Initial Environmental Examination

March 2015

ARM: Sustainable Urban Development Investment Program –Tranche 2

Construction of Road Links of the Yerevan Western Ring Road

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

TRANCHE 2

Babajanyan–Ashtarak highway road link

Initial Environmental Examination (Draft)

Date	Rev	Drafted by	Checked and compiled by	Approved by
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Consultant

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Funding Agency

ADB

Asian Development Bank

Implementing Agency

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VERSION HISTORY

Version	Date	Modifications	
Draft	27/06/2014	First Issue	
Draft V2	16/07/2014	Following Ruzanna Voskanyan comments	
Draft V3	04/12/2014	As per ADB and Ruzanna Voskanyan comments	
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ABBREVIATIONS

ADB	Asian Development Bank
AM	Accountability Mechanism
AP	Affected Person
Engineer	Construction Supervision Consultant
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EIA	Environmental Impact Assessment
EIEC	``Environmental Impact Expertise Center" SNCO
EMP	Environmental Management Plan
ERT	Emergency Response Team
ES	Environmental Specialist
GRM	Grievance Redress Mechanism
HSE	Health, Safety & Environment
IA	Implementing Agency
IEE	Initial Environmental Examination
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
PIU	Project Implementing Unit
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. ADB classified the Project as a category B project based on the Rapid Environmental Assessment (REA) Checklist. The initial Environmental Assessment activities for the "Construction of Vahagni-Malatia-Sebastia district (Babajanyan Street) Road Link of Yerevan Western Ring Road, were carried out by the Engineer. The Engineer consultants visited the Project's site prior to preparation of the report. Consequently Engineer prepared a draft IEE report for the Tranche 2 - Babajanyan–Ashtarak highway Project.

A.2. Screening and Classification

3. Tranche 2 - Babajanyan–Ashtarak highway Project, under the SUDIP has been screened by ADB to determine its environmental category with the ADB's Rapid Environmental Assessment Checklist (REA). Based on the REA Checklist, The Project is classified as a Category "B". This draft IEE report is prepared to meet requirements of ADB's SPS (2009).

A.3. Compliance and Fulfillment of the SPS Policy & Republic of Armenia (RA) Law on EIA

a) Public Consultation and Participation

4. According to ADB's SPS (2009) and RA Law on Environmental Impact Assessment (EIA) (1995) as the new law come into force in July 2014, public consultation has been organized according the old law requirements, 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 meeting and consultations have been organized in June 2014.

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

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

(ii) Ministry of Nature Protection;
- Nature Protection Expertize SNCO

(iii) Non-government organizations (NGOs) such as:
- Association for Sustainable Human Development
- Young biologist association.

6. A public consultation event to disclose the initiative and to present the Project took place on 18 June 2014 at Yerevan Ajapniak community, in N155 school. An advertisement was placed in the Hayastani Hanrapetutyun newspaper and on the Municipality of Yerevan website, as well as the invitations were sent directly to key stakeholders through Yerevan Aarhus center network. Amongst the attendees were sixteen recorded participants, including representatives of relevant government agencies and NGOs, as well as those from general public (See Annex 2: Public Consultation, Meetings and Participation of June 2014).

b) Information Disclosure

7. 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.

8. 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, Yerevan Municipality and with several NGOs.

9. 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) IEE report (including EMP);
(ii) Environmental Assessment and Review Framework (EARF)

A.4. Grievance Redress Mechanism

10. 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 (see section H.2). 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

11. 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).

12. 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, ecological, and socio-cultural and economic environment of the Project area and understanding the technical, social, and institutional aspects;
(ii) Discussions with specialists of RA Ministry of Nature Protection, Yerevan Municipality other relevant official authorities; Organization 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 Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, methods of monitoring the impacts, responsible agencies/persons, and associated costs; and

(v) Proposing the institutional set-up for implementation of the EMP.

13. The baseline investigations (noise and vibrations, water monitoring) and the EMP (Annex 3) will be completed during final design phase.

14. The Structure of this IEE/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.

15. The report will be also prepared in Armenian language for posting on the website of the Municipality of Yerevan and YMPIU.

16. 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.

A.6. Tasks and Accomplishments

17. 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) Prepare environmental screening checklist for classification of the Project.	Environment categorization has been accomplished by ADB.
(ii) Ensure that an Initial Environmental Examination 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	The draft IEE report was prepared by the Engineer consultants and a public consultation was conducted on 18 June 2014. The second public consultation will be carried out in accordance with ADB and Armenian legislation requirements and minutes will be putted into report.

Task	Response/Action taken
requirements.	
(iii) Undertake review of the draft IEE report and EMP to ensure their compliance with the requirements of the Government of Armenia and ADB.	The draft IEE report and EMP were reviewed and updated by the Engineer to comply with the requirements of the Government of Armenia and ADB.
(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 final EIA/IEE will be 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 IEE report of Tranche 2 - Babajanyan–Ashtarak highway Project including EMP and other documents, as necessary to comply with Public Disclosure.	The IEE 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 IEE report and the EMP will be disclosed on YM and YMPIU official websites.
(vi) Ensure that the IEE, including relevant description of appropriate actions and mitigation measures that need to be addressed during final EIA/IEE report preparation stage.	The environmental specialists in the YMPIU will coordinate with the Engineer to ensure that final EIA/IEE will include appropriate information and mitigation measures.

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

B.1. ADB Environmental Assessment Requirements

18. The Safeguard Policy Statement (SPS) (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 Ajapniak and the Malatia-Sebastia Administrative Districts Yerevan Municipality members of the community, persons affected by the Project, 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.

19. The Public Consultation and Participation method and Grievance Redress Mechanism are described in section G and H.

B.2. Armenian Laws Governing Environmental Management and Assessment

20. After Armenia gained its independence in 1991, the deteriorating environmental condition of the country became more apparent and environmental concerns became high priority political issues and the process of development of environmental legislation was initiated. The 10th Article of the Constitution of the Republic of Armenia (passed in 1995) states the State responsibility for environmental protection, reproduction, and wise use of natural resources. Some 25 laws have been promulgated to protect the environment. The relevant national law on environmental protection and assessment is:

(i) Law on Environmental Impact Assessment and Expert Examination (July 22, 2014)

21. The set law is the main law administered by the MNP. Other pieces of pertinent environmental legislation to be considered are:

(i) Law on Specially Protected Natural Areas (1991,updated 2006)
(ii) Law on Ensuring Sanitary-epidemiological Security of the RA Population (1992)
(iii) Law on Atmosphere Air Protection (1994)
(iv) Law on Automobile Roads (1996)
(v) Law on the Protection and Use of Fixed Cultural and Historic Monuments and Historic Environment (1998)
(vi) Law on Environment and Nature Use Charges (1998)
(vii) Law on Flora (1999)
(viii) Law on Fauna (2000)
(ix) Land Code (1991, updated 2001)
(x) Law on Hydro-meteorological Activity (2001)
(xi) Law on Environmental Education (2001)
(xii) Code on Underground Resources (2002)
(xiii) Water Code (1992, updated 2002)
(xiv) Law on Seismic Defense (2002)

(xv) Law on Water Users' Associations and Federations of the Water Users Associations (2002)
(xvi) Law on Waste (2004);
(xvii) Law on Environmental Oversight (2005)
(xviii) Forest Code (2005)
(xix) Law on Rates of Environmental Charges (2006)
(xx) Law on National Water Program (2006)
(xxi) Law on Oversight of Land Use and Protection (2008)

22. The key departments within the MNP that have administrative authority over EIA and the project approval process are two State Non-commercial Organizations (SNCOs):

(i) The "Environmental Impact Expertise Center" (EIEC), 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 EIEC and with the Project EMP.

23. 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 should be prepared in accordance with the Law on Environmental Impact Assessment and Expert Examination (July 22, 2014) and the legislative provisions relevant to environmental protection should be considered accordingly.

24. ADB classifies projects into four categories (A, B,C and FI) depending on the nature and scale of the expected impacts, and requires a different level of environmental study for each category. This includes Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE), which is is not represented in the Armenian system.

25. To reduce the differences between Armenian legislation and International environmental polices the new law on Environmental Impact Assessment and Expert Examination has been approved in July 2014. The new law defines the environmental assessment process. The law requires projects to be assessed according to a two stage process (i) the preliminary stage, which including screening and categorization as category A, B, or C according activity type; and (ii) a main examination phase, where Category A and B projects are further examined. In the law also provided an outline for the EIA report which includes sections on analysis of the project impacts for both physical, biological and social environments, and cumulative impacts.

26. Despite that the law introduces many improvements over the previous law there are still a number of gaps between the Law and ADB's Safeguard Policy Statement (2009) policy principles. In particular, requirements of environmental management planning and the contents of environmental management plans need to be strengthened.

27. Furthermore, in determining environmental standards for projects it supports, ADB follows the approach set out in the World Bank group's Environment, Health and Safety Guidelines (2007), although alternative emission levels and approaches to pollution prevention/abatement can be adopted if necessary to better reflect national legislation and local conditions.

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

28. 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	Ratified by National Assembly	In force for RA
Global Conventions		
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971) - aka Ramsar Convention	Acceded as assignee by the request of MFA RA 1993	1993
UN Convention on Biological Diversity (Rio de Janeiro, 1992)	31 Mar 1993	14 May 1993
Cartagena Protocol on Bio-safety (Montreal, 2001)	16 Mar 2004	29 Jul 2004
UN Framework Convention on Climate Change (New York, 1992)	29 Mar 1993	21 Mar 1994
Kyoto Protocol (Kyoto, 1997)	27 Dec 2002	16 Feb 2005
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	Acceded as assignee by the request of MFA RA in 1993	1993
UN Convention to Combat Desertification (Paris, 1994)	23 Jun 1997	30 Sep 1997
UN Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989)	26 Mar 1999	01 Oct 1999
Convention for the Protection of the Ozone Layer (Vienna, 1985)	28 Apr 1999	01 Oct 1999
Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987	28 Apr 1999	01 Oct 1999
London Amendments to the Montreal Protocol	22 Oct 2003	26 Nov 2003
Copenhagen Amendments to the Montreal Protocol	22 Oct 2003	26 Nov 2003
Montreal amendment to the Montreal Protocol	29 Sep 2008	18 Mar 2009
Beijing amendment to the Montreal Protocol	29 Sep 2008	
Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam, 1998)	22 Oct 2003	26 Nov 2003
Stockholm Convention on Persistent Organic Pollutants (Stockholm, 2001)	22 Oct 2003	17 May 2004
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1979)	10 Apr 2008	21 Jan 2009
Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)	27 Oct 2010	01 Mar 2011

Regional (European) conventions		
UNECE Convention on Long-range Trans-boundary Air Pollution (Geneva, 1979)	14 May 1996	21 Feb 1997
Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP)	In the process of ratification	
UNECE Convention on Environmental Impact Assessment in a Trans-boundary Context (Espoo, 1991)	14 May 1996	10 Sep 1997
Protocol on Strategic Environmental Assessment (Kiev, 2003)	25 Oct 2010	24 Apr 2011
The Protocol on Pollutant Release and Transfer Registers (Kiev, 2003)		
UNECE Convention on Trans-boundary Effects of Industrial Accidents (Helsinki, 1992)	14 May 1996	21 Feb 1997
UNECE Convention on access to information, public participation in decision making and access to justice in environmental matters (Aarhus, 1998)	14 May 2001	01 Aug 2001
Protocol on Water and Health (London, 1999)	In the process of ratification	
Convention on the Prohibition of Military or Any Hostile Use of Environmental Modification Techniques (Geneva, 1976)	04 Dec 2001	15 May 2002
UNECE Convention for the Protection and Use of Trans- boundary Watercourses and International Lakes (Helsinki, 1992)	22 Oct 2003	
European Landscape Convention (Florence, 2000)	23 Mar 2004	01 Jul 2004
Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	22 Jun 1993	
Convention Concerning the Protection of World Culture and Natural Heritage	22 Jun 1993	
European cultural convention	22 Jun 1993	
Convention for Protection of Non-material Cultural Heritage	20 Mar 2006	
Bern Convention - Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979)	26 Feb 2008	01 Aug 2008

B.4. Administrative Framework

a) Management Board

29. 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

30. 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

31. 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

32. 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) Inspecting the Contractor's implementation of mitigation measures as specified in the EMP;
(x) preparing and submitting 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

33. Engineer's (key responsibilities include:

(i) Prepare the draft 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) 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;
(iii) submit the draft and final EIAs/IEEs, EMPs for the MNP, YM and ADB's review and

approval;

(iv) Update and submit for ADB's approval the Environment Assessment and Review Framework (EARF) which was approved in 2010 between ADB and the Government of Armenia and conduct the necessary consultations in compliance with the it; and

(v) apply for and get a positive environmental expertise conclusion from the Environmental Impact Expertise Center" SNCO 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.).

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

(i) supervise the 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, health and safety requirements, road 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) ensure that the construction contractor prepares the detailed site specific EMP;

(vii) report to YMPIU.

f) Contractors

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

(i) prepare Site-specific environmental management plan (SEMP) as a working construction document based on the present IEE/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; hire the services of Archaelological Specialist.

(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 3.

g) Asian Development Bank

36. ADB may carry out periodic project reviews, inspections 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.

37. ADB will also promote the disclosure of information about the Project through the placing the English version of EARF, IEE/EIA and EMP on the website.

38. 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.

39. The government agencies and their roles that could be involved in the Tranche 2 - Babajanyan–Ashtarak highway Project are as follows:

h) Ministry of Nature Protection

40. 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/IEE and the project approval process are:

(i) The EIEC 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 EIEC and with the Project EMP.

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

42. The EIA to be submitted to MNP is developed based on the scope of Law on Environmental Impact Assessment and Expert Examination (2014) which is similar, if not identical to the scope of EIA according to ADB SPS.

43. 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

44. 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.

45. 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.

46. 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

47. 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)[1].

48. 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.

[1] http://www.parliament.am/legislation.php?sel=show&ID=1641&lang=arm

C. DESCRIPTION OF THE PROJECT

C.1. Type of Project

49. 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).

50. Tranche 2 consists of sections 6, 7, 8 + S5 (Argavand) + S9 (Davitashen-Ashtarak highway). Sections 5, 6, 7, 8, 9 of the Tranche 2 starts in Argavand and Getapnya rural communities of Ararat Marz than it stretches from the Yerevan's Malatia-Sebastia district at south-west and districts of Davtashen and Ajapniak located at north-east from the Centre of Yerevan (see Figure C-1 and map in Annex 4).

51. For the new road connecting Argavand Junction to Shirak Street (section 5) a separate EIA has been prepared. Approbation process of this EIA by ADB and Ministry of Nature protection is currently in progress. (http://www.adb.org/sites/default/files/projdocs/2014/42417-023-eia.pdf).

52. Also the IEE/EIA report was prepared under activities for the "Construction of Two Road Links of Yerevan Western Ring Road" by the Project Preparatory Technical Assistance (PPTA) consultants for the Davitashen - Ashtarak highway (Section 9) which was approved by ADB (http://www.adb.org/sites/default/files/projdocs/2010/42417-02-arm-iee-01-draft.pdf).

53. This IEE/EIA refers to the section 6, 7 and 8 of the Tranche 2 Project (named Tranche 2 -Babajanyan–Ashtarak highway Project, which mean construction of the new road between section 5 and 9 (see Figure C-1).

C.2. Location of the Project

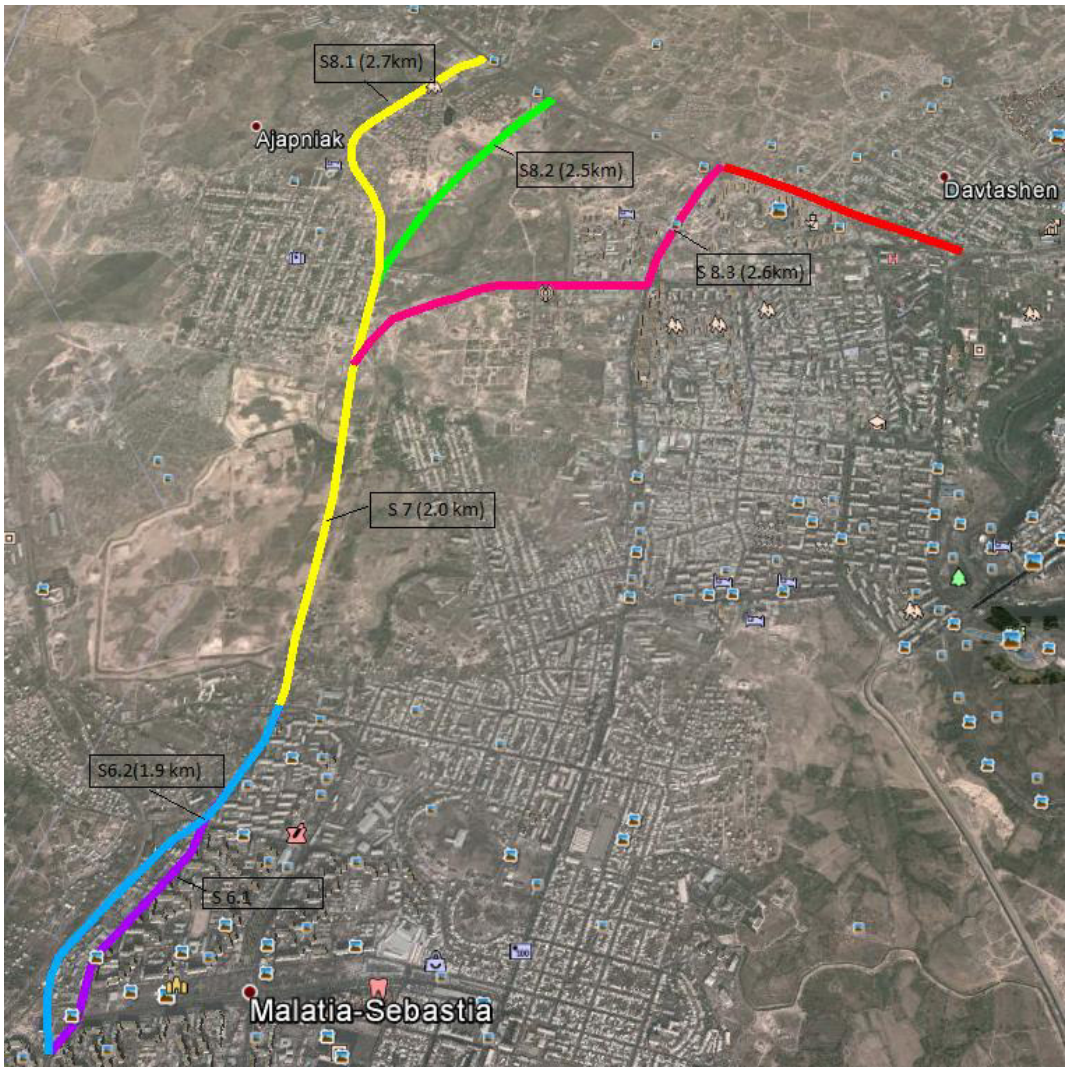
54. Tranche 2 - Babajanyan–Ashtarak highway Project is located in the north-west and south-west area of Yerevan in the administrative districts of Ajapnyak and the Malatia-Sebastia (approximately 6 km south-west of Yerevan City center). The project comprises the main following components: Section 6: Babajanyan-Tichina, Section 7: Tichina-Silikyan and Section 8 : Section 7-Ashtarak Highway) (see Figure C-1).

55. Section 6 is located in the administrative District of Malatia-Sebastia which is borders with Ajapnyak, Center and Shengavit districts and Ararat, Armavir regions.

56. Section 7 is located in the administrative District of Ajapnyak. It is in the north-western part of Yerevan. This section will start from Tichina Street and reach Silikyan old Highway.

57. Section 8 has to provide a link between Section 7 and Ashtarak Highway that leads to the northern part of North South Corridor.

Figure C-1 - Location of Tranche 2 Babajanyan–Ashtarak highway Project



C.3. Description of the Works

Section 6

58. This section will start from Babajanyan Street and reach Tichina Street. The selected option starts by a round-about that links Arno Babajanyan Street, Raffi Street and new alignment of Yerevan western bypass. The section alignment continues to the north along the railway with a new road (2x2 lane divided road with central reservation of 1,6 m, total width of 22,1 m) with overpasses over one local road and Ohanov Street. The section ends at an overpass over Tichna Street. Total length of this section is almost 2 km.

Section 7

59. Section 7 is located in the administrative District of Ajapnyak. It is in the north-western part of Yerevan. This section will start from Tichina street and reach Silikyan old Highway.

60. Section 7 is a new 2x2-lane divided road with central reservation of 1,6 m (total width 22,1) of 2 km long that starts at Tichna Street and ends at Silikian Old Highway. An overpass will be constructed over Old Silikian Highway.

Section 8

61. Section 8 has to provide a link between Section 7 and Ashtarak Highway that leads to the northern part of North South Corridor. The selected option is composed of widening of existing road: Silikian New highway from grade-separated junction of Section 7 and M1 until the beginning of Section 9, and construction of round-about at the intersection of Silikian New Highway and M1. The total length of this section is about 2 km. A cross-section will be the same as Section 7.

62. Detailed design for this Project will be prepared by Engineer and it is expected that construction will be undertaken over a period of 24 months.

C.4. Magnitude of Operation

63. Tranche 2 -Babajanyan–Ashtarak highway road link is part of the program of road upgrades to complete the Yerevan western bypass, aiming to divert through-traffic around Yerevan's City center, which will improve traffic flow and reduce congestion on local roads.

C.5. Screening and Classification

64. Tender 2 - Section 6: Babajanyan-Tichina, Section 7: Tichina-Silikyan, Section 8.1: Vahagni, Section 8.2: Vahagni 2, Section 8.3: Silikyan-Melkumov, under the SUDIP have been screened to determine its environmental category with the ADB's Rapid Environmental Assessment Checklist (REA). The REA checklist completed by the Engineer 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.

65. Based on the REA Checklist, the Project is classified as a Category "B".

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

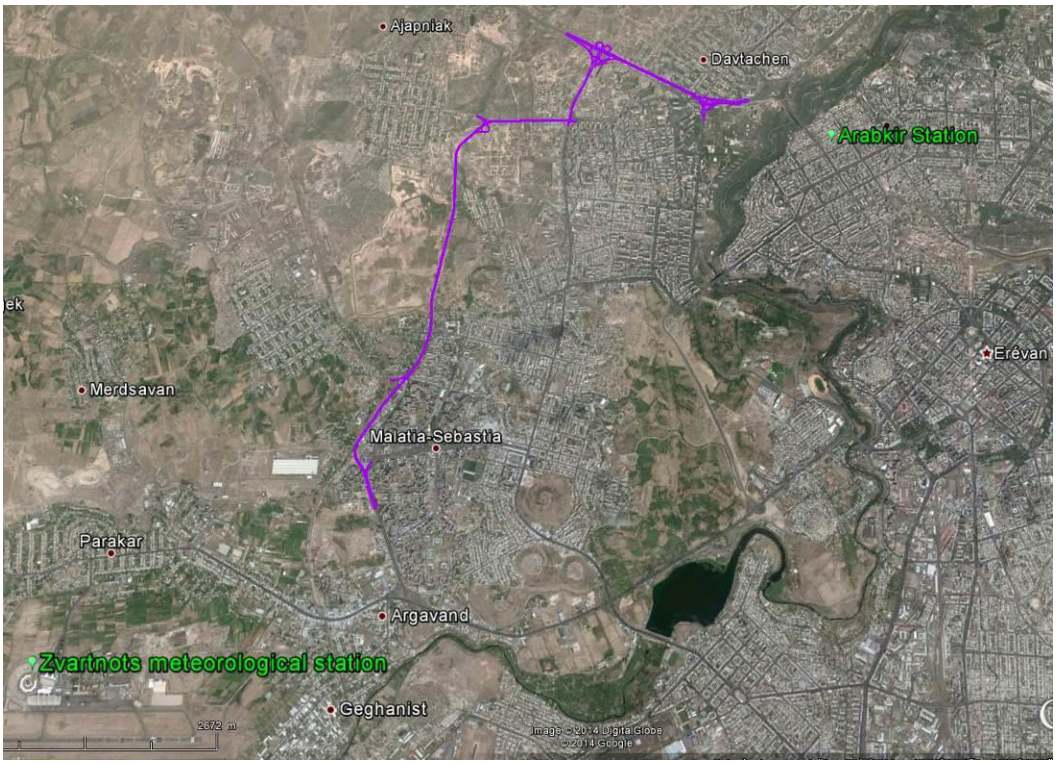
66. This section describes relevant physical, ecological, and socio-cultural and economic conditions within the study area. It also looks at current and proposed development activities within the Project's area of influence, including those not directly connected to the Project. It indicates the accuracy, reliability, and sources of the data. All information has been gathered from different sources. After selection the final project option all appropriate baseline instrumental and field surveys will be implemented for the noise, air, fauna and flora.

D.1. Physical Resources

a) Climate, Air Quality, Noise & Vibration

67. **Climate** - Based on meteorological data from the Zvartnots airport monitoring station, located approximately 9 kilometers from Tender 2 - S6-7-8 (see **Figure D-1**), 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.

Figure D-1: Location of Zvartnots airport monitoring station Air Quality Monitoring Station at Arabkir station



68. **Air Quality** - Yerevan is surrounded by mountains on three sides which hamper 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.

69. According to the Yerevan Master Plan of Yerevan, Tender 2 - S6-7-8 Project is located in a zone of permissible air pollution. Only those sections of the Project, which will be reconstructed based on the existing roads, are located in the zone of moderate air pollution.

70. Another source of data on air quality is an MNP Air Quality Monitoring Station located at Arabkir station (see **Figure D-1**). This Monitoring Station is distant of about 3000 m to 4000 m from Project area.

71. Data collected at the Arabkir station of MNP are representative of the background Air Quality found in the project corridor. Indeed, the project is located in an urban environment where air quality is already negatively impacted by pollution. According to the Master Plan as a result of pollution generated by traffic in new Project's corridor the areas may appear in the zone of low air pollution.

72. Table D-1 below presents the concentrations of air pollutants (Dust, Sulfur dioxide, Nitrogen oxide and nitrogen dioxide) measured from 2008 to 2013 at the Arabkir 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 (0.19) exceeded the Daily Medium (0.15) MPC. However, the total average from 2008 to 2013 was below (0.5) Maximum Single Event allowable.

(ii) Sulfur dioxide: from 2008 to 2013 sulfur dioxide values did not exceeded both the maximum and daily medium MPC.

(iii) Nitrogen oxide: the annual average measured for nitrogen oxide (0.04) have not exceeded the MPC for maximum single event and have maintained (0.06) allowable daily medium MPC.

(iv) Nitrogen dioxide: over the years 2008 to 2013, the total annual average measured nitrogen dioxide (0.06) has not consistently exceeded the MPC.

73. Results providing from MNP Air Quality Monitoring Station located at Arabkir confirm what is presented in Yerevan Master Plan: the average Air Quality of the Project's area is close to permissible concentrations.

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

Pollutant	**Annual average measurement at monitoring Arabkir Station (mg/m^3)**							**Maximum permissible concentration (mg/m^3)**	
	2008	2009	2010	2011	2012	2013	TOTAL AVERAGE 2008-2013	Maximum Single Event	Daily Medium
Dust	0.15	0.07	0.11	No data	0.40	0.24	0.19	0.5	0.15
Sulfur Dioxide (SO2)	0.05	0.04	0.04	0.02	No data	0.02	0.03	0.05	0.05
Nitrogen Dioxide (NO2)	0.052	0.061	0.096	0.053	0.068	0.036	0.06	0.085	0.04
Nitrogen Oxide (NO)	0.02	0.02	0.07	0.07	0.06	0.02	0.04	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.									

74. 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 2008 to 2013 consistently exceeded the daily medium MPC.

75. **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			

76. According to the Master Plan:

- the sections of the projected road which begin or end adjacent to the existing road are in the range of discomfort caused by noise (exceeding maximum permissible value (MPV) <5dBA).
- the remaining sections are not in the range of noise discomfort.
- after construction of the projected road, the existing areas along the new road will be classified as areas of noise discomfort (exceeding MPV up to 3 dBA).

77. After selection of the final project option, Engineer will ensure that appropriate baseline instrumental surveys will be performed by a certified Noise & vibration consultant for sensitive receptors (schools, residences, etc.). During the next public consultations the results of noise and vibration survey , as well as the mitigation measures will be introduced to the affected peoples. Results of monitoring and appropriate maps of monitoring locations will be introduced in final EIA report and will serve as baseline date for the Contractor.

b) Surface and Ground Water

78. There are no surface water bodies close to the alignment. The closest point of the Hrazdan River is approximately 2.3km east of the northern extent of the alignment.

79. Section S.6 passes over the irrigation canal, which is a component of irrigation system. The existing road is already passing through that section. Therefore the new road will not cause additional adverse impact on the irrigation canal. However after selection of the final project option, Engineer will ensure that appropriate baseline instrumental surveys of water quality will be performed by a certified monitoring company. Results of monitoring and appropriate maps of monitoring locations will be introduced in final EIA report and will serve as baseline date for the Contractor.

80. The Master Plan indicates that there is a low risk of flooding in the vicinity of the project site, because the Hrazdan River is highly regulated to control flood risk.

81. According to the Master Plan, Groundwater beneath the majority of the project alignment is at depth of more than 10m or 5-10m. The direction of flow is not known but may reasonably be expected to flow towards the Hrazdan River to the north. There is no other information available about groundwater.

c) Topography, Soils, Geology, Seismology

82. The project site occupies a part of the Yeghvard plateau, giving the site a height above sea level between 900 and 1200m. The plateau of Yeghvard is situated on the right bank of the Hrazdan River. It has a slightly curved (concave) surface with a general slope to the South. It is characterized by a slight incline, with terraced or undulating, slightly incised relief, separated tapers of volcanic slags and existence of domes conditioned by salt tectonics. The project is located in the flat, step-like hilly volcanic plateau.

83. 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.

84. The geology is based on an intrusive ground investigation undertaken in the 1980's and on the Yerevan Master Plan.

85. 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%).

86. The Yerevan Master Plan states that the soils contain elevated concentrations of heavy metals (including chromium, nickel, zinc, copper, cobalt, molybdenum and silver) when compared to background concentrations. To get the total picture of pollution of Yerevan's area, cumulative index of density (CID) has been applied. The CID is the sum of contents normalized according to the elements in a sample. The area of the city is characterized by fields of five levels of pollution. The project is basically located in the fields of second level (low level of pollution, CID = 8-16) and in the fields of third level (average level of pollution, CID =16-32). Also there is a small area in the Section 6: Babajanyan-Tichina, which is characterized by fields of level 4 (high and extremely high CID = 32-128). The main reason of this soil contamination is the existence of utilities in that area. After having the final project approved, detailed survey of the mentioned area will be implemented as needed.

87. The study corridor of Road is located on the right Bank of the Hrazdan River, about 1000 m above the sea level. The climate of the area is semi-arid with even dryer areas with hot summers and moderate cold, and winters with unstable snowpack. Continental climate is conditioned by intrusion of dry superheated air masses from the South in summer and northern cold air masses from the North, which further get colder in the conditions of anticyclone.

88. Topsoil is characterized by brown soils with poor concentration of humus (1% or less). The soils are basically of clay-sand or sand-clay mechanical composition. In the surface layer small cloddy structure of fragile composition has been formed, which is saturated with stones of different sizes. In the lower horizon parts of soil substrates are normally cemented. Vegetation is poor with mostly drought tolerant species, as well as salt tolerant desert plants. Some agricultural lands are located in the project area. As a result of centuries of irrigated agriculture, typical irrigated agricultural pattern of parcels were laid out. There are also orchards and vineyards in residential lands. No pastures are present in the study corridor.

89. Potential sources of contamination within or in the vicinity of the road alignment are associated with:

(i) Dumped waste along the route;
(ii) Orchard and agricultural lands which may have been sprayed with pesticides.
(iii) Existing non acting barns along the Road alignment.

D.2. Ecological Resources

90. 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.

a. Flora

91. The Project area is located in a semi-desert zone of Armenia and belongs to Yerevan floristic

region. Wormwood and ephemeral vegetation is typical to semi-deserts. The typical plant populations for the Project area are halophyll, gypsophila and psamophyll plants, oshinder-ephemeral, oshinder-cereal, oshider-ohsn and oshan and the typical species are *Salsola ericoides, Salsona cana, Calligonum poligonoides, Artemisia fragrans, Kochia prostrata, Teucriumpolium, Poa bulbosa*.

92. Several visits were conducted for the proposed area to confirm and verify the probable presence and occurrence of important species of flora especially those listed in the Armenian Red Book (Annex 5: Flora assessment). During the field visits in Segments S6-1, S6-2, S7, S8-1, S8-2, S8-3 many wild plants from different families such as Fabaceae, Asteraceae, Rosaceae, Poaceae, Poligonace, Chenopodiace, Convolvulaceae, etc were identified but no rare or endangered species listed in the Red Book of Plants of RA which have national conservation significance were identified on site.

93. Among those tree and bush species registered are: Elm, poplar, plane, ash, willow, oak, maple, red-cedar, common box, etc. The largest number of trees was recorded in segment S6-2 - 166 trees, and in segment S8-3 -152 trees. The size of trees is very different, starting from 3-4 cm (3 years old apple trees) to 60-65 cm (Elm and poplar trees). The two most represented tree species which were recorded in all proposed segments of the Road were Elm (223 trees) and Poplar (38 trees). For the quantities of recorded trees and bushes see below table.

Table D-2: the quantities of recorded trees and bushes along sections of Tranche 2 Tranche 2 - Babajanyan–Ashtarak highway Project

	S6.1	S6.2	S7	S8.1	S8.2	S8.3
Trees	**116**	**166**	**5**	**35**	**3**	**152**
Bushes	**311**	**34**	**0**	**43**	**0**	**70**

94. Thirty five trees of *Platanus orientalis* species (oriental plane) were recorded in the segment S8-3 on the left side of the beginning of Silikyan Highway. *Platanus orientalis* (oriental plane) was the only flora species recorded during the survey which is included in the Red Book of Plants of RA as an endangered species (EN B 1 ab (iii) + 2ab (iii)). It is also registered in The IUCN Red List of Threatened Species as a Lower Risk/least concern species.

b. Fauna

95. Preliminary survey of fauna along of offered parts of highway was implemented on June (Annex 6). All sections (S6.1, S6.2, S7, S8.1, S8.2, S8.3) of highway were studied. According to suitable habitats for animals the main important part were S7 (some parts of S.7 right-of-way will cross an area containing tons of deposited construction rubbish and hazardous material) and the beginning part of S 8.3. The standard methodologies of zoological researches were used to survey and census of the different species of animals. The studied area situated in the semi-desert zone where have been found typical for this landscape animals.

- Invertebrates:

96. The survey identified a limited number of species of invertebrate in the area along the section S7. None of the species found are listed in Red Data Book of Armenia.

- Vertebrates:

97. Amphibians: There were recorded two species of amphibians – the green toad (Bufus viridis) and the marsh frog (*Pelophylax ridibundus*) were found in dirty pool in the first part of section S 8.3.

98. Reptiles: The surveys confirmed the presence of three species of reptiles (*Pseudopus apodus, Darevskia raddei, Hemorrhois nummifer*) in the area adjacent to S8.3 was observed. These species are the common reptiles for Armenia.

99. Birds: During our field observations at the S7, S8.3 15 species of birds were registered, where one of them *Larus armenicus* crossing this area only for feeding is listed in the Red Book of Armenia (Table. 3).

100. Mammals: Nine species list of mammals at S7 and a first part S8.3 was made basing on the analysis of our studies.

101. The S6.1, S6.2, S8.3 areas have been profoundly modified by urban development and activities.

D.3. Social and Cultural Resources

102. 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.

103. 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.

104. Section 6 and 7 include Malatia-Sebastia (Babajanyan st., Raffi st., Ohanov st.) and Ajapnyak (Tichina street, Sililyan highway) districts. There are *commercial/business* areas like a car repair station, gas station and store of construction (27 main commercial and 10 secondary structures). *Residential* areas included big houses with orchards, garages. In one of the *industrial* areas is a not operating boiler house.

105. Section 8 is in Ajapnyak (Sililyan new highway) district. There are *commercial/business* areas like car repair station, beauty salon and building of H2 TV and as well as *residential areas*.

106. In all sections there are also community lands which are not used by anyone.

107. The Master Plan indicates that no archaeological or cultural sites are located within the Project

right-of-way and no cultural heritage or archaeological sites designated by UNESCO are located in the vicinity of the site.

108. The recent archaeological reconnaissance survey along the proposed alignment of the road construction (see Annex 7) showed that no archaeological barriers are present in the study area, which means no visible features of sites exist because of urbanization, construction and agricultural activities. The archaeological sites presented in the State list of the Historical and Cultural Immovable Monuments of the Republic of Armenia, Yerevan Province are located far away from the future construction activity related to the Tranche 2 - Babajanyan–Ashtarak highway Project.

109. To identify potential impacts of the proposed projects on physical cultural resources (PCR) a survay has been implemented by experienced archeological specialist. The reconnaissance survey along the proposed alignment of the road construction showed that no archaeological barriers are present in the study area, which means no visible features of sites exist because of urbanization, construction and agricultural activities. The archaeological sites presented in the State list of the Historical and Cultural Immovable Monuments of the Republic of Armenia, Yerevan Province are located far away and can't be affected by the construction activities.

D.4. Economic Development

110. 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.

111. S8 and S7 sections of the project are located in Arabkir Community. Alternatives S8.1 and S8.2 will pass through residential area of Vahagni District and along the golf course. Alternative S8.3 passes through industrial, commercial and residential areas. There are non-operating barn structures in adjacent areas of the southern section of S8.

112. Section S7 passes through agricultural lands of Ajapnyak. The cemetery is located about 0.5 km away.

113. Malatia-Sebastia neighborhood comprises mixed pockets of industrial, commercial, and residential areas. Near to the right of way of S6 located non acting boiler house.

114. Utilities found within the Project Right-of-way include above ground gas pipes, large diameter sewers, irrigation pipes, underground telephone and electrical cable, water supply pipes and overhead High-tension electricity lines. Diversions for ground gas pipes and overhead High-Tension electricity lines will be planned within the design.

E. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

E.1. Introduction

115. The Projects' impacts to the physical, ecological, archaeological, and socio-cultural and economical resources (negative and positive), including the workers' and community health and safety, in the Project's area of influence were identified. Corresponding mitigating measures were 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 (Annex 3).

116. On April, May and June 2014, a team of local and international environmental specialists with the archaeologist conducted an assessment investigation in the project's area. The objective was to focus on the appraisal and assessment of the significance of impacts of the project.

117. Anticipated impacts on the bio-physical environment of the project (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. Details are presented below.

E.2. Positive impacts

a) Positive Impacts Related to the Design

118. The Project will provide a link between Argavand Junction and Ashtarak highway which is 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.

119. The road will be designed and constructed to current high standards, facilitating driver safety (improvement of road markings, signage, safety, drainage, culverts and shoulders). The structural elements of the Project will be designed with consideration to the high risk of seismic activity of the region. Drainage will be incorporated into the road design to control flow, thereby minimizing erosion of soils and local flooding. The design will then enhance the sustainability of the project.

120. The design will include landscaping on the median and along the shoulders of the road (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 (specially for S6 and S8 sections).

121. The road will be designed and constructed to current high standards. Thereby the Project is anticipated to improve road safety.

122. Yerevan's regional air quality will be improved by removing through-traffic from the City and congested local roads.

123. Besides, according to the Master Plan, it is envisaged to implement design landscaping for

public use along section S7 of the newly constructed road. As a result, the surface area of landscaped areas of public use in Yerevan will be expanded and will impact positively adjacent residential areas.

124. As a result of this road construction it will be connected to M1 Ashtarak Highway, which in the framework of north-south road corridor provides access to the Black Sea through the territory of Armenia and Georgia and then to European countries. Currently reconstruction works of Ashtarak Highway are being implemented in the framework of North South Road Corridor, which will result in improved road corridor in compliance with international standards.

b) Economic Benefits

125. 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.

126. Temporary employment during construction works may provide additional income to the local community through the short-term local employment opportunities. Some may improve their situation temporarily while working on the Project. 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.

127. 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 (iii) reduction of accidents. 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.

128. Average vehicle speeds have been estimated to raise, with a typical increase of 20 to 50 km/hour for private cars and 10 to 30 km/hour for goods vehicles. A complete traffic economy study has been prepared for this project considering: Vehicle operating costs, fuel consumption, time savings. 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 and mitigation measures during construction phase

a) Impacts on Flora and Fauna

129. No part of the Project passes through or near any designated ecologically sensitive areas, designated wildlife or other sanctuary, national park, botanical garden, nor area of international significance (e.g., IUCN, RAMSAR site).

130. It was confirmed that there are only one endangered species of flora (35 trees of *Platanus orientalis* species (oriental plane) in the segment S8 on the left side of the beginning of Silikyan Highway) registered under the Red Book along the Project alignment. There are no endangered species of fauna registered under the Red Book along the Project alignment (Annex 5 and Annex 6). This may be due to the present conditions along the Project alignment which is highly disturbed and characterized by built-up area with houses and commercial establishments and the absence of favorable habitat for any species of flora and fauna listed in the Red Book.

131. Even though 35 *Platanus orientalis* (oriental plane) was recorded in the Silikyan Highway of

segment S8, the width of the section is quite wide and when the final design be finalized, it might not be necessary to remove those trees, but if later it be found out that the trees need to be removed, those trees can be easily replanted as they are quite young and healthy plants.

132. A total of 477 small to large community trees and 458 bushes were counted along the Project area. As the design of the construction is in progress and the final design has not been finalized yet the number of affected trees and bushes can be changed and decreased following finalization of the design. The number of trees and bushes which will be affected by the works will be less than is envisaged. The loss of private trees (and any associated business loss) receives compensation within the scope of Land Acquisition and Resettlement procedures.

133. Where possible, community trees removed shall be replanted. The works of replanting of all kind of trees and bushes should be organized either in late autumn following leaf fall or in early spring. If trees are quite old or due to some other reasons the replanting can't be done some of them shall be cut down during road widening; they should be replaced with new trees and bushes at a ratio of 6:1. Appropriate potential planting areas will be identified by the Engineer during final design preparation stage.

134. Analyzing of collected data regarding to fauna it was suggested to use grid with small cells 70sm high along the highway of part S7 and (S 8.3 about 3km) and also to make passages for small mammals along the highway (part S7) for giving them a chance to pass the road safely. The mitigation measures are presented in the Flora & Fauna and vegetation clearing Plan in Annex 3.

135. The protected species in the area shall have the special attention as provided in Armenia's Law on Flora (1999), Law on Fauna (2000) and the requirements of the Red Book for Fauna (Governmental decree 29.01.2010, N 71-N).

b) Impacts on soil, erosion and sedimentation

136. After final design development in the event that the project passes through contaminated soils, detailed mitigation measures are included in the EMP (Annex 3).

137. **Soil erosion and sedimentation.** The Project is located on a relatively flat terrain. 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 described in the EMP (Annex 3).

c) Impacts related to Air quality (dust and exhaust gases)

138. As ground cover is removed, exposed soils within the site will provide a dust source potentially causing nuisance to nearby receptors and a reduction in local air quality. Built-up, commercial or residential areas (especially in the area of Section 6: Babajanyan-Tichina and Section 8.3: Silikyan-Melkumov) adjacent to the alignment will be the receptors of dust during construction. The generation of dust should be mitigated primarily through maintaining vegetation cover as long as practicable and spraying the haul roads with water.

139. Particulate matter and exhaust gases will be generated by construction vehicle exhaust although the exposure to potential receptors is expected to be insignificant because of the limited level and duration. Nevertheless, exhaust attenuation such as scrubbers or diesel particulate filters will still be applied to vehicles. Detailed mitigation measures are planned in the Annex 3:

Environmental Management Plan.

d) Impacts related to Noise and Vibration

140. During construction, noise will be generated from the operation of vehicles and machinery including excavators, compactors, jackhammers, and other construction-related activities. The most sensitive receptors are occupants of residential properties and other buildings that are adjacent to the road alignment especially of Section 6 and 8.3.

141. Construction noise levels at nearby receptors will vary throughout the construction period depending on the activities carried out, the distance to sensitive receptors, as well as atmospheric conditions. The Contractor will develop an Environmental Protection Plan as a part of SEMP, when actual locations of construction camps are known. Without mitigation, increased noise levels would likely result in significant temporary noise impacts. Mitigation measures that will be applied to minimize noise will be detailed in Annex 3: Environmental Management Plan.

142. During construction, equipment may generate vibration at the properties immediately adjacent to the alignment. Any vibration resulting in nuisance effects will be temporary. Vibration effects will be localized and will unlikely result in structural damage to buildings or walls of the adjacent private properties. However it is important to note that, some of the houses can be not well insulated and not very well built. Being very close to the right-of-way, inhabitants may experience high sound levels inside their dwellings and house can be more sensitive to vibration. Inventory surveys will be undertaken by the Contractor prior to construction and again after construction to inspect any damage. Any damage as a result of construction of the Project will either be repaired by the contractor at his own expense or the owners compensated also at the cost of the Contractor.

e) Impacts on historical and archeological monuments

143. As per recent Archaeological survey (see Annex 7) the archaeological sites presented in the State list of the Historical and Cultural Immovable Monuments of the Republic of Armenia, Yerevan Province are located far away from the future construction activity related to the Tranche 2 - Babajanyan–Ashtarak highway Project and cannot be affected by the construction activities.

144. However, a mitigation measure can be required along section 7 and south part of section 8 as following: a short monitoring by an archaeologist during excavations works of the construction activities.

f) Impacts on agricultural activities

145. **Topsoil** in the project's area 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 for Topsoil.

g) Impacts on resettlement

146. 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 will be assessed and a social analysis report will be presented. Resettlement will be undertaken in accordance with the LARP.

h) Specific impacts caused by work activities

147. **Construction Camps.** Locations for any construction camps will be selected by the contractor in consultation with the Engineer Environment Specialists to ensure minimal impact. For each camp, the Contractor will develop a Construction Work Camps Plan as a part of Site-specific EMP with measures listed in Annex 3.

148. **Utilities.** For all urban works, there is always a potential risk 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. The Contractor prior to construction shall prepare temporary or permanent relocation and/or protection plan. Any disruption to services should 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 3.

149. **Safety.** Construction site safety for workers and residents of the nearby communities is one 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.

150. Construction will interfere with existing traffic and might obstruct or close road way and pedestrian way. Routine mitigations during construction are described in the EMP (Traffic management plan) (see Annex 3).

151. **Environmental and Safety Orientation.** An environmental and safety orientation training program will be developed and implemented during all Project phases. 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's Environmental and Safety specialists in accordance with the Safeguard Orientation Plan presented in Annex 3 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 recruited 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 IEE/EIA to comply with ADB safeguards.

152. **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.

153. **Impact on water**. The respective mitigation measures for preventing adverse impacts on canal of irrigation caused by construction activities are introduced in the EMP (Annex 3).

154. **Excess Spoil.** Some excessive amount of soil material may be generated. If excess spoil is

generated from the excavation and grading activities, the spoil will be classified, 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.

155. **Oil and Fuel Spills.** There is potential for spill or leakage of fuels and oils from inappropriately stored material, during refueling or caused by hose rupture from heavy machinery. This would contaminate the soil and could infiltrate into the groundwater or eventually enter surface water if carried off site through run-off. Mitigation in the EMP (Annex 3) 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.

156. **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.

157. Excessive soil, oil and fuel spillages and other waste issues are addressed in EMP (Annex 3) and will be mitigated by Contractor in accordance with Waste and Material Management Plan as a part of SEMP.

158. **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.).

159. The transportation of material in, from or to the sites of Road link 2 will include common excavation, embankment and subgrade layer material. Demolition of the existing carriageway and other structures will also induce the removal of big quantities of material. This will induce additional vehicle movements over the construction period that the contractor will have to consider in his traffic management plan.

160. 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.

161. 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.

162. **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 will be 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). 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.4. Negative impacts and mitigation measures during operation phase

a) Impacts on Flora

163. **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 (Annex 3).

b) Impacts related to Air quality

164. 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.

c) Impacts related to Noise quality

165. Operational noise levels are predicted to increase beyond ambient levels in areas close to the Project. 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.

E.5. Cumulative Environmental Effects

166. 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.

167. Baseline

monitoring surveys (Air quality, Water quality, Noise & Vibration) will be implemented. The environmental Protection Plan, Site Management Plan (Quarry and borrow pit, dumping sites, concrete batching and asphalt plants) and Traffic and Access management Plan will be created and described mitigation measures to be implemented.

168. The implementation of these different measures will mitigate the cumulative effects.

F. ANALYSIS OF ALTERNATIVES

169. The ADB's Safeguard Policy Statement (2009) as well as armenian legislation 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.

170. 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.

171. 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 Davtashen, Ajapnyak and Malatia-sebastia neighborhood.

172. 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.

173. Based on the Preliminary Design and road alignment, alternatives for both the design and road alignment were considered. The alternatives are also included in this report. As all the proposed sections have been classified as environmental category "B", the choice of the final design and the alignment will be conditioned by the design's feasibility, as well as the scope of Land acquisition and resettlement. 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

174. 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 IEE/EIA and EMP and updated by the Contractor.

175. 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 are 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 IEE/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 occurred.

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

176. The Public Consultation and Communication plan and relevant mitigation measures are presented in the EMP (see Annex 3).

G.1. Information Disclosure

177. The draft and final IEE/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

178. To fully comply with the ADB's policy requirements on Public Consultation and Information Disclosure a public consultation has been organized on 18 June 2014 Yerevan, Ajapniak community, in N155 school. The second public 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 as well as the invitations was sent directly to key stakeholders through Yerevan Aarhus center network. Announcement, attendance list and minutes of the public consultation are attached as Annex 2 of the IEE report.

179. 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.

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

(i) the authorized body – regarding the application submitted by the Initiator for the report and expertise draft conclusion at least 7 working days prior to the public consultations;

(ii) the Initiator – regarding the conceptual/framework document and the envisaged activities and implementation of their impact assessment activities at least 7 working days prior to the public consultations;

(iii) territorial administration bodies and the head of the affected community – regarding the conceptual/framework document and the envisaged activities and implementation of their impact assessment activities at least 7 working days prior to the public consultations.

181. The content of the notification should contains the details of the Initiator, the place of implementation, the summary description of the envisaged activity or the conceptual/framework document , the place of getting acquaitned with them and conducting discussions, the conditions, the timeline of providing comments and proposals and other information.

182. The notification and the design documents should be also placed at the official websites of the authorized body at least 7 working days prior to the public consultations.

183. Public consultations are carried out by:

(i) the Initiator – regarding the conceptual/framework document , the envisaged activities and the assesment processess of their impacts,

(ii) Territorial administration body, the Initiator - regarding the conceptual/framework document and draft report on strategical assesment of their impact,

(iii) Territorial administration body, the Initiator - regarding the envisaged activity and report on its impact assessment.

184. The authorized body ensures the participation of its representative in the discussions.

185. Based on the results of public consultations the Initiator makes a protocol attached with videorecording.

186. The reasonable comments and proposals by the public should be considered by the Initiator and the authorised body. In case of neglecting, justifications should be provided.

187. 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.

188. 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.

189. A public consultation event to disclose the initiative and to present the Project took place on 18 June 2014 at Yerevan Ajapniak community, in N155 school. An advertisement was published in the Hayastani Hanrapetutyun newspaper and on the Municipality of Yerevan website, as well as the invitations were sent directly to key stakeholders through Yerevan Aarhus center network.

190. During the meeting the results of the Initial Environmental Impact Assessment of Tranche 2 were introduced. It was noted that surveys showed that the potential negative/adverse impacts of the Project would be temporary and would be mitigated and minimized through measures specified by the environmental management plan.

191. The results of the survey of flora showed that 35 Platanus orientalis (platan) (listed in the Red Book) would be the most significantly affected trees. Question was asked if relocation of other trees was also possible. It was noted that some of the existing trees could be relocate (as they are young and healthy trees), if those trees will be affected during the implementation of the final design. They will be cut only in the event of impossible relocation. For each tree cut a replanting measure with a ratio of 1:6 will be implemented.

192. The public was also made aware of possible suggestion-making and grievance procedures/mechanisms. It was noted that affected persons could make any suggestion and/or complaint related with environmental impact assessment and environmental security issues.

193. Fauna specialist introduced that there were no species of the Red Book in the Project area and it would be possible to prevent potential negative impacts through proposed mitigation measures. Particularly in the S.7 section it was suggested to install a grid with small holes along the road and to create 2-3 average sized passageways to ensure free movement of the animals. A question was raised if it is possible to put such mitigation measures.The Engineer stated that these suggestions were acceptable and would be taken into consideration during implementation of the final design.

H. ACCOUNTABILITY & GRIEVANCE REDRESS MECHANISM

H.1. ADB's Accountability Mechanism

194. 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.

195. 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.

196. 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.

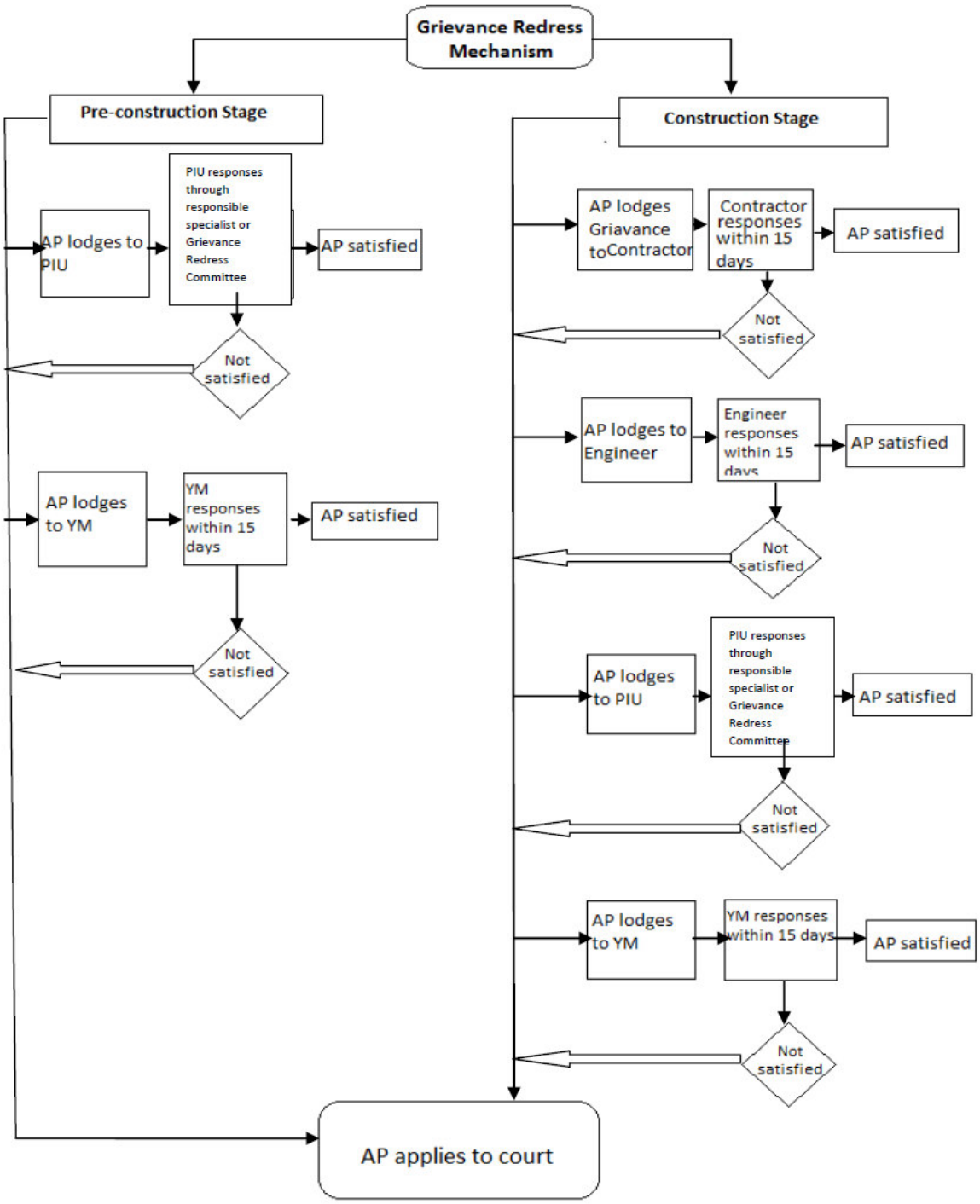
H.2. Grievance Redress Mechanism

197. 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 will 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, and the courts.

198. Public will be informed about the GRM during the public consultations. 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.

199. The procedural steps of the Grievance Redress Mechanism for the Project provided below.

Figure H-1: Grievance Redress Mechanism Flow-Chart



200. 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.

Pre-construction stage:

201. Step 1. The person affected by the Project could raise their suggestions/concerns/complaints first of all to the PIU. PIU receives and resolve/replies the APs' grivances.

202. If an AP is not satisfied with the response or PIU responsible staff needs additional capacity to responce the APs' grivance, the Grievance Review Group (GRG) can be farmulated to ensure comprehensive, equitable and transparent discussion of the case. To establish legitimacy of the GRG to review and judge on the substantive merit of the AP's complaint, the composition of the GRG should be balanced and include an independent observer to ensure the impartiality and transparency of the complaint review process. The following composition of the GRG is proposed:

Members	Position
(a) Representative of PIU	Chairperson
(b) Representative of safeguards team (PIU)	Member
(c) Representative of Local Government, as relevant	Member
(d) Certified technical expert, as relevant	Member
(e) Representative of Engineer/Contractor, as relevant	Member
(f) Representative of the APs	Member
(g) Independent party (for example NGO)	Observer

203. To make for effective complaint processing, the role and responsibilities of each GRG member should be carefully elaborated and explained to them.

204. Step 2. If AP is not satisfied with PIU's decision even after GRG review of the grievance, then s/he can lodge the grievance to the Yerevan Municipality. YM follows Public Administration RA law for registration, revision and resolving the case.

Construction Stage:

205. **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 register book 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.

206. Contractor should immidetly inform the Engineer and PIU if AP lodged the grivance and should send the copy of written complaint to them. Contractor should implement appropriate mitigation measures to solve the issue and send the written responce/reply to the AP with cc Engineer and PIU.

207. 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 receiving the response from the Contractor.

208. The incoming suggestions/ complains shall be considered and classified into environmental and social/resettlement items. The social/resettlement safeguard related complains shall be handled in the scope of Engineer and YMPIU LARP specialists.

209. 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.

210. Step 3. Should the Engineer fail to satisfy the complaint, AP could apply to YMPIU, YM, EA and ADB AM. The complaint in the Constraction stage at the PIU level will be proceded with the same schame as in the pre-construction stage.All the contact information shall be provided by Contractor on posters and on the Project informational board. Contractor shall serve as an entry point in this stage and provide the necessary explanations and assistance in application to the mentioned entities, if needed through the personal contact with AP.

211. Finally the AP can always seek attention and interference of 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 YM level to avoid/minimize litigation as much as possible.

212. 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

213. 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. When the final EMP will be developed as an integral part of the final EIA/IEE it will be included in the tender and contract documents. The EMP is presetned in Annex 3 and will be updated during final design phase.

214. On the other hand the Contractor will determine his construction practices, working methods, schedule and access to the site. To best reflect the changed and modified conditions the Contractor will 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 will be considered as consistent part of Contractor's contractual liabilities.

215. 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 3;
(vii) Environmental work plans prepared (maps, drawings, etc.).

I.1. Mitigation

216. 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 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.

217. The Environmental Management Plan summarizes the anticipated environmental impacts (as identified in section 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.

218. 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 access roads Implement the measure on identification and protection of existing 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.
(v) Submit for approval by the Engineer 28 days prior to start the works the Site-specific Environmental Management Plan.

219. 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.

220. The provisions set out in the EMP will be implemented by the Contractor ES and monitored by the Engineer ES in assistance with YMPIU ES.

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

(i) Occupational Health, and Safety Plan
(ii) Public Consultation and Communications Plan
(iii) Vegetation Clearing Plan
(iv) Utilities Protection and Relocation Plan
(v) Environmental Protection Plan

(vi) Construction Work Camps Plan
(vii) Site Management Plan (Quarry and borrow pit, dumping sites, concrete batching and asphalt plants)
(viii) Traffic and Access Management Plan
(ix) Emergency Response Plan
(x) Waste and Material Disposal Plan
(xi) Site Reinstatement, Landscaping, and Revegetation Plan

a) Occupational Health, and Safety Plan

222. The main purpose of this Plan is to document all the ADB and Armenian legislation requirements to the General Contractor (GC)[2] and the subcontractors (SCs) to ensure environmental and occupational safety and health protection through the Project implementation.

223. 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 3.

224. 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.

225. 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.

226. 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

227. 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.

228. 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.

229. This plan is developed with the intention of maintaining the constant communication with stakeholders, members of the community where the project is located and to the general public in whole.

[2]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).

c) Flora & Fauna Protection and Vegetation Clearing Plan

230. 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.

231. The plan is developed 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.

232. Mitigation measures are presented in EMP (Annex 3).

d) Utilities Protection and Relocation Plan

233. 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.

234. Utility designs will be validated by utility owner. The Utilities Protection and Relocation Plan will be implemented in accordance with Technical Specifications

235. Mitigation measures are presented in Annex 3.

e) Physical and Cultural Resources (PCR) Preservation Plan

236. 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.

237. 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.

238. If necessary, the mitigation measures will be based on the conclusions of the archaeological survey report (currently in progress).

f) Environmental Protection Plan

239. 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 irrigation canal 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 3) Particularly the following aspects are addressed:

(i) Soil erosion and sediment control;

(ii) Air pollution and dust control;
(iii) Noise & vibration control.

240. 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,

241. 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.

242. 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.

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

g) Construction Work Camps Plan

244. 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.

245. 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

246. 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

247. 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 aproved with police, Engineer and agreed with YMPIU, YM.

j) Emergency Response Plan

248. 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 3: Environmental Management Plan will allow reducing the risk of any impacts up to an acceptable level.

k) Waste and Material Management Plan

249. 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.

250. 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.

251. 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 3: Environmental Management Plan and could be completed by Contractor in SEMP.

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

252. Should be referred also to the appropriate sections of the Technical Specifications

253. 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 maintenance)

254. 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

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

256. Baseline data collection for soil, air quality and noise & vibration will be implemented by Engineer during preparation of the final EIA/IEE and also will be implemented or confirmed by the Contractor 21 days prior to the commencement of works.

257. 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.

258. The regular environmental monitoring 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.

259. 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.

260. 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 3, Table 2.

I.3. Implementation arrangement

261. Implementation schedule and responsible entities of implementation are provided in the EMP (see Annex 3).

a) Environmental Staffing

262. 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 3, table 1.

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

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

(i) The Contractor environmental specialist with a strong background of health and safety 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 monitor 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;
- In S7, implement short surveys by an archaeologist during excavation works of construction phase and provide reports on these surveys;
- Environmental specialist prepares monthly environmental report as part of Contractor's monthly progress report.

(ii) The Engineer environmental specialist with a strong background of health and safety has the following responsibilities, roles and tasks:

- Supervise, inspect and coordinate, on a daily, weekly and monthly basis, the tasks of the environmental 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 and 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 effectiveness 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 EIEC and with the Project EMP.

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

c) Awareness raising and environmental training

264. 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 final EIA/IEE and EMP.

265. 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

266. A specific pay item will be 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) will be foreseen also in the Engineer budgets in the scope of request for proposal. Costs will be calculated and introduced in the final IEE/EIA and EMP when final design will be developed.

I.5. Reporting

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

268. 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.

269. 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.

270. 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.

271. The Engineer submits to YMPIU weekly monitoring reports and report on environmental safeguards as 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

272. The potential negative impacts (such as nuisances from noise, dust, traffic and access changes, which are likely to be experienced by nearby communities, the impact on Flora and Fauna and the impact on the potential Archeological Site 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

273. Based on this draft IEE, during detailed design preparation stage final EIA/IEE and EMP should be prepared and submitted for ADB and MNP approval.

274. The construction contractor will consider the final EIA/IEE and EMP as part of the Contract.

275. The Contractor shall prepare based on the future Annex 3: Environmental Management Plan 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.

276. The Engineer shall monitor and supervise the implementation of mitigation measures by the Contractor as will be specified in the final 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/IEE and EMP. The Engineer may also stop all relevant works (at the Contractor's cost) until the requirements of the EIA/IEE 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.

277. 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 and YMPIU.

278. 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.

279. During final design preparation stage the Engineer will engage a specialist to survey 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.

280. Contractor shall accept the results of the surveys and investigations (tree identification

and counting, environmental baseline data, utilities) of the final EIA/IEE 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.

ANNEXES

Annex 1: Rapid Environmental Assessment (REA)

Annex 2: Public Consultation, Meetings and Participation of 18 June 2014

SUSTAINABLE URBAN DEVELOPMENT INVESTMENT PROGRAM TRANCHE 2
List of Participants of Public Consultation on Initial Environmental Impact Assessment
For Road section Babajanyan –Ashtarak Highway

N	Name, Surname	Position	E-mail/Tel	Signature
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Attendance sheet

ՔԱՂԱՔԱՅԻՆ ԿԱՅՈՒՆ ԶԱՐԳԱՑՄԱՆ ՆԵՐԴՐՈՒՄԱՅԻՆ ԾՐԱԳԻՐ ՏՐԱՆՇԵ 2

Բարգավանի փողոց – Աշտարակի մայրուղի ճանապարհահատվածի

Շրջակա միջավայրի վրա ազդեցության գնահատման հանրային լսման մասնակիցների ցանկ

N	Անուն Ազգանուն	Պաշտոն	Էլ. Հասցե / հեռ.	Ստորագրություն
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11	[illegible]	[illegible]	[illegible]	
12	[illegible]	[illegible]	[illegible]	
13	[illegible]	[illegible]	[illegible]	
14	[illegible]	[illegible]	[illegible]	
15	[illegible]	[illegible]	[illegible]	
16	[illegible]	[illegible]	[illegible]	

PROTOCOL Of Public Consultation on Initial Environmental Impact Assessment (IEIA)
within Sustainable Urban Development Investment Program, Tranche 2

(For Section 6: Babajanyan-Tichina, Section 7: Tichina-Silikyan,
Section 8.1: Vahagni 1, Section 8.2: Vahagni 2, Section 8.3: Silikyan-Ashtarak Highway)

Date/Time: June 18, 2014, at 16:00

Location: City Yerevan, Ajapnyak Community, Secondary School N155

The list of participants is attached.

The following issues were raised in the agenda of the session:

- Opening speech
- Presentation of Initial Environmental Impact Assessment of Sustainable Urban Development Investment Program, Tranche 2.

Opening of the meeting

As an opening of the meeting Nora Martirosyan, Project Director of the Sustainable Urban Development Investment Program, welcomed the participants.
Nora Martirosyan mentioned that the Republic of Armenia shall submit relevant package of documents to the Asian Development Bank (ADB) in order to receive a loan from the ADB for the implementation of Tranche 2. The Initial Environmental Impact Assessment is a constituent part of the package.

Nora Martirosyan noted that the objective of the Project was to improve urban transportation system in Yerevan. She also informed that according to the Project it was envisaged to complete missing road connections in the western urban ring road, which would help divert transportation from the centre of the city.

The first issue of the agenda was introduced by Armine Yedigaryan, Environmental Specialist of the Consulting Company.

Armine Yedigaryan introduced the results of the Initial Environmental Impact Assessment of Tranche 2. It was noted that surveys showed that the potential negative/adverse impacts of the Project would be temporary and would be mitigated and minimized through measures specified by the environmental management plan.
The results of the survey of flora showed that the species 35 Platanus orientalis (platan) of the Red Book would be most significantly affected trees. However, it was noted that relocation of the mentioned trees was possible (as they are young and healthy trees), if those trees were affected during the implementation of the final design.
Nora Martirosyan asked if relocation of other trees was also possible.
Armine Yedigaryan noted that some of the existing trees were possible to relocate. They will be cut only in the event of impossible relocation. For each tree cut a replanting measure with a ratio of 1:6 will be implemented.
Further Armine Yedigaryan mentioned that management, prevention or mitigation of potential impacts of the Project would be elaborately incorporated in the Environmental Management Plan (EMP). The EMP will include the main principles, general mitigation measures and about 12 sub-plans.
The public was also made aware of possible suggestion-making and grievance

procedures/mechanisms. It was noted that affected persons could make any suggestion and/or complaint related with environmental impact assessment and environmental security issues.
The second issue of the agenda was introduced by Astghik Ghazaryan, who had implemented a survey on fauna of the Project. She mentioned that there were no species of the Red Book in the Project area and it would be possible to prevent potential negative impacts through proposed mitigation measures. Particularly in the S.7 section, for flat areas it was suggested to install a grid with small holes along the road and to create 2-3 average sized passageways to ensure free movement of the animals.

The Engineer stated that these suggestions were acceptable and would be taken into consideration during implementation of the final design.

Minutes of the meeting were taken by
Armine Yedigaryan, Environmental Specialist of the Consulting Company
(Egis International)

Annex 3: Environmental Management Plan of Tranche 2 - Babajanyan–Ashtarak highway Project

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 and 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 **Tranche 2 - Babajanyan–Ashtarak highway Project**				
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)	Missing baseline information for monitoring during construction phase	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. 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 **Tranche 2 - Babajanyan–Ashtarak highway Project**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
CONSTRUCTION PHASE				
3. Orientation and environmental training	Contractor's non-compliance to the EMP leading to insufficient environmental controls and environmental degradation.	1. Contractor hires one Environment and Health & Safety Specialist to manage environmental issues and mitigation. 2. Provide training to all staff on Environment and Health & Safety (See sub-plans below for more details).	**Contractor** Provide specialist(s) and train staff **Engineer** Monitor the Contractor, construction workers, environmental parameters and reports to YMPIU **YMPIU** Issues non-compliance notices	**Contractor** Cost of 1 HSE Specialist available full-time during the 24 months construction period is estimated at: **US$ 60 000** **Engineer** Remuneration for 24 months included in budget is estimated at: **US$ 52 000** Cost of 1 day induction training program on Health, Safety and Environment for 50 construction workers at US$ 50 par day plus the fees of 3 days of a trainer at US$ 75 per day, is estimated at: **US$ 2 950**
4. All site construction activities (including activities in Right of way, Borrow pits, Dump sites, Construction camps)	Environmental degradation, Nuisance from dust, air pollution noise & vibration Safety and health hazards to workers and community residents	Prepare and submit, within mobilization period, a SEMP including the following environmental management sub-plans: 1. Occupational Health and Safety Plan 2. Public Consultation and Communications Plan 3. Flora & Fauna Protection and Vegetation Clearing Plan 4. Utilities Protection and Relocation Plan 5. Archeological Preservation Plan 6. Environmental Protection Plan 7. Construction Work Camps Plan 8. Site Management Plan (Quarry and borrow pit, dumping sites, concrete batching and asphalt plants)	**Contractor** Prepare and implement **Engineer** Review, approve and monitor implementation **YMPIU** Supervise the Contractor	Costs of those plans are accounted for each of the Construction Plans detailed below.

Table 1: Environmental Management Plan: Mitigation

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		9. Traffic and Access management Plan 10. Emergency Response Plan 11. Waste and Contaminated Soil Management Plan 12. Site Reinstatement, landscaping and Revegetation Plan	and the Engineer	
		1. Occupational Health, and Safety Plan		
5. All site activities	Lack of information on EMP and applicable environmental regulations for the Project may lead to environmental degradations Sickness, injury, or death of workers, road users and other people near the site caused by exposure to hazardous substances; slips, trips and falls; and falling objects.	1. Occupational Health & Safety orientation trainings on the following topics: • General rules and regulations to be followed on the construction site and camps • Construction activity-specific rules and regulations including working on bridge, working with electrical tools, digging pits, etc. • General health and safety awareness program for educating construction workers on sexually transmitted diseases and HIV/AIDS. • Illegal trafficking: workers should be made aware that trafficking of humans, wildlife, endangered species, and illegal substances through the road corridor will not be tolerated and be advised of a progressive penalty scheme up to and including dismissal. 2. Take all reasonable precautions (tape fencing, guard points, etc.) to prevent unauthorized entry to the Site 3. Exclude unsafe working practices and unsafe tools from the construction-site. 4. Fire-extinguisher is available and easily accessible in all operating machinery and in all sections of the construction site.	**Contractor** Implement the Plan and Prepare the orientation program **Engineer** Review, approve plan and assist monitor implementation Review incident logs **YMPIU** Review plan and assist the Engineer	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 3 above. Cost of PPEs for 50 workers at US$ 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 **Tranche 2 - Babajanyan–Ashtarak highway Project**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		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 Engineer and to relevant authorities when needed.		
		2. Public Consultation and Communications Plan		
6. 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	**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 3 above.

Table 1: Environmental Management Plan: Mitigation

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		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.		
		3. Flora & Fauna Protection and Vegetation Clearing Plan		
7. Earthworks and other construction works	Disturbance and degradation of flora and fauna habitat, especially 35 trees of Platanus orientalis species in the segment S8-3 recorded in the IUCN Red Book. 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 6. Inform the Engineer in case of an injured animal is found. 7. Undertake the vegetation removal and site clearing preferably during late autumn and/or winter. 8. A register of cut trees and shrubs is created and kept available for review.	**Contractor** Hire a local Fauna and Flora specialist to assess the occurrence of Red Book species in the project area (following Following Annex 5 and Annex 6) 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**	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 3 above. Cost of hiring during 20 days a local Fauna and Flora specialist at US$ 75 per day, is estimated at: **US$ 1500** Cost for protection of existing community trees for an estimated 50 trees at US$ 25 per tree is estimated at: **US$ 1250** (number of trees to be confirmed)

Table 1: Environmental Management Plan: Mitigation

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		9. For vegetation clearance purposes, pesticides shall not be used. If necessary use only pesticides that are not listed in the Government decree N293 of 17 March 2005 and exclude the use of POP containing chemicals. 10. Ensure that workers are using PPE when using pesticides or other vegetation clearing chemicals. 11. Cut vegetation shall not be burned but manage as per waste and material disposal plan. 12. Transport cut vegetation to approved waste dump within 2 days. 13. Temporarily heap cut vegetation in designated location within the Project righ-of-way before transportation to waste dump.	Supervise the Engineer	
		4. Utilities Protection and Relocation Plan		
8. Utilities protection and relocation	Disruption of services provided by utilities causes impact on APs	1. Implement the protection and relocation of utilities in accordance with Technical Specifications (reference to be confirmed). 2. Identify with utility owner the exact location of 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	**Contractor** Survey utilities and prepare plan prior to construction 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	Cost of protecting and relocating utilities cannot be strictly accounted as environmental mitigation measures. For information purposes, the evaluated costs of construction activities related to utilities will be estimated. (to be estimated)

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		damaged during construction works.	**YMPIU** Monitor the Engineer and review	
		5. Archeological Preservation Plan		
9. Road construction activities at section where potential archeological resources could be discovered.	Damage to archaeological, historical and cultural resources	SEMP will be developed for section 7 and south part of section 8 where potential archeological sites could be discovered. A short monitoring will be implemented by an archaeologist during excavations works of the construction activities. If achaeological resources are discovered the Archaeological Preservation Plan will be respected. The Archaeological Preservation Plan will contain the following: • Purpose, • Responsible entities, • Approvals and permits, • Procedures, • Site description and sensitive receptors, • Risk assessment, • Mitigation measures. After the risk assessment the following mitigation measures will be implemented: 1. Restrict construction works activities to the road right-of-way by fencing. 2. In the vicinity of the archeological sites, ban any constructions activities, material deposit or vehicles parking outside of designated construction areas. 3. Ban dumping and disposal of waste, garbage and	**Contractor** Hire a local archeologist to implement the monitoring. Support archaeologist during the monitoring. Wait end of Investigation before continuing construction activities. **Engineer** Modify road design to integrate recommendations of detail Archeological Investigation if any. Review recommendations and monitor implementation. Assist with liaison with local representatives and service providers **YMPIU** Monitor the Engineer and review	**Contractor** If archaeological resources are discovered, included in total construction cost, estimated to be maximum 2%. **ADB** Included in the corporate environmental due diligence cost

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		construction debris in the archeological sites. 4. During construction, secure the site outside of the construction area from heavy equipment and construction materials. 5. 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.		
		6. Environmental Protection Plan		

Table 1: Environmental Management Plan: Mitigation

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
10. Earthworks 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 (reference to be confirmed) – 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 (reference to be confirmed) - 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 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.	**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 natural area at; **US$ 5 000** b) Cost of the installation of an Oil separator is estimated at: **US$ 12 000** c) Cost of extraction, stockpiling and reuse topsoil at US$ 3 per m^3 Volume of top soil to be estimated d) Cost of seeding grass : at US$ 1 par m^2. Area of barren ground where risk of erosion and growth of undesirable adventive plants is high to be estimated. e) Cost of spraying water on barren ground and construction tracks to prevent dust emission during 8 months (240 days) out of the 24 months of the construction timeline, at US$ 100 per day is estimated at: **US$ 24 000** f) 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

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		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 as necessary 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 sections 6 and 8-3 of project corridor. They will be confirmed by the Contractor in its SEMP. ***Water quality and sediment control*** 1. All runoff from work areas have to be managed. 2. Prevent untreated discharge of storm water from all construction sites; 3. Prevent run off from all construction sites including: construction camps, quarries, crushing, and concrete batch plant, waste disposal site, etc. 4. Install netting or sheeting beneath the bridge during construction to catch any materials that may be dropped 5. Regularly inspect, repair or maintain drainage structures to avoid sedimentation especially after rainfall events. 6. Clean ditches, drains and culverts from sediments coming from construction activities. 7. Perform concrete casting, joints sealing, application of water-proofing paint or protective systems, curing agents, etc. during the dry season to avoid pollution of water bodies		

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		8. Clean all operating machinery and undertake refuelling at safe distance from water bodies 9. Install petrol/oil Interceptors at each outfall. 10. Install penstock or similar restriction devices at all facilities to prevent pollution in the event of accidental spillage. ***Noise & vibration control*** 1. Comply with construction activities related noise & vibration national legislation. 2. As far as possible, 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. 5. Sensitive receptors are identified in sections 6 and 8-3 of project corridor. 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) are regularly controlled.		
		7. Construction Work Camps Plan		

Table 1: Environmental Management Plan: Mitigation

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
11. Accommo-dation 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 ambient environment	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. 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.	**Contractor** Prepare plan and monitor implementation. **Engineer** Review plan and superviser 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 3 above.
		8. Quarry and borrow pits, dumping site, concrete batching and asphalt plants's Management Plan		
12. 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	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	**Contractor** Prepare plan and monitor **Engineer** Review plan and supervise implementation. **YMPIU**	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 3 above.

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	historical, cultural sites and monuments, losses to aesthetics, disruption of local livelihood and 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.	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 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.	Monitor and review the Engineer	

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		9. Traffic and Access Management Plan		
13. 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 hours where practicable.	**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.

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		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		
14. Handling hazardous substances Emergency situations (incidents, accidents, etc)	Leakage or spillage of diesel fuel, oil or other toxic substances entering soil, and groundwater.	1. Provides to the Engineer the list of substances which contain hazardous elements e.g., diesel, waste oil, paints, herbicides, etc. 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	**Contractor** Prepare plan and implement Dispose of Hazardous Materials per MNP directive **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

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		train the workers on their proper use. 3. Store equipment for cleaning up spillages properly to ensure it is easily available when needed. 4. Ensure that the ERT and all personnel handling chemicals and hazardous substances receive hazard and risk management training. 5. Clean the area of spillage immediately to prevent potential contamination of soil and groundwater using a dedicated absorbent material. Remove the pollutant, together with the contaminated soil and the absorbent materials and discard to a site approved by MNP. 6. Manage hazardous wastes in accordance with Armenian regulation. 7. Use chemicals, hazardous substances, and fuel only when necessary. Those substances should be stored on site, within a covered, secure and naturally ventilated area with an impervious floor and impervious bund around it. The bund should have a capacity of at least 150% of the capacity of the largest tank. 8. Locate the storage area away from drainage lines and danger areas. 9. Designate an Emergency Response Team (ERT) as a part of the Environmental team response-ready at any time. 10. Ensure that the ERT receives emergency response training. 11. Provides all construction sites with emergency contact information, responsible persons & safety officer name(s), telephone numbers, etc. 12. Develop an Accident report form with the Engineer.	Review plan and supervise implementation **YMPIU** Assist liaison with MNP. Review and monitor the Engineer	already accounted in point 3 above. Cost of 3 days of training of the 10 members of the Emergency Response Team at US$ 50 per day, plus the fees of 3 days of a trainer at US$ 75, is estimated at: **US$ 1725**

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		13. Inform the Engineer on any accidents (incidents) immediately and report by filling in the accident report form.		
		11. Waste and Material Disposal Plan (WMP)		
15. 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 for obtaining licenses when needed. 8. Obtain all permits for waste disposal and dispose only in permitted sites. 9. Obtain the hazardous waste disposal approvals from MNP. 10. Apply to the Engineer for waste disposal dump sites investigation and approval. 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	**Contractor** Prepare plan implement and monitor, **Engineer** Review plan & supervise implementation **YMPIU** Assist liaison with YM and 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 3 above.

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Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
		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, Armenian legislative orders and best international practices.		
		12. Site Reinstatement, Landscaping, and Re-vegetation Plan		
16. 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	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.	**Contractor** Hire approved landscape contractor to implement plan and monitor trees and other plants survival **Engineer** Provide landscaping design Review plan and monitor implementation. Monitor tree and other plants survival during works and defects liability	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. Planting and seeding cost to be estimated.

Table 1: Environmental Management Plan: Mitigation **Tranche 2 - Babajanyan–Ashtarak highway Project**				
Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	areas Cleared vegetation and trees are not fully compensed by vegetation restoration works.	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 landscape design or instructed by the Engineer. • 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. 6 seedling trees / shrubs for every single community tree or shrub cut down in the project right of way. • 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).	**YMPIU** Monitor the Engineer and monitor trees and other plants survival	
POST-CONSTRUCTION PHASE **(Operation and maintanance)**				
17. Defect correction works	All the impacts identified in	1. Activity-specific mitigation measures envisaged in the Construction Phase	**Contractor** Implements the EMP and SEMP for	Cost of long term monitoring by the Contractor cannot be evaluated at the

Table 1: Environmental Management Plan: Mitigation

Tranche 2 - Babajanyan–Ashtarak highway Project

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US$)
	Construction Phase		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	moment.
18. Re-vegetation	Vegetation does not 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.
19. 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

Tranche 2 - Babajanyan–Ashtarak highway Project

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 Engineer 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	Shall be set when the Contractor is planning its recruitment 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 Supervision cost to be included in Engineer budget **YMPIU** Supervise the Engineer	According to regular monitoring schedule Plan must be developed and validated prior the commencement of construction activities
3. Public Consultation and Communication	Information of the General Public about construction	All construction sites	Documentation review Construction	The Public Consultation and Communications Plan is available on all construction sites	**Contractor** Development and management of the Public Consultation and Communication Plan	According to regular formal monitoring schedule The Plan must be

Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
	stages Information of APs about Project's grievance redress mechanism		sites' inspections Public consultations Review of the register of complaints	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	**Engineer** Environmental Specialist reviews and supervise the Public Consultation and Communications Plan Supervision cost to be included in Engineer budget **YMPIU** Supervise the Engineer	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 and monitors 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 sipervises the Flora & Fauna Protection and Vegetation Clearing Plan Supervision cost to be included in Engineer budget **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 Relocation	Cases of disruption of services	All construction sites	Review of all documentation related to	The Utilities Protection and Relocation Plan is available Number and severity of	**Contractor** Development and monitors of the Utilities Protection and Relocation Plan as a part of SEMP	According to regular monitoring schedule The Plan must be

Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
	impacting end users Re-located of utilities is implemented where needed		Utilities Protection and Relocation Construction site(s) inspections Review register of complaints	complaints logged in the Register of Complaints Utilities discovered during constructions works did not lead to interruption of service to end users	Monitoring cost to be included in Contractor's budget **Engineer** Environmental Specialist reviews and supervise the Utilities Protection and Relocation Plan Supervision cost to be included in Engineer budget **YMPIU** Supervise the Engineer.	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 monitoring	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 measurements	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. Dust emissions, noise & vibration measurements nearby sensitive receptors located at 50m distance from 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	**Contractor** Development and monitors of the Environmental Protection Plan. Monitoring cost to be included in Contractor's budget **Engineer** Environmental Specialist reviews and supervise 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 PIU prior to the commencement of construction activities Baseline data to be collected 21 days before works commencement date. Measurements of dust emissions at least every two weeks and more frequently during dry

Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
		plan		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)		conditions, depending on complaints received from APs 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 Register of Complaints	**Contractor** Development and montiors of the Construction Work Camps Plan Monitoring cost to be included in contractor budget **Engineer** Environmental Specialist reviews and suvervise the Construction Work Camps 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
8. Quarry, borrow pit, concrete batching, asphalt plants and dumping	Location, layout and management of Quarry, borrow pit, concrete	Quarry, borrow pit, concrete batching, asphalt plants and	Documentation review Sites' visits	The Sites Management Plan is available The layout of the Construction Work Camp(s) complies with specifications of the Plan	**Contractor** Development and monitors of the Sites Management Plan Monitoring cost to be included in contractor budget **Engineer**	According to regular formal monitoring schedule The Plan must be developed and validated prior the

Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
site	batching, asphalt plants and dumping site Nuisances to affected communities	dumping site		Number and severity of complaints logged in the Register of Complaints	Environmental Specialist reviews and sipervise the Sites Management Plan Supervision cost to be included in Engineer budget **YMPIU** Supervise the Engineer.	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 and monitors 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 hazardous substances	Accidental or chronic leakage or spillage of diesel fuel, oil or other toxic substances	All Construction sites	Documentation review Sites' visits	The Emergency Response 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	**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**	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of construction activities

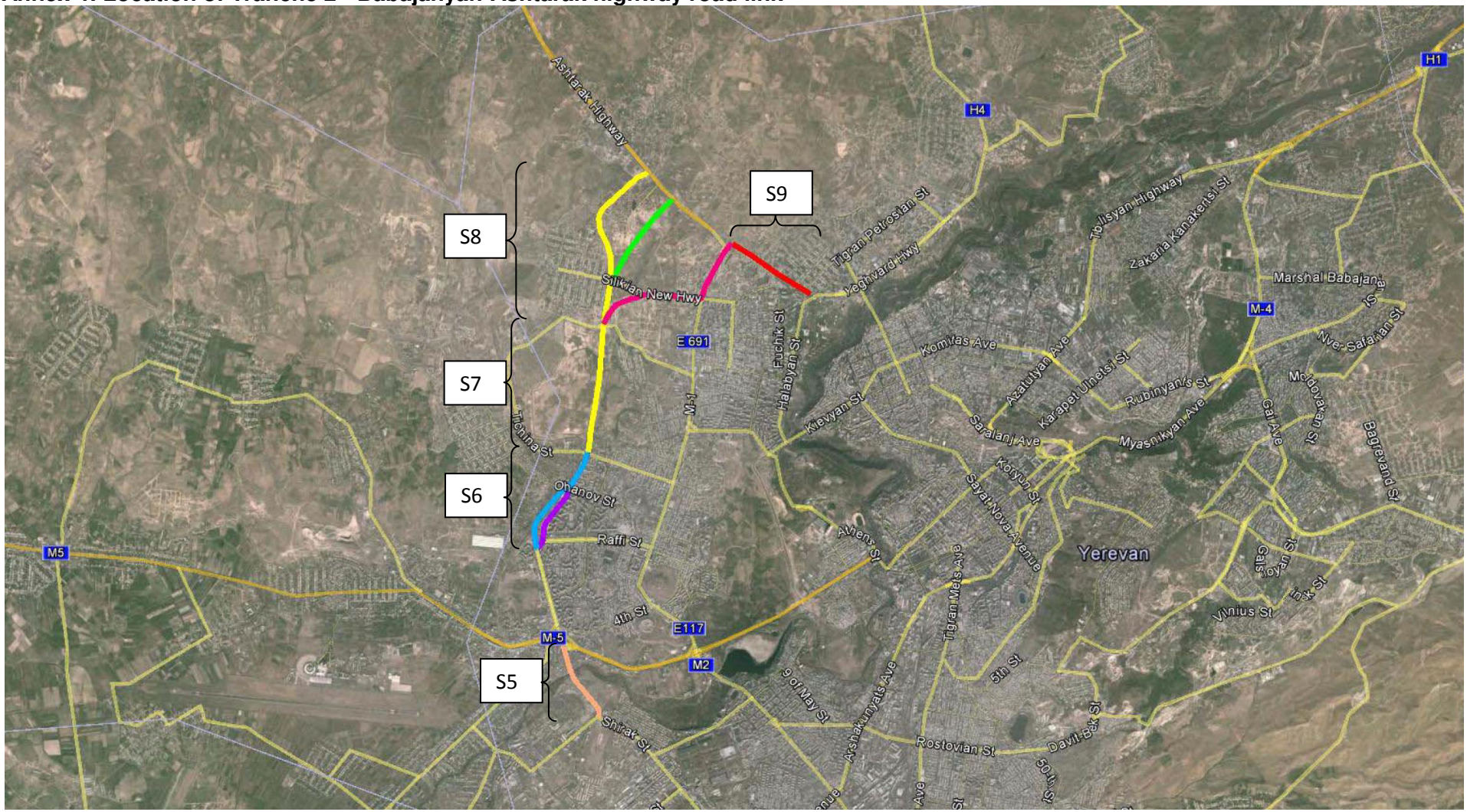
Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
				their training	Supervise the Engineer	
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. Engineer 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 **Tranche 2 - Babajanyan–Ashtarak highway Project**						
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
13. Records and reporting	Site inspection checklists, Site inspection minutes, Register books Consultation records, Training records, Licenses,	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**	The Contractor transfer documents monthly at minimum Engineer submits a weekly monitoring report and a monthly progress report End of Phase report Audit report

Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
	and Permits				Review the Engineer reports Report to ADB	YMPIU prepare a bi-annual report to ADB

Table 2: Environmental Management Plan: Monitoring **Tranche 2 - Babajanyan–Ashtarak highway Project**						
Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
OPERATION PHASE (1 Year) **(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	**Contractor** **YM** collects and analysis of Noise & Vibration, Water and Air Quality data Monitors specialized monitoring company 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
16. Safety		Project right of way			**Safety is controlled by Police.**	

Annex 4: Location of Tranche 2 - Babajanyan-Ashtarak highway road link



Annex 5: Flora assessment

VAHAN AMIRKHANYAN

1. INTRODUCTION

1.1 Background and Scope of this Report

This report describes the methods and results of an investigation of environment and possible impact on flora and vegetation in the Proposed Project area.

The primary focus of the investigation was on occurring and potentially occurring species and populations listed as rare and endangered species under the Red Book of Plants of Republic of Armenia and also to conduct a thorough assessment of the flora in and around the construction of new Road to maximize the opportunity for detecting threatened species, populations. The assessment did not rely only on survey field results, but also took literature, historical and regional data, reports, etc. into account.

2. EXISTING ENVIRONMENT

2.1 Location of the Project

The investigated areas cover theWest part of Yerevan up to its North-West. Tender 2 - S6-7-8 Project is located in the North-West and South-West areas of Yerevan, in the administrative districts of Ajapnyak and Malatia-Sebastia (approximately 6 km South-West of Yerevan City centre). Section 6 is located in the administrative district of Malatia-Sebastia which borders with Ajapnyak, Center and Shengavit districts and Ararat, Armavir regions. This section will start from Babajanyan street and reach Tichina Street. Section 7 is located in the administrative district of Ajapnyak. It is in the North-Western part of Yerevan. This section will start from Tichina street and reach Silikyan old Highway. Section 8 has to provide a link between Section 7 and Ashtarak Highway that leads to the northern part of North South Corridor. Altitude of study sections ranges from 900 m (section 6) to 1140 m (section 8) above sea level.

2.2 Geology and Soil

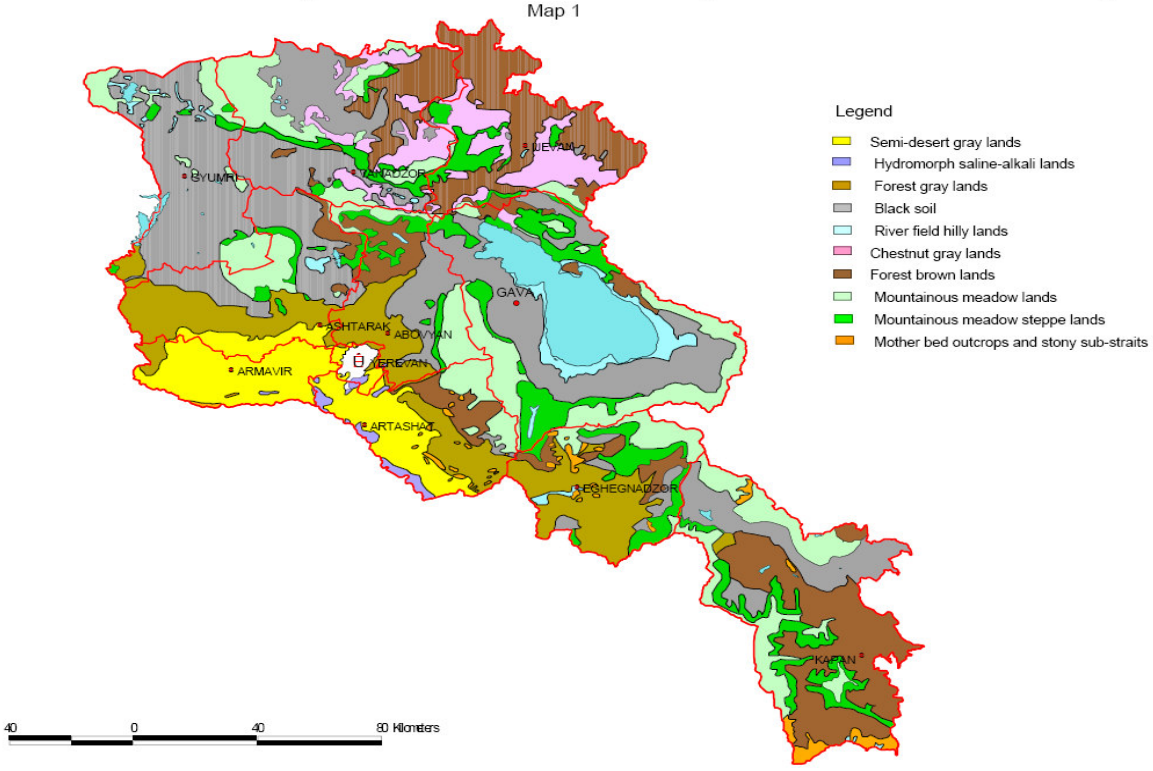
The area of construction of the road is located within dry desert zone where the soil is semi-desert gray. The proposed area is included in the dry desert zone that is formed at an altitude of 850-1250 m. The soil mainly has clay-sand mechanical composition. Semi-desert gray soils occupy areas of lowland hill-wavy planes of foothill zone of Ararat Valley. The surface layer is of crushed lumpy soft composition that is rich in rocks of various sizes. Soil substrate particles in lower horizons are generally concreted.

This type of soil is characterized with law fertility and scarce power (25-40 cm), under which crushed rocks in the form of marl are spread.

These soils are characterized by low humus content (1.5-2.0%), fabric and considerable content of carbonates, the pH ranges from 7.5 to 8.5, i.e these soils are mainly neutral, sometime weak alkaline. They have medium absorbability (30-35 mg equivalent in 100g).

Map of land cover of the Republic of Armenia territory

Map 1

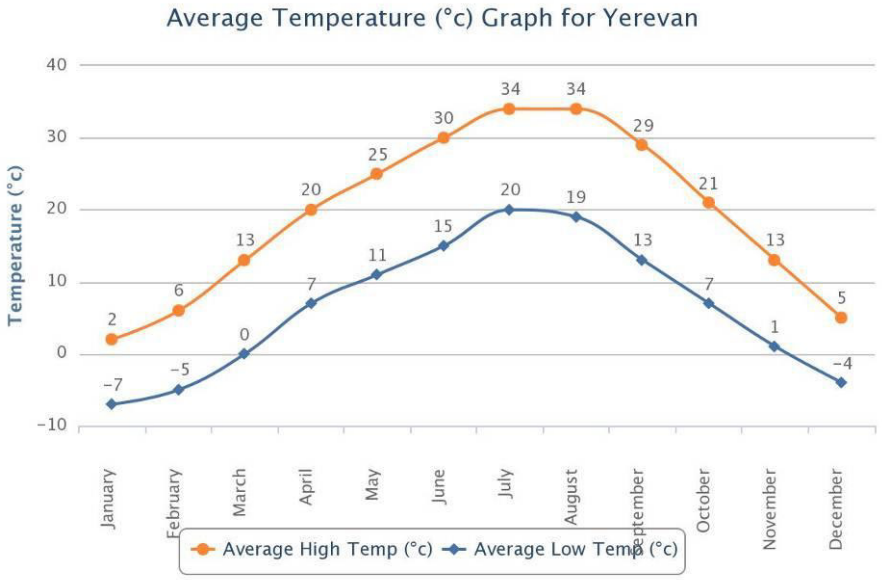


The content of organic matters and available inorganic nutrients are low. They contain a lot of stones on the surface and in the profile of the soil. Below carbonate horizons gypsum bearing layers are met.

In summer the daily temperature amplitudes on top of the rocks reach up to 50^0 C and sometimes up to 60^0 C. In winter it is frozen at the average depth of 2–30 cm, and sometimes it can freeze up to 46 cm. Dry climate and poor vegetation result in the division of land profile into horizons and poor saturation with organic substances. Under the impact of such fluctuations species are destroyed and huge quantitative materials of different formations are accumulated on the surface of the relief. Under denudation, the combination of processes is considered, demolition of weathering products. The lands are very dry and cracked in summer. Practically, it is impossible to grow plants without irrigation in such conditions.

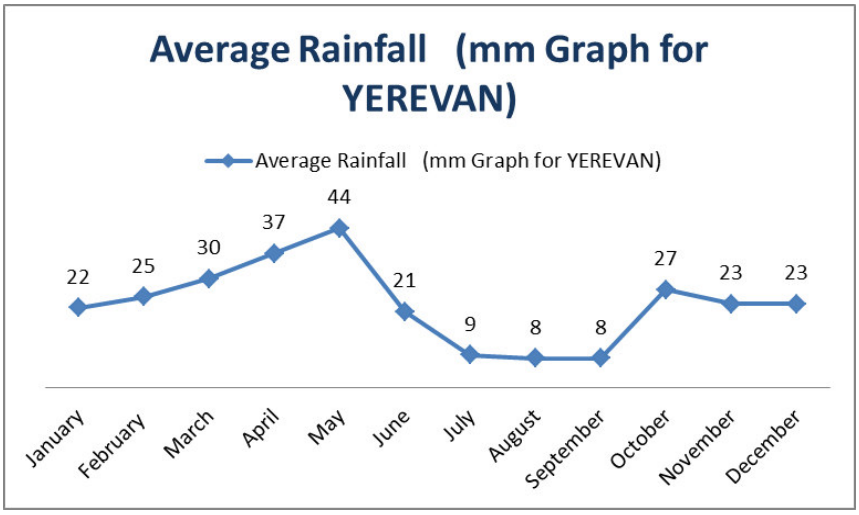
2.3 Climate

Yerevan is located in 2 landscape zones: desert-semi desert climate prevails on the altitude 850-1000 m, and dry steppe climate is spread on higher altitude. The climate of Yerevan is continental semi-arid, with the influence of mountain climate, with hot and dry summers and cold and unstable snow-cover. This is attributed to the fact that Yerevan is located on a plain surrounded by mountains and to its distance to the sea. The total duration of sunny days is up to 2700 hours. The average annual temperature is 8.8-11.6 ^{o}C, and the average annual fluctuation of temperature is equal to 31 ^{o}C.



Source: World Meteorological Organization

The summer season lasts more than 4 months with dry and hot weather, the average air temperature in August is 22-26°C, and the peak temperature is equal to 41.4°C. Mountain-valley winds blow in summer, which become stronger in the 2nd half of the day sometimes reaching 15-20 m/sec. Winter is moderately cold: constant snow cover is formed not every year. The average temperature in January is -4-6 °C, and the peak temperature is -31 °C. Light winds prevail. Spring is short with unsteady weather. Mild, sunny and windless autumn is peculiar to Yerevan.



Source: World Meteorological Organization

The average quantity of annual precipitations is 250-370 mm. Maximum precipitations fall in May (average is 44 mm), while in summer a quantity of precipitations recorded on average doesn't exceed 32-36 mm.

The continental climate is conditioned by dry overheated air mass blowing from the South in summer, and the invasion of cold air masses from the North in winter, that further on get colder in anti-cyclonic weather conditions. Non-frost period usually lasts 213 days but sometimes it varies between 163 to 234 days.

2.4 Legislation

During its independence Armenia has adopted several laws and numerous normative documents which support flora and vegetation conservation in whole its diversity. The approval and publication of the Red Book of Plants serves the aim as well.

The following legislation is applicable to the protection of flora in Armenia:

Title of the Law	Year adopted
The Republic of Armenia Forest Code	2005
Law of the Republic of Armenia on Compensation Tariffs for the Damage Caused to Flora and Fauna due to Environmental Violations	2005
Law of the Republic of Armenia on Specially Protected Areas (a law with the same title was first adopted in 1991)	2006
Law of the Republic of Armenia on Rates of Environmental Charge (a law with the same title was first adopted in 2000)	2006

Decisions of the RA Government

- ✓ Decision of the Government of the Republic of Armenia No. 1232-N, dated July 21, 2005, on the RA National Forest Program
- ✓ Decision of the Government of the Republic of Armenia No. 1412-N, dated September 7, 2006, on the Procedure for Reforestation Cutting in Forests of Industrial Importance
- ✓ Decision of the Government of the Republic of Armenia No. 133-N, dated February 7, 2008, on the Procedure for the Maintenance of State Forest Cadastre, State Registration of Forests and Submission of Data
- ✓ Decision of the Government of the Republic of Armenia No. 72-N, dated January 29, 2010, on Approval of the Red Book of Plants of the Republic of Armenia

3. FLORA ASSESMENT

3.1 Methodology

Several field visits for surveying of the flora of the Project site were carried out by the Reporting officer. The surveys involved an initial desk top assessment followed by on-site surveys. The desk top assessment included searching all available information: reports, books, atlases, Red book of Armenia, etc. All available resources, which provide floristic lists, vegetation community classification were used.

. Based on these surveys an assessment of likely past and current reports relevant to consideration of the impacts of the proposed areas with respect to flora and vegetation were examined. The primary information sought was records of rear and endangered flora species and ecological communities as well as overall vegetation community classification. The area occupancies of all potential rare or endangered plants registered in the Red Book were studied to see whether there were any species the area occupancies of which coincided the project implementation area.

During the surveys, mainly carried out on foot, the locations of all vegetation associations and dominant flora species were determined. A preliminary list of available trees and bushes owned by the community or privately was compiled as well as the number of community trees and bushed were identified (Annex 1, Annex 2 and Annex 3). The vegetation, its conditions and site layout were recorded in order to assess the extent of impacts on vegetation.

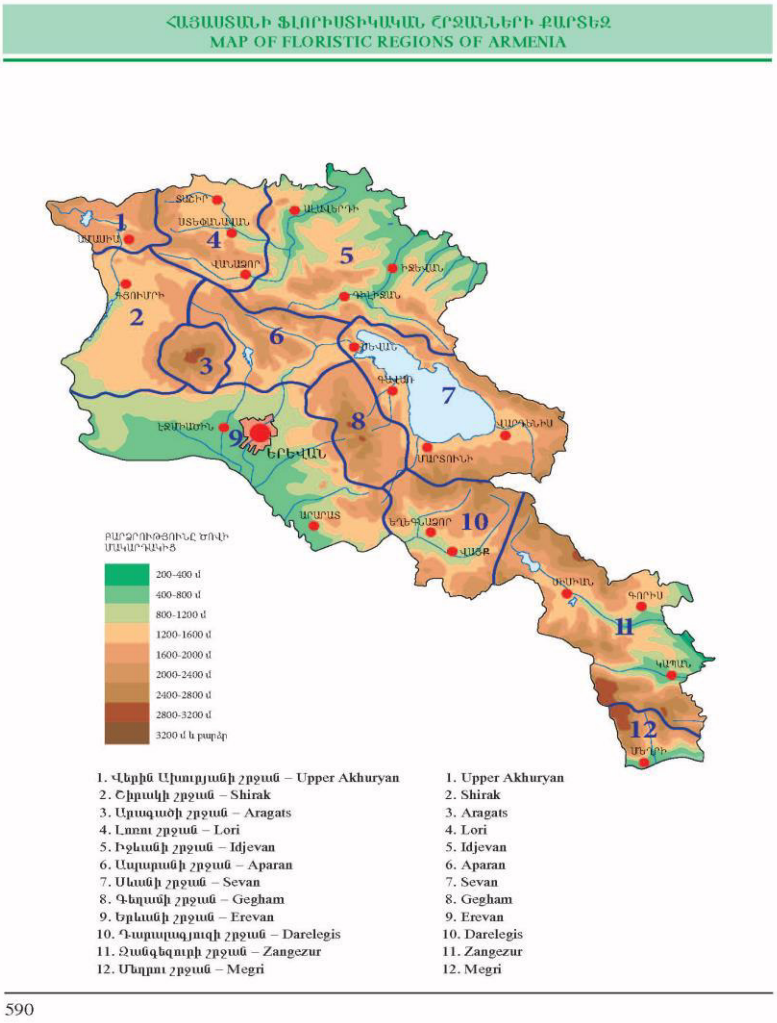
3.2 Flora of Armenia

The biodiversity of Armenia is especially rich in economically valuable, rare and endemic species. Despite its small area, about 3600 species of vascular flowering plants are found in Armenia. More than half of the plant species of the Caucasus occur in Armenia, which only occupy 6.7% of the whole territory. The density of higher plants is quite high (100 spp./km^2), which is one of the highest in the world. Due to great altitudinal variation (from 375 meters up to 4095 meters from the sea level), 7 landscape climatic zones with distinct flora are formed in a relatively small terrain.
The rate of endemism is also very high: there are 125 endemic vascular plant species, which is about 3% of the total flora diversity of the country.

3.3 Flora of the Programe area

The Program area is located in a semi-desert zone of Armenia and belongs to Yerevan floristic region. Wormwood and ephemeral vegetation is typical to semi-deserts. Yerevan floristic region includes Armavir Marz, Ararat Marz, parts of Aragatsotn Marz and Kotayk Marz as well as Yerevan City. The major part of landscapes in this zone has been turned to agro-landscapes.

Yerevan floristic region is distinguished by the presence of natural landscapes which are habitats for numerous representatives of flora. The definite diversity of natural landscapes makes the existence of various natural ecosystems with their unique bio-diversity possible.



Natural flora comprises about 900 species of vascular (high-class) plants. Three types of species are registered in the Red list of the International Union for Conservation of Nature (IUCN). The species registered in the IUCN Red list are Walnut (Juglans regia) (Status: Near Threatened), Muchlenbergella Overina (Sambucus tigranii) (Status: Vulnerable D2) and Sweet flag bulrush (Acorus calamus) (Status: Least Concern Ver 3.1).

The flora of Yerevan Floristic Region is comparably rich and specific (comprises 40% of the total flora of Armenia).The vegetation is mainly of xerophyle character. The major vegetation types include: friganoid, tragant steppe, artemisia formations, sparse open scrub-lands, and close to rivers swamps. The list of local endemics in Yerevan region is comprised of 12 species: Centaurea erivanensis (Lipsky) Bordz, C.fajvuschii Gabr., C.vavilovii Gabr., Et Takht., Cousinia armena Takht., Allochrusa takhtadjanii Gabr. Et Dittr., Astragalus holophyllus Boriss., Isatis bushiorm Hovh., Euphorbia vedica Chatshat, Acantholimon vedicum Mitz., Linum barsegianii Gabr. & Dittr., Salsola tamamschjanae Iljin.

The typical plant populations for the Project area are halophyll, gypsophila and psamophyll plants, oshinder-ephemeral, oshinder-cereal, oshider-ohsn and oshan and the typical

species are Salsola ericoides, Salsona cana, Calligonum poligonoides, Artemisia fragrans, Kochia prostrata, Teucriumpolium, Poa bulbosa.
Several visits were conducted for the proposed area to confirm and verify the probable presence and occurrence of important species of flora especially those listed in the Armenian Red Book. During the field visits in Segments S6-2, S7, S8-1, S8-2, S8-3 many wild plants from different families such as Fabaceae, Asteraceae, Rosaceae, Poaceae, Poligonace, Chenopodiace, Convolvulaceae, etc were identified but no rare or endangered species listed in the Red Book of Plants of RA which have national conservation significance were identified on site. The same result was recorded following studies of area occupancies of rare and endangered species. However, the fact that no plants listed in the Armenian Red Book were identified in project sites negates the necessity for mitigation measures to be taken for the protection of flora.

Road segments S6-1 and S6-2, which are located in Malatia Sebastia district, passalong a highly-modified urban area and many community trees and bushes. A total of 477 small to large community trees and 458 community bushes were recorded in all segments of the proposed area. Among those tree and bush species registered are: Elm, poplar, plane, ash, willow, oak, maple, red-cedar, common box, etc. The largest number of trees was recorded in segment S6-2 - 166 trees, and in segment S8-3 -152 trees. The size of trees is very different, starting from 3-4 cm (3 years old apple trees) to 60-65 cm (Elm and poplar trees). The two most represented tree species which were recorded in all proposed segments of the Road were Elm (223 trees) and Poplar (38 trees). For the quanitites of recorded plants and bushes please refer to Annex 1.

Thirty five trees of Platanus orientalis species (oriental plane) were recorded in the segment S8-3 on the left side of the beginning of Silikyan Highway. Platanus orientalis (oriental plane) was the only flora species recorded during the survey which is included in the Red Book of Plants of RA as an endangered species (EN B 1 ab (iii) + 2ab (iii)). It is also registered in The IUCN Red List of Threatened Species as a Lower Risk/least concern species.

There are homestead lands along segment S6-2 and S7 that might be affected during the works. The main fruit trees and berries that were studied during field visits which were grown in those lands are: apricot, peach, cherries, mulberry, walnut, different kinds of berries, etc. (for the most common list of fruits and berries grown on the homestead lands of the Project area please refer to Annex 3).

3.4 Impacts on Flora

The likely adverse environmental impacts on the flora as a result of construction works are expected to be localized and not large-scale. These may include, but are not limited to the following: cutting of trees and bushes, degradation of vegetation at the construction sites, soil erosion due to improper disposal of excavated soil. The study of baseline environmental data, site investigations and analyses revealed no major environmental impacts on flora to be likely caused by implementation of the proposed construction works. The Contractor shall refrain from destroying, removing or clearing trees, timber, scrub, crops and other flora to any extent greater than is being necessary for the execution of the works. During construction works measures necessary to prevent the disturbance of the biodiversity must be taken.

Impact on flora will be restricted with cutting of some trees and bushes and clearing of vegetation in the work area. A total of 477 small to large community trees and 458 bushes were counted along the Project area. As the design of the construction is in progress and the final design has not been finalized yet the number of affected trees and bushes can be changed and decreased following finalization of the design. The number of trees and bushes which will be affected by the works will be less than is envisaged.

3.5 Mitigation Measures

During the investigation it was confirmed that, there were no endangered flora species registered in the Red Book along the Project alignment except Platanus orientalis (oriental plane) which was recorded in segment S8-3. Even though 35 Platanus orientalis (oriental plane) was recorded in the Silikyan Highway of segment S8-3, the width of the section is quite wide and when the final design be finalized, it might not be necessary to remove those trees, but if later it be found out that the trees need to be removed, those trees can be easily replanted as they are quite young and healthy plants.
Where possible, community trees removed shall be replanted. The works of replanting of all kind of trees and bushes should be organized either in late autumn following leaf fall or in early spring. If trees are quite old or due to some other reasons the replanting can't be done some of them shall be cut down during road widening; they should be replaced with new trees and bushes at a ratio of 6:1.

The loss of private trees which are grown on the homestead lands (and any associated business loss) shall receive compensation within the scope of Land Acquisition and Resettlement procedures.

3.6 Recommendations

A. Following finalization of design works final survey should be carried out to:
   - identify which trees and bushes should be replanted and which should be cut down;
   - identify all trees and bushes which are located close to construction site and could be damaged by construction works;
B. Implement necessary measures to protect those trees and bushes from damage.
C. Keep a registrar where all the trees and bushes be numbered.
D. If rare or endangered species be identified during the works in the affected area necessary measures should be taken to protect them.
E. All possible measures should be taken to minimize the number of trees and bushes being affected. The minimal number of affected trees can be taken into account during the design phase of the project.

Annex 1

The Quantities of Recorded Trees and Bushes

NN	Name of trees and bushes	Sections						Total number
		S6.1	S6.2	S7	S8.1	S8.2	S8.3	
	Trees							
1	Field Elm	77	57		2		87	223
2	Silver poplar	6	8	3	15		6	38
3	Grey poplar (Canadian Poplar)	1						1
4	European sh	6	24		3	3	1	37
5	White willow		2	2	1		2	5
6	Caucasian oak	4						4
7	Norway maple		19				2	21
8	Oriental plane						35	35
9	Apricot	2	1				3	6
10	Ailanthus		6					6
11	Silver berry				2			2
12	Common almond	1					1	2
13	Caproniana cherry	2	2					4
14	Common plum (Garden plum)		1		5		4	10
15	White mulberry	1	11		7			19
16	Domestic apple		27					27
17	Sweet cherry						11	11
18	Siberian fir	2						2
19	Eastern red-cedar	14	8					22
Total trees		*116*	*166*	*5*	*35*	*3*	*152*	*477*
	Bushes							
1	Grapevine		12					12
2	Thuja occidentalis	6					8	14
3	Dog rose				37			37
4	Common Box	300					60	360
5	Rose	5	22					27
6	European Goosberry						2	2
7	Sea buckthorn				6			6
	Total bushes	311	34	0	43	0	70	458

Annex 2

The Complete List of Recorded Plants and Bushes

NN	Latineren/Latinum	Հայերեն անվանումը/Armenian	Անգլերեն անվանումը/English
1	Ulmus foliacea.	Թեղի Տերևաշատ.	Field Elm
2	Populus alba L	Բարդի սպիտակատերև	Silver poplar
3	Populus canadensis	Կանադական բարդի	Grey poplar (Canadian Poplar)

4	Fraxinus excelsior L.	Հացենի սովորական	European sh
5	Salix alba L.	Ուռենի Սպիտակ	White willow
6	Quercus macranthera	Կաղնի սովորական	Caucasian oak
7	Acer platanoides	Թխկի	Norway maple
8	Platanus orientalis L.		Oriental plane
9	Armeniaca vulgaris (Prunus armeniaca)	Ծիրանենի սովորական	Apricot
10	Ailanthus altissima	Այլանթ բարձրաբուն	Ailanthus
11	Elaeagnus angustifolia L.	Փշատենի	Silver berry
12	Amygdalus communis	Նշենի սովորական	Common almond
13	Cerasus vulgaris Mill.	Բալենի սովորական	Caproniana cherry
14	Prunus Domestica L.	Սալորենի տնային	Common plum (Garden plum)
15	Morus Albra L.,	Թթենի սպիտակ	White mulberry
16	Malus domsetica	Խնձորենի սովորական	Domestic apple
17	Cerasus Avium	Կեռասենի սովորական	Sweet cherry
18	Thuja occidentalis	Թույա արևմտյան	Nothern white cedar
19	Juniperus virginiana	Վիրգինյան գիհի	Eastern red-cedar
20	Abies sibirica	Եղևնի սիբիրական	Siberian fir
21	Vitis Vinifera	Խաղող	Grape vine
22	Rosa canina	Մասրենի Սովորական	Dog rose
23	Búxus sempervírens	Տոսախ մշտադալար	Common Box
24	*Rosa*	Վարդենի	Rose
25	Grossularia relinata	Կոկռոշենի սովորական	European Goosberry
26	Hippophaë rhamnoides L.	Չիչխան սովորական	Sea buckthorn

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Annex 6: Fauna assessment

Preliminary report of survey of fauna along highways

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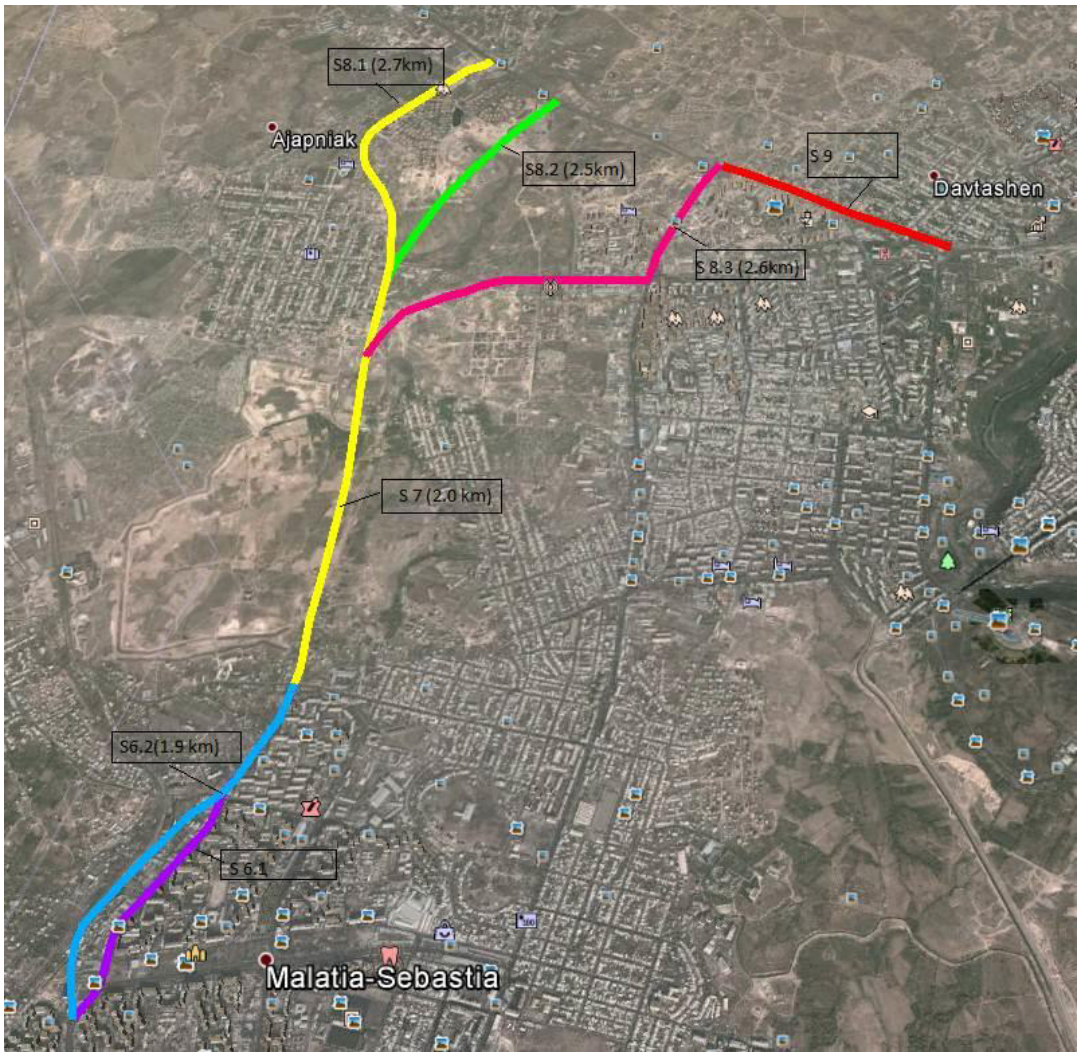
Preliminary survey of fauna along of offered parts of highway was implemented on June 15-17. All sections (S6.1, S6.2, S7, S8.1, S8.2, S8.3) of highway were studied. According to suitable habitats for animals the main important part were S7 and the beginning part of S 8.3. The standard methodology of zoological researches were used to survey and census of the different species of animals. The studied area situated in the semidesert zone where have been found typical for this landscape animals.



Methodology.

Observation and collection of the invertebrate have been made over 3 days period.
The diurnal field survey time was divided between different parts of roads.
Weather conditions during the survey were sunny and warm.
Invertebrates were recorded using the techniques grubbing at ground level, turning over stones, as well as a direct observation. Mollusks were collected from the upper layer of soil and from

vegetation.
Survey methods for vertebrates were chosen based on their appropriateness for targeted species, efficiency, and the time required to complete them. We used different methods, following the standard methodology (Формозов, 1951,1976; Новиков,1953; Приедниекс, 1990, Хейеридр,2003). Traps for small mammals were installed in a grid pattern, surrounding areas along highway. It should be noted that additionally to immediate observations of birds and mammals it was also survey the traces of activities of animals. Active searches were used extensively to survey for a variety of animals. Suitable or preferred habitats for each species were searched and the animal was to be encountered. The method involved traveling in an area (walking or driving permanent transects) while recording all animals seen or heard. Most bird surveys were accomplished using this approach; the preferred habitat of each species was searched visually (using optics) and auditorially for their presence. We also recorded the presence of traces, dens and other products of life of animals. The traces of animals are conventionally subdivided into groups.

1. Traces related to nourishment of animals
2. Relics of animals' life
3. Dens
4. Refuges

During the route counts the starting point and the trajectory of the route are recorded by a GPS device. We recorded all locations where animals, their dens and permanent resorts were noted. Information on trapped or observed animals was recorded on data sheets. This information was subsequently logged into a computerized data base maintained in the Excelm' format. When possible, specimens were photographed.

RESULTS

Invertebrates.
The survey identified a limited number of species of invertebrate in the area along the section S7 (Table 1). None of the species found are listed in Red Data Book of Armenia.
Table 1

Vertebrates.
Amphibians. There were recorded two species of amphibians – the green toad (*Bufus viridis*) and the marsh frog (*Pelophylax ridibundus*) were found in dirty pool in the first part of section S 8.3. (Table 2)
Reptiles. The surveys confirmed the presence of three species of reptiles (*Pseudopus apodus, Darevskia raddei, Hemorrhois nummifer*) in the area adjacent to S8.3 were observed. These species are the common reptiles for Armenia (Table 2).

Table 2. List of amphibian and reptiles

Family	Species	Red Data Book of RA	IUCN
Bufonidae	*Bufus viridis*		LC
Ranidae	*Pelophylax ridibundus*		LC
Anguidae	*Pseudopus apodus*		
Scincidae	*Eumeces schneideri*		
Lacertidae	*Lacerta strigata*		LC
Lacertidae	*Ophisops elegans*		
Lacertidae	*Darevskia raddei*		LC
Typhlopidae	*Typhlops vermicularis*		
Colubridae	*Hemorrhois nummifer*		

Colubridae	*Dolichophis schmidti*		
Colubridae	*Eirenis collaris*		LC
Colubridae	*Eirenis punctatolineatus*		LC
Colubridae	*Telescopus fallax*		LC
Colubridae	*Natrix tessellata*		
Viperidae	*Macrovipera lebetina*		

Birds. During our field observations at the S7, S8.3 15 species of birds were registered, where one of them *Larus armenicus* crossing this area only for feeding is listed in the Red Book of Armenia (Table. 3).

Table 3. List of Birds

Family	Species	Red Data Book of RA	IUCN
CICONIIDAE	*Ciconia ciconia*		LC
LARIDAE	*Larus armenicus*	VU	LC
APODIDAE	*Apus apus*		LC
MEROPIDAE	*Merops apiaster*		LC
UPUPIDAE	*Upupa epops*		LC
ALAUDIDAE	*Galerida cristata*		LC
HIRUNDINIDAE	*Hirundo rustica*		LC
HIRUNDINIDAE	*(Hirundo) Ptyonoprognerupestris*		LC
MOTACILLIDAE	*Motacilla alba*		LC
TURDIDAE	*Oenanthe hispanica*		LC
CORVIDAE	*Pica pica*		LC
CORVIDAE	*Corvus monedula*		LC
CORVIDAE	*Corvus corone*		LC
PASSERIDAE	*Passer domesticus*		LC
FRINGILLIDAE	*Carduelis carduelis*		LC

Mammals. Species list of mammals at S7 and a first part S8.3 was made basing on the analysis of our studies (Table 4).

Table 4. List of mammals

Family	Species	Red data Book of RA	IUCN
Erinacedae	*Erinaceus concolor*		LC
Soricidae	*Crocidura gueldenstaedti*		
Vespertilionidae	*Pipistrellus kuhli*		LC
	Pipistrellus pipistrellus		LC
Leporidae	*Lepus europaeus*		LC
Canidae	*Vulpes vulpes*		
Gliridae	*Dryomys nitedula*		LC
Allactagidae	*Allactaga elater*		LC
Cricetidae	*Cricetulus migratorius*		LC

	Microtus socialis		LC
Muridae	*Sylvaemus witherbyi*		LC
	Rattus norvegicus		LC

Since the studies were carried out during the daytime, many species of mammals could not be met, as well as the carnivores and animals inhabited in burrows are the night species. This prevents to carry out the registration. This is related also to the representatives of Chiroptera, which can to reside far of the investigated area, but come to this area during nutrition. Among 12 species mentioned in the literature 6 species were observed visually. According to the literature data and also our researches, none of the species of mammals are rare and need special protection.

Suggestions

Analyzing of collected data we suggest to use grid with small cells 70sm high along the highway of part S7 and (S 8.3 about 3km). Beside this we also suggest to make passages for small mammals along the highway (part S7) for giving them a chance to pass the road safely.

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Supplement

Research place S7

Invertebrates

Buthus eupeus

Acrida bicolor

Vertebrates

Pseudopidalea viridis

Pelophylax ridibundus

Hemorrhois nummifer

Pseudopus apodus

Galerida cristata

Pica pica

Oenanthe hispanica ♂

Oenanthe hispanica ♀

Upupa epops

Hirundo rustica

Larus armenicus

Motacilla alba

Sylvaemus witherbyi

Crocidura gueldenstaedti

Erinaceus concolor

Annex 7: Archeological Investigation

Final Report of the Archaeological investigations along the potential alignment of the Tranche 2

Section 6: Babajanyan-Tichina, Section 7: Tichina-Silikyan, Section 8.1: Vahagni ,Section 8.2: Vahagni 2, Section 8.3: Silikyan-Melkumov

Boris Gabrielyan
Archeologist consultant
28.06.2014

The assessment and management of the cultural heritage within the project's area is a priority and it is considered prudent to include the services of an archaeologist. The objective of the services is to:

1. Identify potential impacts of the proposed projects on physical cultural resources (PCR) - movable or immovable objects, sites, structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or cultural significance;

2. Provide archaeological input to the respective initial environment examination (IEE) or environmental impact assessment (EIA) reports, each including an environmental management and monitoring plan (EMP), which will be prepared by a consultancy on behalf of YM, the executing agency (EA);

For the implementation of the undertaken tasks the following type of studies has to conducted:

a) Preliminary desk study – Collection of information about the archaeological sites and historical monuments from unpublished (archival) and (published) literary sources, their identification with the list of the archaeological and historical monuments of the Yerevan province (State list of the Historical and Cultural Immovable Monuments of the Republic of Armenia, Yerevan Province).

b) Fieldwork activities including systematic and intensive survey – Field investigations to be carried out in the separated areas of the future construction activities, fixed on the engineering maps and construction projects. Record and fixation of the archaeological situations, i.e. structures, collection of surface finds, study of sections etc., for understanding the boundaries and spread of the cultural layers and their relationship with the area planned under future construction activities.

c) Suggested solutions based on the legislation and other regulation documents, acts to bring to minimum the possible damage, and potential destruction of the archaeological

site or historical monument or the PCR. Potential impacts of the proposed projects on PCR - movable or immovable objects, sites, structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or cultural significance is identified. As the main regulation the Law on Preservation and Utilization of Immovable Monuments of History and Culture and of the Historic Environment (adopted on the 11 of November 1989) (http://www.parliament.am/legislation.php?sel=show&ID=1641&lang=arm) was used.

The area of the future road construction is situated on the foothills of the Ararat Depression, having around 900-1000 m elevation above the sea level. Experience from archaeological studies in the regional perspective is showing that the foothills were among the most important ecological niches occupied during the Stone Age and intensively exploited by Bronze-Iron Age populations of Armenia. Our desk study of the alignment of the road is showing areas not used under habitation activities, which can have some archaeological potential. Also study of the State list of the Historical and Cultural Immovable Monuments of the Republic of Armenia, Yerevan Province reveal a record of a Bronze-Iron Age settlement and tomb field in the area of Silikyan block of the Ajapnyak district of Yerevan (catalog number 1.1.2 and 1.1.2.1 - 2.1.1, 2.1.2 and 2.1.3), where the road is planned to be built. Fieldwork activities were required to organize a survey by a small team of archaeologists along the potential alignments to identify weather there are archaeological monuments directly affected by the proposed design, which will determine the future scope of works and/or exclude any archaeological component during the project's implementation.

A reconnaissance survey along the potential alignment of the road was conducted at 25.06.2014. The area of the alignment was divided into three conventional sub-areas – Area1, Area 2 and Area 3 (see Map). Judging from the Google image of the area reflecting the alignment of the potential road Area 1 is out from the archaeological interest, because of being heavily urbanized sector. This observation was confirmed by survey results, where the potential alignment is passing in parallel with railroad along houses and gardens with lots of soil transportation and agricultural activity. The Area also is partly including an urban sector of the Malatia-Sebastia block of Yerevan. Area 2, which is passing through the chain of hills south from the Ajapnyak block of Yerevan, has a portion, which seems to have potential archaeological interest. Our survey showed that the natural surface of the area was totally under long term use of agricultural activities, where traces of former grape gardens are still visible. No any external signs of archaeological sites or separate features are visible (Image 1-3). Area 3 which is located between the old and new Silikyan highways was heavily distracted through work of mechanisms, where at least around 1.5-2 m of the original sediments were moved opening the fluvio-glacial origin Pleistocene layers and the basalt bedrock. Nowadays it

is a garbage area, which is fully out of any archaeological significance (Image 4).

Conclusive remarks - The reconnaissance survey along the proposed alignment of the road construction showed that no archaeological barriers are present in the study area, which means no visible features of sites exist because of urbanization, construction and agricultural activities. The archaeological sites presented in the State list of the Historical and Cultural Immovable Monuments of the Republic of Armenia, Yerevan Province are located far away and can't be affected by the construction activities. Only possible recommendation as a mitigation measure can be required in Area 2 as following: to propose a short monitoring by an archaeologist during excavations works of the construction activities as a possible chance find procedure.

Boris Gasparyan

National Archaeological expert

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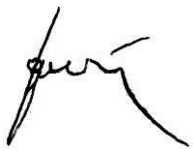
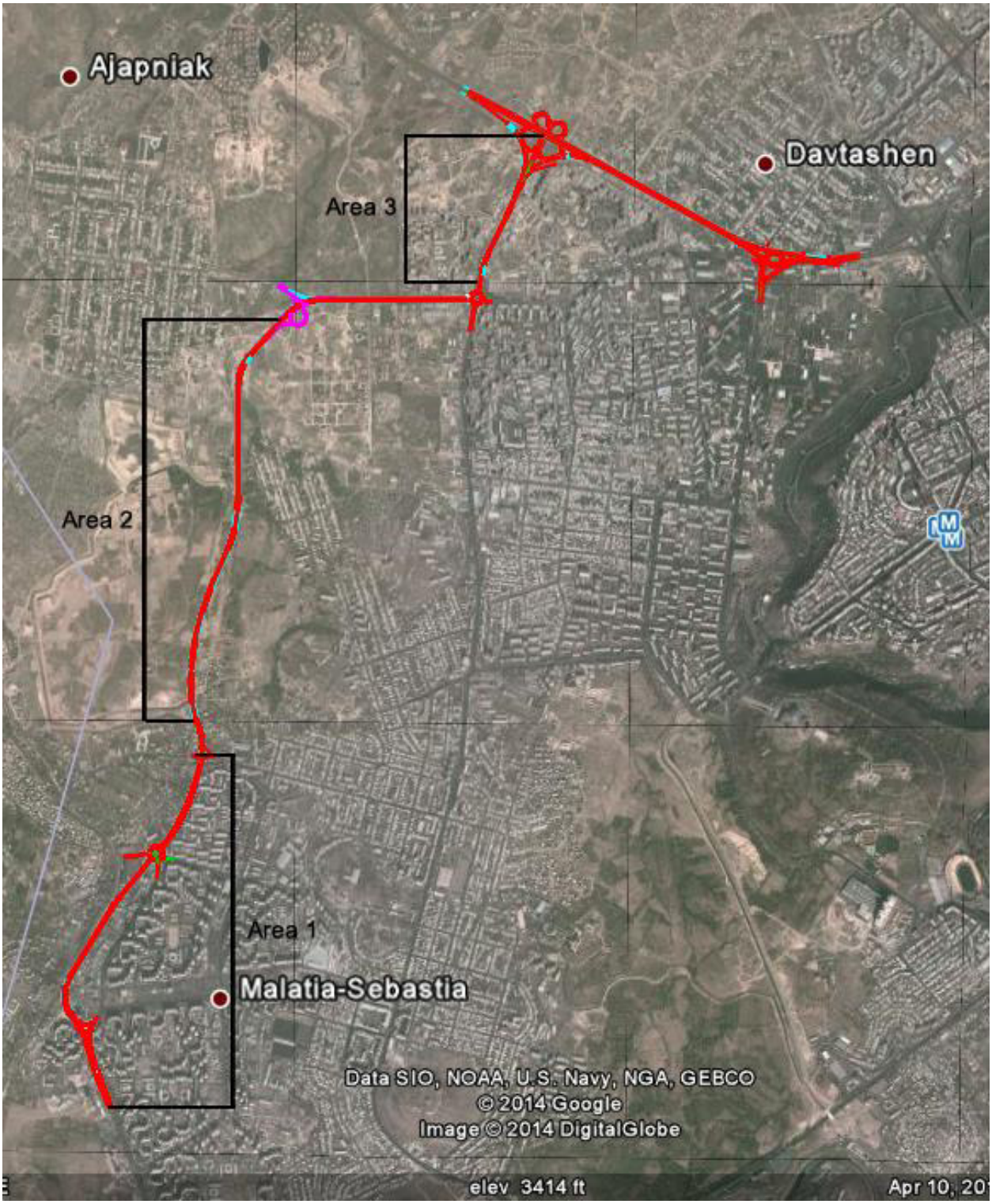


MAP



The future highway alignment design divided into three conventional areas

Image 1. Main view of the Area 2 from north

Image 2. Main view of the Area 2 from north

Image 3. Main view of the Areas 1 and 2 from north (from the Silikyan old highway)

Image 4. Main view of the Area 3 from south (from the Silikyan old highway)