Culture
2. Hakob Simonyan: Director of "Scientific Research Center of the Historical and Cultural Heritage" SNCO, Republic of Armenia, Ministry of Culture
3. Gagik Harutyunyan: Engineer, Shengavit administrative district
4. Monika Yeritsyan: journalist of "Ecolur" informational NGO
5. Silva Adamyam: Chair of "Ecodashink" NGO
6. T. Stepanyan: representative of "Ecodashink" NGO
7. Loris hakobyan: inhabitant of Shengavit district
8. Yurik Abajyan: inhabitant of Shengavit district
9. Pavlik Papoyan: inhabitant of Shengavit district
10. Edita Vardgesyan: environmental specialist, Consultant Company (SWEROAD International),
11. Armine Yedigaryan: environmental specialist, Consultant Company (SWEROAD International),
12. Boris Gasparyan: archeologist, Consultant Company (SWEROAD International),
13. Anna Khachatryan, representative of Consultant Company, (Adinfosys)
14. Nora Martirosyan: Project Manager "Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1,

15. Ruzanna Voskanyan – Environmental specialist, Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1,
16. Sirak Gyulbudaghyan: Land Acquisition and Resettlement Specialist, Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1,
17. Vardan Karapetyan – Technical specialist, "Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1,
18. Tatyana Sargsyan, Monitoring and Assessment specialist, "Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1
19. Taguhi Khachatryan: Communications and Public Relations specialist, Consultant Company (SWEROAD International),
20. Anna Malikoyan – Communications and Public Relations specialist, "Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1,

The public consultation on environmental impact assessment was opened with welcoming speech by Mrs. Nora Martirosyan; Project Director of Sustainable Urban Development Investment Program. She introduced herself and noted that the public consultation was dedicated to Environmental Impact Assessment (EIA) Report for Nor Shirak-Argavand and Argavand-Shirak road sections. Nora Martirosyan informed that Design and Consultant Companies, as well as environmental specialists and archeologists of Sustainable Urban Development Investment Program had been working on EIA. After Nora Martirosyan completed her speech, Edita Vardgesyan, environmental specialist of the Consultant Company welcomed the participants, introduced herself and noted that the document of environmental impact assessment was submitted to the Expertise of the Ministry of Nature Protection by the Design Company. The environmental team has worked on the given document. Also she noted

that the public consultation was carried out within the framework of EIA. Edita Vardgesyan presented the environmental safety of the program for Nor Shirak-Argavand and Argavand-Shirak road sections. She informed that the program was implemented taking into account the provisions of the Safeguards Policy of the Asian Development Bank (ADB) and the regulations of the RA. She mentioned that the safeguard mechanisms were provisions aimed at identifying impacts in the initial/preliminary phase of the program and eliminating them if possible, and in case if it's not possible, at least mitigating them. Edita Vardgesyan noted that before beginning construction works impacts shall be identified, an environmental plan shall be developed, which will include mitigation measures, as well as meetings will be held to keep the public informed of the Program and the possible impacts caused by the Program. She informed that the RA regulations and laws had been taken into account during development of the EIA document. The environmental specialist of the Consultant Company informed that a preliminary environmental survey was done in 2010, after that environmental impact assessment was implemented based on supplementary survey and the documents mentioned in 2013. Both documents included the Environmental Management Plan as a constituent part. She noted that the Contractor should develop an environmental management plan based on the EMP of EIA, which should be more localized and detailed. Edita Vardgesyan pointed out that it was the requirement of ADB and the intention of Sustainable Urban Development Investment Program that the Contractor shouldn't consider the environmental management plan as an additional activity, but should do his best to cause the least possible damage to the environment. Edita Vardgesyan presented the content of EIA. The environment specialist informed of positive and negative impacts. The positive impacts include unloading traffic in the center of Yerevan, which will result in a reduction of air pollution. Another positive impact is the opportunity of excavations of "Karmir Blur", which will have historical and cultural significance. Otherwise it is unknown when it could be implemented. The road to be constructed enables protection of Karmir Blur from the cemetery, which is expanding illegally entering into the monument's preservation area. It creates working opportunities, increases

road safety, and promotes economic growth of suburbs of Yerevan. Another positive impact is landscaping; 6 trees will be planted for each tree cut by the Contractor.

Hakob Simonyan (the Director of "Scientific Research Center of the Historical and Cultural Heritage" SNCO, Republic of Armenia, Ministry of Culture) pointed out that another positive impact of the Program is cleaning up debris/construction waste spread in Karmir Blur over 20 years. It will be cleaned up before construction starts. This was confirmed by Edita Vardgesyan, who added that it would contribute to the development of tourism.

Edita Vardgesyan informed that unfortunately the Program would also have negative impacts, which would be temporary and controllable in the opinion of the environmental team. She indicated that there were no Red Book species of flora and fauna, since it is an urbanized area, and those species are already extinct. The environmental specialist again referred to the environmental plan, according to which if the Contractor detects similar species, he should keep the RA Ministry of Nature Protection informed of that. Edita Vardgesyan quoted that during preliminary assessment it was assumed that in Hrazdan gorge (canyon) there were bat species of Red Book. She noted that specific survey was conducted in the December of 2013 and a report was submitted, according to which there were no bats as of today. However, she indicated that it cannot be excluded that bats can come in search for prey. It should be clarified before the start of Construction. She mentioned again that measures were envisaged in the Environmental Management Plan in the event of discovering them.

Armine Yedigaryan, the environmental specialist of Design Company pointed out that according to the conclusion of the survey the cave couldn't be used as a colony/residence by bats. Bats may go to the caves at nights in search for food.

Silva Adamyan, President of "Ecodashink" NGO, asked Edita Vardgesyan the following question: "If you think that this area doesn't contain Red Book species of flora and fauna any longer, and in the event of detecting some, measures will be taken, then in what ways you think the Program will promote preserving those species of flora and fauna once the implementation of the program has been decided?. What will happen if someone who is good at identifying species of flora and fauna discovers similar plant or animal during construction?". She also added that night is the most active time of bats in their whole lives.

Edita Vardgesyan noted that according to the preliminary environmental survey and the EIA there was a little possibility of discovering those species of flora and fauna and in the event of discovering them measures were envisaged in the environmental plan.

Silva Adamyan, President of "Ecodashink" NGO, was wondering who conducted the survey of species of flora and fauna.

Armine Yedigaryan, the environmental specialist of Design Company replied that survey of bats was done by Georgi Papov, Department Chair of Microbiology of the YSU. He is a specialist of bats.

Silva Adamyan, President of "Ecodashink" NGO noted that in her opinion surveys should be conducted again, as she works at the center of zoology and ecology. The best specialist of bats in Armenia is their director: doctor Yavroyan (PHD). She added that she didn't think an unknown specialist like Papov could have done the survey any better. Silva Adamyan announced that she didn't see any environmental specialist among those present, and the procedure of public consultation was violated, since their NGO got informed about public consultation from the website of Nature Protection of the RA, where invitation for participation and the names of NGO-s were inserted. The procedure of the public consultation was violated in a sense that "Ecodashink" NGO hadn't received a personal invitation for participation. Instead they got informed of the public consultation from the website of Nature Protection of RA. She said they were not obliged to study the newspapers to get information. Silva Adamyan indicated that ADB intentionally hadn't been implementing any activity with social sectors for the last two years.

Nora Martirosyan, Project Manager "Investing projects Implementation Unit Building up of Yerevan", replied to the representative of "Ecodashink" NGO that ADB was not entitled to give announcements on the Project.

And as to the question that there were no environmental specialists in the auditorium, Nora Martirosyan replied that at least three environmental specialists and three archeologists were present.

Edita Vardgesyan continued to introduce the impacts and mitigation measures. She spoke about the impact on the Hrazdan River and noted that flow of sediments and excavated material to the river would be prevented and the unhindered movement of fish would be ensured and water quality monitoring would also be implemented. Edita Vardgesyan informed that because of the construction of the new road, a certain quantity of topsoil would be removed from the alienated area, and soil erosion, sludge and sediments in the Hrazdan River canyon might occur as well. First of all, in accordance with Environmental management plan, mitigation measures are measures envisaged by the RA legislative regulations based on which soil erosion and sedimentation control will be implemented. The impact on the air

quality will be in the form of dust and exhaust gases for which the mitigation measures are provided in Environmental management plan. Edita Vardgesyan informed that during construction the Contractor would arrange a construction site, maintain its cleanliness, management of material and solid and liquid waste, management of the traffic and construction equipment, introduced the occupational health and safety, grievance redress mechanisms. After the presentation of EIA the audience was given the opportunity to ask questions, but questions were not raised.

At the end of the presentation Hakob Simonyan, Director of "Scientific Research Center of the Historical and Cultural Heritage", as a positive result mentioned the fact that students had participated in excavation works, who were paid and could pay their tuition fee, which is a solution to a social problem. Hakob Simonyan also raised the issue of Karmir Blur, which was gradually collapsing. He noted that the excavations should be a signal in order to raise the issue of restoration of the monument, particularly the multi-section house.

Nora Martirosyan, Project Manager "Investing projects Implementation Unit Building up of Yerevan", mentioned with regret that the Project did not envisage the preservation of those monuments, however the Project was willing to raise this question at the Municipality, which supports and implements the Project, and if possible to obtain funds for the preservation of the monuments.

Karo Ayvazyan, the representative of the RA Ministry of Culture asked how the problem of the existence of construction waste would be solved.

Nora Martirosyan, Project Manager "Investing projects Implementation Unit Building up of Yerevan", answered that before the construction waste disposal/removal and systematic excavations would be done. However, a complete cleaning of the monument area will not be implemented.

Boris Gasparyan, the archeologist of the Consultant Agency, clarified that the areas subject to excavation were covered with waste and obviously before excavations and commencement of construction works the construction waste would be cleaned. She mentioned that the road would become very busy and more people would see the archeological site and probably it would be better if the surrounding was improved.

Karo Ayvazyan, the representative of the RA Ministry of Culture, also asked about land allocation and Nora Martirosyan, Project Manager "Investing projects Implementation Unit Building up of Yerevan", answered that the project is a Yerevan Municipality project and in

terms of community lands land acquisition and resettlement would not be implemented, as they already belonged to the Municipality.

Boris Gasparyan, the archeologist of the Consultant Agency, presented the archeological part of the Project. He informed that Argavan-Shirak new road section would pass along the borders of Karmir Blur archeological site. He noted that he considered the construction of the road to be positive, as it would prevent the illegal expansion of the cemetery, which enters into the monument's preservation area. Cleaning of the waste accumulated for years, which will be implemented within the framework of the Project, was also mentioned by him as a positive result. Boris Gasparyan also informed of the measurements taken to preserve and protect the historical-archeological value, which are included in the design and construction stages. He informed that the measurements of design stage imply 4 stages. Two of them are already implemented: the preliminary study in the zone of immediate impact and test excavations along the zone of immediate impact. Boris Gasparyan mentioned that the sections of archeological excavations had been divided into 3 zones and it could be confidently stated that there were no any archeological chance finds in two zones. The archeologist informed that the test excavations in the zone of immediate impact had been carried out by means of 10 survey pits, which were distributed along the alignment. In the first zone a tomb was found out, where some archeological chance finds existed. In the first zone the excavations will continue throughout the third and the fourth stages, which imply exploratory excavations of archeological locations and final defining of the boundaries of the archeological section and their systematic excavations. Boris Gasparyan informed the participants of the mitigation measures which would be also implemented in the construction phase.

Minutes were taken by:

Anna Malikoyan – Communications and Public Relations specialist, "Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1,

Reviewed by:

Edita Vardgesyan: environmental specialist, Consultant Company (SWEROAD International),

Ruzanna Voskanyan – Environmental specialist, Investing projects Implementation Unit Building up of Yerevan" Community Non Commercial Organization, Sustainable Urban Development Investment Program, Tranche 1

ANNEX 13
Sustainable Urban Development Investment Program

Project 1 Road link 3
Argavand Junction

Environmental Impact Assesment Report (Addendum)

This road link has about 3.7 km length and comprises of a new highway to be constructed and the existing roads to be widened, both two-way, with cross-sections of two lanes.

- Excavated soil - 176229 m^3
- Backfilling - 34203 m^3,
- Volume of concrete works -7016 m^3
- Surface area of asphalt to be demolished - 5024 m^2,
- Surface area of pavement - 36401 m^2:

1. Impact on Atmospheric air

To assess impact on atmospheric air during construction works, for the construction phase calculations have been made on emissions and expected near-earth concentrations as a result of emission diffusion. During the construction works emissions of harmful substances will be caused by excavation, loading works, pavement, markings and equipment operation.

1.1. Calculation of Dust Emissions

Composition of emissions and the amount of substances have been determined by calculations and are provided below. Necessary descriptions and coefficients have been accepted based on average indexes.

a) Calculations of dust emission during excavation-loading works.

During Excavation-loading works dust emissions are caused basically during loading the dump-trucks. Calculations were made in accordance with approved methodology and procedure ("ВРЕМЕННОЕ МЕТОДИЧЕСКОЕ ПОСОБИЕ ПО РАСЧЕТУ ВЫБРОСОВ ОТ

НЕОРГАНИЗОВАННЫХ ИСТОЧНИКОВ В ПРОМЫШЛЕННОСТИ СТРОИТЕЛЬНЫХ МАТЕРИАЛОВ", Минпромстрой СССР, 1987).

$Q = (P_1 \times P_2 \times P_3 \times P_4 \times P_5 \times G \times 10^6 \times B \times P_6)/3600$ t/h, where (1)

P_1 – is a share/part of a dust fraction, 0.05

P_2 – 0-50 is the part of particles in the aerosol of spreading dust in mikrometers, 0.02 (density 2.7 g/cm^3)

P_3 – coefficient, which takes into account wind speed in the site of construction equipments, 1.0

P_4 - coefficient, which takes into account humidity of the material, 0.7 (humidity up to 5%)

P_5 - coefficient, which takes into account size of the material, 0.4

P_6 - coefficient, which takes into account the conditions of the location/area, 1.0

B - coefficient, which takes into account dumping height of materials, 0.6

G – amount of excavated soil mass, 176229 m^3/construct. period or 475818.5 t/ construct. period.

Duration of the works: 18 months

475818.5: 18month/year: 30 days/month: 10 hours/day = 88.1 t/period

$Q = (0.05 \times 0.02 \times 1.0 \times 0.7 \times 0.4 \times 88.1t \times 10^6 \times 0.6 \times 1.0)/3600 = 4.07$ g/sec

or 8.9 g/sec x 10800 5400hours x $3600/10^6 = 79.36$ t/constr. period

b) Calculations of dust emissions during operating construction machinery/equipments.

During operation of construction machinery and heavy transport/vehicles, friction of wheels will cause dust emissions into the atmosphere.

Total amount of dust emissions is determined in accordance with approved methodology /5/.

Based on formula $Q = (C_1 \times C_2 \times C_3 \times N \times L \times q_1 \times C_6 \times C_7)/3600 + C_4 \times C_5 \times C_6 \times q_2 \times F_0 \times n$

Where

C_1 – is coefficient, which takes into account average load carrying capacity of transportation of the area, $C_1 = 1.0$

C_2- is coefficient, which takes into account average speed of locomotion in the area, $C_2 = 2.0$

C_3 - is coefficient, which takes into account condition of roads, $C_3 = 0.5$

N – is the number of races of all transportation per hour, N = 7.3

L – is the average length of one run/race, km L = 5 km

C_4 - is coefficient, which takes into account the profile of the surface of the material on the platform, C_4 – fluctuates within the range of 1.3 – 1.6, C_4 = 1.3

F_o – is the average surface/area of the platform, Fo – is the average area of the platform, F_0 = 8

C_5 - is coefficient, which takes into account the blowing speed of materials, C_5 = 1.0

C_6 - is coefficient, which takes into account the humidity of the surface layer of materials C_6 = 0.7

C_7 is coefficient, which takes into account the share/part of dust emissions into the atmosphere, we accept C_7 = 0.01

q_1 – dust emissions into the atmosphere in case of 1 km race q_1 = 1208 g

q_2 – dust emissions from the unit of actual surface of the material g/m^{2}sec q_2 = 0.002

n – is the number of vehicles n = 7

Q = (1.0 x 2.0 x 0.5 x 7.3 x 6 x 1208 x 0.7 x 0.01)/3600 + 1.3 x 1.0 x 0.7 x 0.002 x 8 x 7 = 0.187 g/sec

Q = (0.187 x 5400 x 3600)/10^6 = 3.635 t/const. period

1.2 Estimated emissions from harmful substances during operation of construction equipments.

g) *Emissions associated with diesel fuel.*

Emissions associated with diesel fuel are calculated based on methodical order[1] of "Calculations of emissions of harmful substances from motor-vehicle transport into the atmosphere" designed by the Ministry of Nature Protection of the RA.

According to the mentioned procedure emissions of specific gravity from heavy vehicles and machinery are provided below, in Table 1.

Emissions of specific gravity (g/kg fuel)

Table 1

Type of fuel	Name of substance						
	NO_x	CH	ՅՕՍ	CO	N_2O	CO_2	ՊՄ
Diesel fuel	42.3	0.243	8.16	36.4	0.122	3138	4.3

Adjustment coefficients of emissions from harmful substances depending on average age of exhaust pipe filter and technical condition of the motor vehicle are given below, in Table 2.

Adjustment coefficients of emissions from harmful substances

Table 2

Category of motor car	Harmful substance	Impact coefficient	
		of average age of the exhaust pipe filter	of technical condition
Vehicle with high load bearing capacity	CO	1.33	1.8
	CH	1.2	2.0
	NO_x	1.0	1.0
	CO_2	1.0	1.0
	N_2O	1.0	1.0

Coefficients of carbon monoxide (CO), carbohydrates (CH) and nitrogen oxide (NO_x) are taken from methodical index of "calculations of emissions of harmful substances into the atmosphere caused by vehicles (Moscow, hydrometeorology, Publications 1983), and coefficients of carbon dioxide (CO_2) and nitrogen dioxide (N_2O) have been acknowledged/accepted 1, since other values are not suggested for them.

During construction in total 6 machinery/equipments and 7 vehicles (means of transportation) will be operated, which are run/operated by diesel. Estimated cost of diesel fuel during construction activities will amount to 338.5 t, average cost per day – 313.5 kg,

Table 3.

Type of vehicle	Harmful substance	Emissions of specific gravity, g/kg	Emissions, g/sec	Emissions, t/constr. hour
Vehicle with high load bearing capacity	CO	87.14	0.76	29.5
	CH	0.58	0.005	0.195
	NO_x	42.3	0.369	14.32
	N_2O	0.122	0.001	0.04
	Volatile Organic Compounds (VOC)	8.16	0.071	2.76
	Solid particles (SP)	4.3	0.036	1.45

Sulfur dioxide

Emissions of (SO_2) sulfur dioxide are calculated based on the approach that sulfur contained in the fuel completely turns into SO_2. In that case formula of CORINAIR inventory system is applied.

$ESO_2 = 2\Sigma k_s b$, where

k_s is sulfur contained in fuel; 0.002 kg/kg

b –is fuel consumption / 677100 kg

$ESO_2 = 2\Sigma k_s b$

SO_2 = 2 x 338500 kg x 0.002 = 1354 kg/constr. period or 1.35/constr. period (0.03 g/sec).

d) Emissions caused during preparation works of concrete mixture

Concrete mixer will be installed for making concrete mixture. A mixture of cement, inert materials and water are needed to get cement mortar. Inert materials should be carried while wet and cement should be carried dry by cement carrying truck. Cement dust is calculated in the following manner:

G_{cement} = Vx d x k x n, where
V - concrete volume, 7016 m^3/constr. hour,
D- specific gravity of concrete taking into account that concrete has different types of density, average 1.8 y/m^3 is accepted

K- average cement coefficient in concrete mixture, 0.25
N- emission coefficient of cement dust, 0.0004 t/period
Emissions amounted to:
$G_{cement.}$ = 7016 x 1.8 x 0.25 x 0.0004 = 1.26 t/constr. period
Duration of concrete works-18 months
1.26 t/ constr. period x 10^6 g/t : 540 days : 10 hours/day : 3600 = 0.065 g/sec.

Pavement

During implementation of asphalt works after placing asphalt concrete layer, evaporation of solvents used for dilution of bitumen and asphalt mixure occurs. Calculation has been made in accordance with Corinair (6) procedure (SNAP CODE 040611):

$G = V_{asf} \times K_1 \times K_2 \times d$, where

G – emission of organic diluents during construction period, t/ constr. hour

V_{asf} - volume of all kinds of asphalt,

Paving area will amount to 36401 m^2, asphalt volume 36401 x 0.2 = 7280.0 m^3,

K_1 – coefficient of the content of diluents, 0.1

K_2 – a particle/share of emissions of carbohydrates according to the volume of diluents, 0.05;

D – average specific gravity of organic diluents, 0.86 kg/l

G = 7280.0 x 0.1 x 0.05 x 0.86 = 31.3 t/constr. period or

By dividing into the whole period of pavement works which takes 18 months or 540 days, we will get the amount of emissions per second: 22.67 t x 10^6g/t : 540 days : 24 hours/days: 3600 sec/hours = 0.67 g/sec

Road Markings

Markings are carried out through organic paints, which cause emissions of solvent vapors.

$P = V_{paint} \times L_1 \times L_2 \times d$, where

V_{paint} – amount of paints used, 1170 kg

L_1 –coefficient of the content of diluents, 0.6

L_2 – part of emissions from carbohydrates according to the volume of diluents, 0.05;

G = 1170x 0.6 x 0.05 = 35.1 kg or 0.035 t/constr. period

or dividing into the whole period of works 35.1 կգ x 10^3 g/kg: 5400 days : 10 hours/days: 3600 sec/hours = 0.018 g/sec

Results of the calculations which are summed up according to the types of work and separate substances are provided below, in Table 4. In the calculations nitrogen oxides and evaporating organic combinations (carbohydrates) are incorporated.

In order to assess impact of emissions on the environment, expected near-earth concentrations after diffusion in the air has been determined.

Taking into account that technical means are movable sources of emissions, calculation of diffusion has been made for carbohydrates and cement dust caused by inorganic dust, pavement and painting. The site has been acknowledged as an emission source /platform source/. Taking into account that the construction site transfers from one site to another, conditional coordinates have been implemented.

Descriptions of platform source and calculated substances are provided in Table 5.

Amount of harmful emissions into atmosphere during construction period

Table 4

Phases of construction works	Amount of harmful emissions into the atmosphere, t/constr. hour (g/sec)						
	dust	Carbone monoxide	VOC	Nitrogen oxide	SP	SO_2	Cement dust
1.Excavation-loading works	79.36 (4.07)	-	-	-	-	-	-
2. Movements of technical means	3.635 (0.187)	-	-	-	-	-	-
3. Emissions associated with diesel fuel	-	29.5 (0.76)	2.76 (0.071)	14.36 (0.37)	1.45 (0.036)	1.35 (0.03)	-
4. Concrete mixer		-	-	-	-	-	1.26 (0.065)
5. Asphalting works/pavement		-	31.3 (0.67)	-	-	-	-
6. Markings		-	0.035 (0.018)	-	-	-	-
TOTAL	82.99 (4.257)	29.5 (0.76)	34.1 (0.57)	14.36 (0.37)	1.45 (0.032)	1.35 (0.03)	1.26 (0.065)

Description of emissions into atmosphere and their sources

Road link 3 - Argavand Junction

Table 5

Name of emission source	Description of emission source			Description of gas mixture		Coordinates				Emissions of harmful substances		
	N	Height, m	Diameter, m	V, m^3/sec	T, ^0C	X_1	Y_1	X_2	Y_2	Name	g/sec	y/constr. hour
1	2	3	4	5	6	7	8	9	10	11	12	13
Non-organized platform emission source	1	2.5	25	1.4	20.0	500	500	525	520	- inorganic dust - VOC - cement dust	4.26 0.57 0.065	82.99 34.1 1.26

Results of Calculation of near-earth concentrations of atmospheric emissions

During construction, the calculations of diffusion of harmful substances in the atmosphere were made by a computer based program "Raduga" ("Rainbow"1). The data of Table 5 have been used as input data.

The following were determined based on calculations made:

- the coordinates of the nominal design point, m
- concentrations of harmful substances,
- the direction of the torch axis,
- wind speed (m/sec) at which the near-earth concentration at the nominal design point reaches its optimal value.

Since the difference in heights doesn't exceed 50m, the relief index is 1.0 in accordance with ОНД – 86 method.

The results of the computer based calculations are presented in the section of Annexes.

Maximum level of pollution is as follows:

Table 6

№	Name of Pollutant	Absolute value of maximal pollution, mg/m^3	Maximal pollution as a portion of the maximal MAC
1.	Inorganic dist	0.19	0.378
2.	VOC	0.017	0.017
3.	Cement dust	0.003	0.01

The above-mentioned numbers (as shown in the table) show that near-earth concentrations are in the range of permissible norms.

2. Impact on Water resources

2.1 Water Usage

During construction works water is used for workers' household needs, industrial, watering (for dust control) purposes and for preparing cement mixture.

a) For drinking and household needs of employees and workers (drivers included) water consumption will be calculated as follows:

Wd.i. (drinking & industrial) = (n x N x + n_1 x N_1) T_1 where

n – ET (engineering-technical) is the number of employees 12 persons

N– ETE (engineering-technical employee) water consumption normative

0.016 m^3day/ person

T_1 – number of working days 540 days

n_1– number of workers (drivers included) 40 persons

N_1 – workers' water consumption normative 0.025 m^3day / person

Wd.i. = (12 x 0.016 + 40 x 0.025) x 540= 643.7 m^3/const. hour

Daily avarage` 1.192 m^3/day

b) Water consumption for watering purposes is determined as follows:

U_1 = S_1 x K_1 x T, where

S_1 – is the surface of watered area, 360 m^2 (working platform),

K_1 – 1 m^2 daily watering normative, 0.0015 m^3,

T – duration of works' implementation, 440 days/ days without precipitation/.

2. U_1 = 360 x 0.0015 x 440 = 237,6 m^3/ const. hour or 0.54 m^3/day

c) Water consumption for preparation of concrete mixture is determined as follows:

$W_{cement.}$ = Vx B, where

V - volume of concrete, 11850 m^3/ constr. period,

B-water content,

$W_{cement.}$ = 7016 x 0.25 = 1754.0 m^3/ constr. period or 3.25 m^3/day

2.2 Drainage

Water consumption for watering (dust control) is entirely ranked in the category of losses, and water consumption for concrete mixture is ranked in the category of irrevocable use and outflow will not occur.

The volume of wastewater resulting from drinking water usage is

$W_{drainage}$= Wd.i. – (Wd.i.x K), where

K – loss coefficient, 0.05

$W_{drainage}$ = 647,3 – 647,3 x 0.05 = 614,9 m^3/ const. hour or 1,14 m^3/day.

During construction activities, wells of wastewater disposal will be installed, which will be dismantled after completion of works.

During construction activities other water flows will not accumulate.

Balance of Water Consumption and Drainage

Table 7.

Water consumption needs	Water consumption, m^3/year			Drainage, m^3/year			Circulatory volumes, m^3/year
	Total	Drinking quality	Technical quality	Outflow/leakage	Loss	Irrevocable use	
Watering of construction platforms	237,6	-	237,6	-	-	237,6	-
Preparation of concrete mixture	1754.0		1754.0	-	-	1754.0	-
Drinking and household	647.3.	647.3	-	614,9	28,8	-	-
Total	27246.1	647.3	1991.6	614,9	28,8	27246.1	-

2.3 Rainwaters

To remove rain waters from the site, creation of bypassing ditch system has been envisaged as a Project solution. Those areas where construction equipments and vehicles will be stationed and fuel and lubricant solutions will be stored, will be separated by means of special barricades and will be furnished by collecting system of leakages with water-resistant bottom (to prevent outflow from fuel), which will exclude the flow of surface (rain waters) waters into that area and consequently pollution of rain waters will be prevented as well. For drainage (to remove rain waters from the site) a construction of temporary pothole (with oil collector) is envisaged. There purification of waters, settling of sedimentation velocity of

suspensions and other mechanical mixtures will be carried out. Afterwards flow waters will be removed from the site to the relief of the area.

The Contractor shall have an Environmental Managment Plan (EMP) for the site, which will specify principles of construction site/camp management, including design and setting up of a camp, which will considerably determine the dimensions of damage caused to the nature (surface and underground waters).

Potential impacts and suggested mitigation measures are provided in the respective subplans of the EMP.

3. Solid and liquid wastes

Caused by the Contractor's activities: Solid wastes caused by construction activities include loaded road surface, oil interceptors/separators, packing appliances of materials and other wastes caused by the construction workers. Liquid wastes caused by the program include domestic wastewater and oil wastes caused by the construction workers.

The EMP specifies that wastes caused by the Contractor's activities must be collected, stored, removed and disposed in accordance with RA laws and regulations of MNP.

For construction of roads existing raods will be partially used. In some sections new areas will be included, which will be paved.

Pavement of existing roads shall be demolished and disposed to a dumping site designated by the Yerevan Municipality. Other wastes will be disposed to the same area.

Special designated areas will be temporarily used for construction sites. After completion of construction works the sites will be reinstated. For that reason the following measures are envisaged:

- Dismantling and removal of all temporary structures,
- Removal of concrete covers, pipes and construction debris,
- Leveling and improving the area.

During and after construction activities the following wastes will be accumulated in the construction sites:

Table 8

№	Name	Hazard rate	Cipher (code) according to the "List of Wastes"	Amount, t/years
1	Oil wastes of used engines	III	5410020102033	3.51

2	Remnants of asphalt and asphalt concrete mixture	IV	31401200 01 00 4	1718.2
3	Used tyre covers/carcass	IV	5750020213004	0.65
4	Non-graded waste (with the exception of those having big dimensions) caused by domestic areas of companies.	IV	91200400 01 00 4	14.1
	Total			1736.46

Wastes will be disposed to the dumping sites designated by Yerevan Municipality.

4. Economic Assessment of Impact During Construction

Economic damage is the value of measures, expressed in cash equivalent, for the elimination of damage on environment. Calculations of economic damage is made in order to assess the damage on the environment by monetory indicators, and does not incur any financial liabilities.

Economic damage takes into account:

- Costs associated with health deterioration of population
- Damage on agriculture, forestry and fish farming
- Damage on industry

Economic damage is calculated for contamination of soil, water resources and pollution of atmospheric air. In this program contamination of soil and water resources is not expected and the damage is calculated for pollution of atmospheric air.

Economic damage is calculated according to "Assessment Procedure of Impacts on Atmosphere Caused by Economic Activities", approved by N 91 – Ա R.A. Government Decision made on January 25, 2005.

Economic damage for each emission source is estimated by formula 1:

$A = E_c T_i \Sigma H_i A_i$ where

A - impact, expressed in AMD

E_c – coefficient of the characteristic of the environment's polluting source (active contamination zone), in accordance with the Table 9 of the mentioned procedure the index of industrial areas is set to be 4.

H_i - the value expressing the i-th substance (dust type) comparative harmfulness, for carbon monoxide is 1, for nitrogen dioxide – 12.5, for inorganic dust is 10, for cement – 45, for carbohydrates is 3.16, for solid particles of diesel fuel combustion is 200, for sulfur anhydride is 16.5 (5).

A_i – is the given coefficient of i-th substance emission amount,

T_i – transport index, is a constant and is chosen based on the principle of promoting environment protection. According to the given procedure:

T_i = 1000 dram.

A_i - coefficient is determined by formula 2

$A_i = c\ (3\ A_{ai} - 2\ MAC_i),\ A_{ai} > MAC_i$ (2), where
where:

MAC_i –is the i-th substance annual maximum allowable concentration amount in tons. Considering that the diffusion calculations of emissions of harmful substances into the atmosphere showed that the expected near-earth concentrations are in the range of permissible norms, actual emissions are accepted as MAC. Based on this:

$A_i = A_{ai}$

A_{ai} - i-th substance actual annual emissions in tons.

c = 1 for the immovable sources

c = 3 for movable sources (for motor-vehicle transport).

Impact is not assessed for the materials whose normative volume concentration has not been specified by state standards.

Amount of emissions for movable and immovable sources are provided below:

Table 9

Name of emission of substances	Amount of emissions, t/constr. hour	
	Immovable sources	Movable sources
Inorganic dust	79.36	3.635
carbon monoxide	-	29.5
VOC	31.65	2.76
nitrogen dioxide	-	14.32
Solid particles	-	1.45

Sulfur dioxide	-	1.35
Cement dust	1.26	-

$A = E_c\ T_i\ \Sigma\ H_i\ \ A_i$ = 4 x 1000 x {1 x 10 x 79.36+ 1 x 3,16 x 31.65+ 1 x 45 x 2.13 + 3 x 10 x 3.65 + 3 x 1 x 29.5 + 3 x 3.16 x 2.76 + 3 x 12.5 x 14.32 + 3 x 200 x 1.45 + 3 x 16.5 x 1.35} = **10533600.0** AMD/constr. period.

The amount of money mentioned does not incur any financial liability.

2Р

<<РАДУГА>>

2014.5.27

ИСХОДНЫЕ ДАННЫЕ

Управляющие параметры расчета и характеристики объекта

Объект: New Argavand and shirak street

Таблица 1

Число источников	1
Число рассматриваемых вредных веществ	3
Географическая широта местности (град.)	41
Температура	25.6
Районный коэффициент	200
Шаг перебора направления ветра	30
Характеристика перебора направления ветра	векторный
Скорость ветра	6
Число вкладов	
Число максимальных концентраций	
Угол	90
Число групп суммирования	0
Константа целесообразности проведения расчета	0.1

2Р

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2014.5.27

ПАРАМЕТРЫ ИСТОЧНИКОВ

Объект: New Argavand and shirak street

ТАБЛИЦА 7 СТАНИЦА 1

КОД	ВЫСОТА	ДИАМЕТР ТОЧЕЧНОГО ИЛИ ПЛОСКОСТНОГО	ПАРАМЕТРЫ ГАЗОВОЗДУШНОЙ СМЕСИ			КООРДИНАТЫ				УГОЛ МЕЖДУ ОСЬЮ ОХ И НАПРАВЛЕНИЯ НА СЕВЕР	УЧЕТ РЕЛЬЕФА
			СКОРОСТЬ	ОБЕМ	ТЕМПЕРАТУРА	ТОЧЕЧНОГО, НАЧАЛО ЛИНЕЙНОГО ИЛИ ЛИНИИ И ЦЕНТРА ПЛОСКОСТ.		КОНЕЦ ЛИНЕЙНОГО ИЛИ ЛИНИИ ЦЕНТРА ПЛОСКОСТНОГО			
Н ИСТ.	Н(М)	Д	W(М/С)	V(М,КУБ/С)	Т(ГРАД.С)	Х1(М)	Y1(М)	Х2(М)	Y2(М)	С(ГРАД)	РН
1	2.5	25.00	1.4000	687.2234	20.0	500	500	525	500	90	1.00

2Р

<<РАДУГА>>

2014.5.27

НАРАКТЕРИСТИКА ВЫБРОСОВ

ОБЬЕКТ: New Argavand and shirak street

ТАБЛИЦА 8 СТРАНИЦА 1

КОД ВЕЩ-ВА	НАИМЕНОВАНИЕ(ШИФР) ВЕЩ-ВА	ПДК(КГ/М,КУБ)	КОЕФ.ОСЕДАНИЯ	ЧИСЛО ИСТОЧНИКОВ
901	dust	0.500000	3.0	1

Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)
1	4.2600														

КОД ВЕЩ-ВА	НАИМЕНОВАНИЕ(ШИФР) ВЕЩ-ВА	ПДК(КГ/М,КУБ)	КОЕФ.ОСЕДАНИЯ	ЧИСЛО ИСТОЧНИКОВ
902	VOC	1.000000	1.0	1

Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)
1	0.5700														

КОД ВЕЩ-ВА	НАИМЕНОВАНИЕ(ШИФР) ВЕЩ-ВА	ПДК(КГ/М,КУБ)	КОЕФ.ОСЕДАНИЯ	ЧИСЛО ИСТОЧНИКОВ
903	cement	0.300000	3.0	1

Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)	Н ИСТ	МОЩ(Г/С)
1	0.0650														

2P----------

<<РАДУГА>>

2014.5.27

РЕЗУЛЬТАТЫ РАСЧЕТА

Объект: New Argavand and shirak street

Распределение максималъных наземных концентраций (без фона)

dust Таблица 9 Станица 2

A=200 TB= 25.6 град.C U*= 6 m/s
выбор шага направления ветра = 30 град.
отображение рельефа каждому источнику
характеристика выбрасываемых веществ

КОД ВЕЩЕСТВА	901
НАИМЕНОВАНИЕ (ШИФР) ВЕЩЕСТВА	dust
ПРЕДЕЛЬНО ДОПУСТ.КОНЦЕНТР.(МГ/М,КУБ)	0.5000
КОЭФФИЦИЕНТ ОСЕДАНИЯ ВЕЩЕСТВА	3.0
ФОНОВАЯ КОНЦЕНТРАЦИЯ	НЕ УЧИТЫВАЕТСЯ

КОД ИСТОЧНИКА	ВЫСОТА ВЫБРОСА	ДИАМЕТР УСТЬЯ	ПАРАМЕТРЫ ГАЗОВОЗДУШ. СМЕСИ: ОБЪЕМ	ТЕМПЕРАТУРА	СКОРОСТЬ	КООРДИНАТЫ ТОЧЕЧНОГО,НАЧАЛА ЛИНЕЙН,ИЛИ ЦЕНТРА ПЛОСКОСТ: X1(M)	Y1(M)	КОНЦА ЛИНЕЙНОГО ИЛИ ДЛИНА И ШИРИНА ПЛОСКОСТН.: X2(M)	Y2(M)	У Г О Л	КОЭФ. РЕЛЬЕФА	ОПАСНАЯ СКОРОСТЬ ВЕТРА	МОЩНОСТЬ ВЫБРОСА	МАКСИМАЛЬНАЯ КОНЦЕНТР: В ДОЛЯХ ПДК	РАССТОЯНИЕ ОТ ИСТОЧНИКА
NN	H(M)	D(M)	V(M.KUB/S)	T(LAIP C)	W(M/S)	X1(M)	Y1(M)	X2(M)	Y2(M)	S	PN	UM(M/S)	M1(g/s)	CM	XM(m)
1	2.525.00		687.2234	20.0	1.40	500	500	525	500	90	1.00	40.0	4.26000	6.85104	85.3

Среднезвешенная скорость ветра 40.040 м/с
Сумма максимальных концентраций (доли ПДК) по ОНД-86 Q= 6.8510361

<<РАДУГА>>

2014.5.27

РЕЗУЛЬТАТЫ РАСЧЕТА

Объект: New Argavand and shirak street

Распределение максималъных наземных концентраций (без фона)

VOC Таблица 9 Станица 3

A=200 TB= 25.6 град.C U*= 6 m/s
выбор шага направления ветра = 30 град.
отображение рельефа каждому источнику
характеристика выбрасываемых веществ

КОД ВЕЩЕСТВА: 902
НАИМЕНОВАНИЕ (ШИФР) ВЕЩЕСТВА: VOC
ПРЕДЕЛЬНО ДОПУСТ.КОНЦЕНТР.(МГ/М,КУБ): 1.0000
КОЭФФИЦИЕНТ ОСЕДАНИЯ ВЕЩЕСТВА: 1.0
ФОНОВАЯ КОНЦЕНТРАЦИЯ: НЕ УЧИТЫВАЕТСЯ

КОД ИСТОЧНИКА	ВЫСОТА ВЫБРОСА	ДИАМЕТР	ПАРАМЕТРЫ ГАЗОВОЗДУШ. СМЕСИ: ОБЪЕМ	ТЕМПЕРАТУРА	СКОРОСТЬ	КООРДИНАТЫ ТОЧЕЧНОГО,НАЧАЛА ЛИНЕЙН,ИЛИ ЦЕНТРА ПЛОСКОСТ	КООРДИНАТЫ КОНЦА ЛИНЕЙНОГО ИЛИ ДЛИНА И ШИРИНА ПЛОСКОСТН.	У Г О Л	КОЭФ. РЕЛЬЕФА	ОПАСНАЯ СКОРОСТЬ ВЕТРА	МОЩНОСТЬ ВЫБРОСА	МАКСИМАЛЬНАЯ КОНЦЕНТР: В ДОЛЯХ ПДК	РАССТОЯНИЕ ОТ ИСТОЧНИКА
NN	H(M)	D(M)	V(M.KUB/S)	T(LAIP C)	W(M/S)	X1(M) Y1(M)	X2(M) Y2(M)	S	PN	UM(M/S)	M1(g/s)	CM	XM(m)
1	2.525.00	687.2234	20.0	1.40	500	500	525 500	90	1.00	40.0	0.57000	0.15278	170.6

Среднезвешенная скорость ветра 40.040 м/с
Сумма максимальных концентраций (доли ПДК) по ОНД-86 Q= 0.1527813

<<РАДУГА>>

2014.5.27

РЕЗУЛЬТАТЫ РАСЧЕТА

Объект: New Argavand and shirak street

Распределение максималъных наземных концентраций (без фона)

cement Таблица 9 Станица 4

A=200 TB= 25.6 град.C U*= 6 m/s
выбор шага направления ветра = 30 град.
отображение рельефа каждому источнику
характеристика выбрасываемых веществ

КОД ВЕЩЕСТВА	903
НАИМЕНОВАНИЕ (ШИФР) ВЕЩЕСТВА	cement
ПРЕДЕЛЬНО ДОПУСТ.КОНЦЕНТР.(МГ/М,КУБ)	0.3000
КОЭФФИЦИЕНТ ОСЕДАНИЯ ВЕЩЕСТВА	3.0
ФОНОВАЯ КОНЦЕНТРАЦИЯ	НЕ УЧИТЫВАЕТСЯ

КОД ИСТОЧНИКА	ВЫСОТА ВЫБРОСА	ДИАМЕТР УСТЬЯ	ПАРАМЕТРЫ ГАЗОВОЗДУШ. СМЕСИ: ОБЪЕМ	ТЕМПЕРАТУРА	СКОРОСТЬ	К О О Р Д И Н А Т Ы: ТОЧЕЧНОГО ИСТОЧНИКА ЛИНЕЙН,ИЛИ ЦЕНТРА ПЛОСКОСТ	НАЧАЛА ЛИНЕЙНОГО ИЛИ ДЛИНА И ШИРИНА ПЛОСКОСТН.	КОНЦА ЛИНЕЙНОГО ИЛИ ДЛИНА И ШИРИНА ПЛОСКОСТН.	У Г О Л	КОЭФ. РЕЛЬЕФА	ОПАСНАЯ СКОРОСТЬ ВЕТРА	МОЩНОСТЬ ВЫБРОСА	МАКСИМАЛЬНАЯ КОНЦЕНТР В ДОЛЯХ ПДК	РАССТОЯНИЕ ОТ ИСТОЧНИКА
NN	H(M)	D(M)	V(M.KUB/S)	T(LAIP C)	W(M/S)	X1(M)	Y1(M)	X2(M)	Y2(M)	S	PN	UM(M/S)	M1(g/s)	CM	XM(m)
1	2.525.00	687.2234	20.0	1.40	500	500	525	500	90	1.00	40.0	0.06500	0.17422	85.3	

Среднезвешенная скорость ветра 40.040 м/с
Сумма максимальных концентраций (доли ПДК) по ОНД-86 Q= 0.1742243

2P----------
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<<РАДУГА>>

2014.5.27

Объект: New Argavand and shirak street

Вариант ARG

Таблица 11

К О О Р Д И Н А Т Ы В Е Р Ш И Н								шаг X(M)	шаг Y(M)
X1	Y1	X2	Y2	X3	Y3	X4	Y4	DX	DY
-500	-500	-500	1500	1500	1500	1500	-500	50	50

2P

<<РАДУГА>>

2014.5.27

НАИБОЛЬШИЕ КОНЦЕНТРАЦИИ
(X,Y) - точка координаты
QH -нормированная концентрация в долях ПДК
HB -направление ветра в град.
U - скорость ветра м/с
Объект: New Argavand and shirak street
вещество:dust Таблица 13 Страница 1

QH	X	Y	HB	U	Но.Источ: вклад	Но.Источ: Вклад	Но.Источ: Вклад	Но.Источ : Вклад
0.378539	500	500	180	0.5	1	0.37854		
0.059034	400	700	120	0.5	1	0.05903		

Минимальная и максимальнная концентрации в точках расчэтов: 0.0099633849 0.3785393974

<<РАДУГА>>

2014.5.27

НАИБОЛЬШИЕ КОНЦЕНТРАЦИИ
(X,Y) - точка координаты
QH -нормированная концентрация в долях ПДК
HB -направление ветра в град.
U - скорость ветра м/с
Объект: New Argavand and shirak street
вещество:VOC Таблица 13 Страница 1

QH	X	Y	HB	U	Но.Источ: вклад	Но.Источ: Вклад	Но.Источ: Вклад	Но.Источ : Вклад
0.016869	500	500	180	0.5	1	0.01687		

:	0.001318	950	750	30	0.5	1	0.00132

Минимальная и максимальнная концентрации в точках расчэтов: 0.0005452223 0.0168689807

<<РАДУГА>>

2014.5.27

НАИБОЛЬШИЕ КОНЦЕНТРАЦИИ
(X,Y) - точка координаты
QH -нормированная концентрация в долях ПДК
HB -направление ветра в град.
U - скорость ветра м/с
Объект: New Argavand and shirak street
вещество:cement Таблица 13 Страница 1

:	QH	:	X	:	Y	:	HB	:	U	:Но.Источ:	вклад	:Но.Источ:	Вклад	:Но.Источ:	Вклад	:Но.Источ	: Вклад	:
:	0.009626		500		500		180		0.5	1	0.00963							
:	0.001501		400		700		120		0.5	1	0.00150							

Минимальная и максимальнная концентрации в точках расчэтов: 0.0002533725 0.0096263931

2P----------
298099 0 ЛитССР ММП ПКТИ <<РАДУГА>>
2601 ВИЛЬНЮС
2014.5.27

Анализ исходных данных по выбросам

Обьект: New Argavand and shirak street

Таблица 14 Страница 1

КОД ВЕШ-В	НАИМЕНОВАНИЕ(ШИФР) ВЕЩЕСТВА	Требуемое потребление воздуха (м.куб/с)	Мошность выброса M(г/с)	Произведение ТПВ(требуемое потребление воздуха) на R(параметр разбавления)(м.куб/с)	Класс пред-приятия	В расчет включить +/ нет- по отношению концентрации/массе выбросов	
901	dust	8520	4.3	1.0563E+0005	4	+	+
902	VOC	570	0.6	4.7277E+0002	5	-	+
903	cement	217	0.1	6.8310E+0001	5	-	+

2P----------
298099 0 ЛитССР ММП ПКТИ <<РАДУГА>>
2601 ВИЛЬНЮС
2014.5.27

Анализ исходных данных по источникам

Объект: New Argavand and shirak street
Вещество: dust Таблица 15 Страница 1

Код источника	Источники высота	дыаметр устья	Мощность выброса M1(г/с)	Концентрация на выходе C(мг/м.куб)	Скорость выброса Um(m/s)	Объем газовоз смеси Xm(M)	Радиус зоны влияния RR(M)	Требуемое потребление воздуха ТПВ(м.куб/с)	Параметр разбавления R	Степень воздеист. на природ П	Класс источника	Рекомендуется источник в расчеты Включить + Невключить -
NN	H(м)	Д(м)	M1(г/с)	C(мг/м.куб)	Um(m/s)	Xm(M)	RR(M)	ТПВ(м.куб/с)	R	П		+
1	2.50	25.00	4.260	6.20	1.40	687.22	12681.0	8.52E+0003	1.2E+0001	1.1E+0005	3	+

Объект: New Argavand and shirak street

Вещество: VOC Таблица 15 Страница 1

NN	H(м)	Д(м)	M1(г/с)	C(мг/м.куб)	Um(m/s)	Xm(M)	RR(M)	ТПВ(м.куб/с)	R	П		+ / -
1	2.50	25.00	0.570	0.83	1.40	687.22	1706.5	5.70E+0002	8.3E-0001	4.7E+0002	4	+

Объект: New Argavand and shirak street

Вещество: cement Таблица 15 Страница 1

NN	H(м)	Д(м)	M1(г/с)	C(мг/м.куб)	Um(m/s)	Xm(M)	RR(M)	ТПВ(м.куб/с)	R	П		+ / -
1	2.50	25.00	0.065	0.09	1.40	687.22	1371.0	2.17E+0002	3.2E-0001	6.8E+0001	4	+