

Initial Environmental Examination

May 2015

ARM: Sustainable Urban Development Investment Program –Tranche 2

Construction of Road Links of the Yerevan Western Ring Road
Road Link for Davitashen-Ashtarak highway

Prepared by the Yerevan Municipality for the Asian Development Bank.

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REPUBLIC OF ARMENIA



YEREVAN MUNICIPALITY

CONSTRUCTION OF ROAD LINKS OF THE YEREVAN WESTERN RING ROAD Sustainable Urban Development Investment Program Tranche 2

Road link Davitashen-Ashtarak highway



Initial Environmental Examination

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ABBREVIATIONS

ADB	Asian Development Bank
AM	Accountability Mechanism
AP	Affected Person
BOD	Biochemical oxygen Demand
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERT	Emergency Response Team
HSE	Health, Safety & Environment
IA	Implementing Agency
IEE	Initial Environmental Examination
IFI	International Financial Institution
IMF	International Monetary Fund
IUCN	International Union for Conservation of Nature
LARP	Land Acquisition and Resettlement Plan
MFF	Multi-tranche Financing Facility
MNP	Ministry of Nature Protection
MOC	Ministry of Culture
MOE	Ministry of Economy
MENR	Ministry of Energy and Natural Resources.
MPC	Maximum Permissible Concentration
NGOs	Non-government organizations
NO	Nitrogen oxide
NO ₂	Nitrogen Dioxide
NPE	Nature Protection Expertise
PIU	Project Implementing Unit
PPTA	Project Preparatory Technical Assistance
RA	Republic of Armenia
RAMSAR	Ramsar Convention on Wetlands
REA	Rapid Environmental Assessment (checklist)
SEI	State Environmental Inspectorate
SEMP	Site-Specific Environmental Management Plan
SNCO	State Non-commercial Organization
SO ₂	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) Multitranchise Financing Facility (MFF). A matter of policy of the Bank requires that all projects supported and to be funded by the ADB must comply with the requirements of the Safeguard Policy Statement (SPS, 2009). Under the SPS 2009, an environmental assessment report is required for all environment category "A" and "B" projects. Its level of detail and comprehensiveness is directly related with the significance of potential impacts and risks to the environment. A project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. In that case a full Environmental Impact Assessment (EIA) is required. A project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A. In that case an Initial Environmental Examination (IEE) is required.

2. The Initial Environmental Assessment activities for the "Davitashen Bridge to Ashtarak Highway Upgrade (Project 1)" were carried out by the Project Preparatory Technical Assistance (PPTA) consultants for the whole Project. The PPTA consultants visited the Project's site and also carried out public consultation prior to preparation of the report. They concluded that the Project can be classified as a category B project. (See also section A.2 below. Based on the REA Checklist, Road link Davitashen Bridge - Ashtarak Highway sections classified as a Category "B" by ADB). Consequently PPTA prepared an IEE report for the Davitashen Bridge - Ashtarak Highway section.

3. It must be noted that the IEE report for the Project as prepared by the original PPTA consultants was lacking full conformity with ADB's SPS 2009, and with the Environmental Assessment and Review Framework (EARF, 2015). It is also incomplete with respect to the RA's law on Environmental Impact Assessment and Expert Examination (July 22, 2014). As well as provided environmental information in the draft IEE (July, 2010) is outdated and needs of updates.

A.2. Screening and Classification

4. Davitashen - Ashtarak Highway Road link under the SUDIP have been screened to determine its environmental category with the ADB's Rapid Environmental Assessment Checklist (REA). A REA checklist completed by the PPTA consultants is attached as Annex 1 of this report. The classification was based on the most environmentally sensitive component of the Road links, which means that if one part of a project has the potential for significant adverse environmental impacts, then the Road links are to be classified as environmental category "A" regardless of the potential environmental impacts of other aspects of the Road links. Based on the REA Checklist, Davitashen - Ashtarak Highway Road link is classified as a Category "B" by ADB. At the same time according to the new Armenian EIA legislation if the road section has continuous length of 10 km or more than an EIA report should be prepared to meet requirements of Armenian legislation. As the total length of this road section is 2.4 km so an EIA report according to Armenian legislation is not needed. This final IEE report has been prepared to meet ADB SPS (2009) police requirements.

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

a) Public Consultation and Participation

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

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

- (i) Ministry of Economy – the Executing Agency:
 - Department of Economic Development Policy
- (ii) Municipality of Yerevan – the Implementing Agency:
 - Yerevan Municipality Project Implementation Unit (YMPIU)
- (iii) Ministry of Nature Protection;
 - Biodiversity Policy Division
 - Water Resources Policy Division
 - Atmospheric Air Policy Division
- (iv) Ministry of Culture:
 - Agency for Protection of Historical and Cultural Monuments
 - Department of Cultural Heritage
- (v) Non-government organizations (NGOs) such as:
 - Public Environmental Alliance (an alliance of NGOs)
 - Association for Sustainable Human Development

7. A public consultation event to disclose the initiative and to present the Project in the PPTA stage took place on 19 March 2010 at Yerevan Municipality. An advertisement was placed in the Haykakan Jamanak newspaper and on the YMPIU website, as well as invitations were sent directly to key stakeholders. Amongst the attendees were fifteen recorded participants, including representatives of relevant government agencies and NGOs, as well as those from general public (See Annex 2). As quite a long time has been passed from the first public consultation another Public consultation has been organized on 5 May 2015 after the updates of IEE report to fully comply with the ADB policy requirements on Public Consultation and Information Disclosure. A public consultation event to disclose the initiative and to present the Project took place at Yerevan Davitashen community, in N189 School. An advertisement was placed in the Hayastani Hanrapetutyun newspaper and on the YMPIU website, as well as invitations were sent directly to key stakeholders through Yerevan Aarhus center network. Amongst the attendees were nineteen recorded participants, including representatives of relevant government agencies and NGOs, as well as those from general public (See **Error! Reference source not found.** May 2015).

b) Information Disclosure

8. The ADB SPS's (2009) 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.

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

Heritage among others and with several NGOs.

10. 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);
- (iii) Bi-annual reports.

A.4. Grievance Redress Mechanism

11. 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 **Error! Reference source not found.**). 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

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

- (i) Gathering of baseline information on the physical, biological, and socio-economic environment of the Project area and understanding the technical, social, and institutional aspects;
- (ii) Discussions with officers of RA Ministry of Nature Protection, Ministry of Culture, 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 Structure of this IEE 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.

14. The report will be also prepared in Armenian language for posting on the website of the YMPIU.

15. Baseline data and other information were obtained from field visits and surveys, as well as from published and unpublished sources including climate, topography, geology and soils, natural resources 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.

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

A.6. Tasks and Accomplishments

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 Environmental Assessment is prepared in compliance with the requirements of the Government of Armenia and ADB, and that adequate consultation with affected people is undertaken in accordance with ADB requirements.	The initial IEE report was prepared by the PPTA consultants and a Public consultation was conducted on 19 March 2010 in the Municipality of Yerevan. The second Public consultation took place on May 05, 2015 to introduce findings of updated IEE.
(iii) Undertake review of the initial IEE report and EMP to ensure their compliance with the requirements of the Government of Armenia and ADB.	The initial IEE report and EMP were reviewed and updated by the Engineer to comply with the requirements of the Government of Armenia and ADB. The updated IEE report has been identified in accordance with ADB SPS (2009) requirements.
(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.	As according to the new law on "Environmental Impact Assessment and Expertise " adopted on the 22 July, 2014, "A" category projects include "construction or reconstruction of new roads with four and more lanes or upgrading of roads with maximum two lanes to four lanes in case the

Task	Response/Action taken
	relevant section has continuous length of 10 km or more" an EIA report should be prepared As this project are all less than 10km (2.4km) therefore no EIA is required but an update of the IEE according to ADB SPS requirements.
(v) Submit to ADB the IEE report of 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, YMPIU website. Armenian versions of the IEE report and the EMP will be disclosed on YMPIU official website.
(vi) Ensure that the EMP, including relevant mitigation measures that need to be addressed during the construction stage by the contractor, is included in the bid and contract documents.	The environmental specialists in the YMPIU will coordinate with the Engineer to ensure that all EMP requirements are included in the bid and contract documents.
(vii) Ensure that contractors have access to the IEE and EMP reports of the Project.	The YMPIU shall provide the contractors with the bid documents with a copy of the IEE report and EMP of the Project.
(viii) Ensure and monitor that an EMP, including an environmental monitoring plan, will be properly implemented.	The YMPIU and the Engineer will regularly - monitor construction activities to check the compliance to EMP and monitoring plan.
(ix) In case of the Project constraints need to be adapted during implementation, review the environmental classification, revise it accordingly and identify whether a supplementary IEE study is required.	An additional IEE or EIA shall be carried out in case of major changes in alignment and ROW take place in the Project design after the environmental expertise conclusion is granted.
(x) Submit bi-annual environmental reports to ADB.	The YMPIU will submit environmental bi-annual reports to ADB.

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

B.1. ADB Environmental Assessment Requirements

18. The Safeguard Policy Statement (2009) sets the requirements of environmental assessments for all projects supported by the ADB. At an early stage of project preparation, the policy also requires that the Project's potential risks and their significance are to be identified through the consultation and communication of stakeholders represented by the Davitashen and the Achapniak 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 **Error! Reference source not found.** and **Error! Reference source not found.**.

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 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. The law provides the list of proposed activities by categories subject to environmental impact expertise and also provides 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. The EIA Law specifies notification, documentation, public consultations, and appeal procedures and requirements.

26. Despite that the law introduces many improvements over the previous law there is 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.

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

- (i) Law on Specially Protected Areas (1991) outlines the procedures for establishing protected areas and their management. The Law defines four categories of protected areas in RA: (i) State Reserves; (ii) State Reservations; (iii) National Parks; and (iv) Nature Monuments.
- (ii) Law on the Protection and Use of Fixed Cultural and Historic Monuments and Historic Environment (1998) provides the legal and policy basis for the protection and use of such monuments in Armenia and regulates the relations among protection and use activities. Article 15 of the Law describes procedures for - amongst other things - the discovery and state registration of monuments, the assessment of protection zones around them and the creation of historic-cultural reserves. Article 22 requires the approval of the authorized body (Department of Historic and Cultural Monuments Preservation) before land can be allocated for construction, agricultural and other types of activities in areas containing monuments. The Ministry of Culture has jurisdiction over archaeological, historical, and cultural sites. It is not, however, involved with the fate of modern monuments erected along the highway by private citizens in commemoration of accident victims. The relocation of those monuments will be coordinated by the respective provincial authority (*marzpedts*).
- (iii) Law on Flora (1999) and Law on Fauna (2000) outline Armenia's policies for the conservation, protection, use, regeneration, and management of natural populations of plants and animals, and for regulating the impact of human activities on biodiversity. These laws aim for the sustainable protection and use of flora/fauna and the conservation of biodiversity. The laws provide for assessing and monitoring species, especially rare and threatened species.
- (iv) Law on Atmospheric Air Protection (1994 and last amended in 2007) regulates the emission licenses and provides maximum allowed loads/concentrations for atmospheric air pollution, etc. There is secondary legislation that establishes sanitary norms for noise in workplaces, residential and public buildings, residential development areas, and construction sites.
- (v) Land Code (2001) defines the main directives for use of the lands allocated for energy production, water economy (water supply, water discharge, pumping stations, reservoirs, etc.), and other purposes. The Code defines the lands under the specially protected areas as well as forested, watered, and reserved lands. It also establishes the measures aimed at protection of the lands as well as the rights of state bodies, local authorities, and citizens towards the land.
- (vi) Code on Underground Resources (2002) contains the main directives for use and protection of mineral resources and underground water, including the sanitary protection zones for the underground water resources.
- (vii) Water Code (2002) provides the legal basis for the protection of the country's water resources, the satisfaction of water needs of citizens and economic sectors through effective management of water resources and safeguarding the protection of water resources for future generations. The following regulations and procedures of the Water Code (2002) are relevant: (a) permitting procedures, (b) environmental flows, (c) drainage water, (d) water alternative accounting, (e) access to information on trans-boundary water, (g) reservation of underground water sources, (h) registration of documents in state water cadaster, and (i) public awareness and publicity of the documents developed by WRMA and other normative

- documents which provide guidelines directly linked with water and environmental issues.
- (viii) Law on Wastes (2004) provides the legal and economic basis for collection, transportation, disposal, treatment, and re-use as well as prevention of negative impacts of waste on natural resources, human life, and health. The law defines the roles and responsibilities of the state authorized bodies in the waste sector.
 - (ix) Law on Environmental Oversight (2005) regulates the issues of organization and enforcement of oversight over the implementation of environmental legislation of Armenia and defines the legal and economic bases underlying the specifics of oversight over the implementation of environmental legislation, the relevant procedures, conditions and relations as well as environmental oversight in Armenia. The existing legal framework governing the use of natural resources and environmental protection includes a large variety of legal documents. Government resolutions are the main legal implementing instruments for environmental laws. The environmental field is also regulated by presidential orders, Prime-Minister's resolutions, and ministerial decrees.

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

29. 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 IEE 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,	28 Apr 1999	01 Oct 1999

1985)		
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 Program 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

30. 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

31. 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

32. 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

33. 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

34. Engineer's key responsibilities include:

- (i) update or prepare the final Environmental Impact Assessment (EIA) or Initial Environment Examination (IEE) as applicable, along with the relevant Environment Management and Monitoring Plan (EMP), and other documents as required;
- (ii) submit the updated EIA/IEE, EMP and EARF for the MNP (if applicable), YM and ADB's review and approval;
- (iii) 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 it; and
- (iv) apply for and get a positive environmental expertise conclusion if needed from the Environmental Expertise of the RA Ministry of Nature Protection for the EIA/IEE report and EMP as prescribed by the Armenian legislation (including, agreement on route with the RA Ministry of Culture, etc.).

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

- (i) supervise and monitor construction of the Project including the implementation of the Site Specific EMP;
- (ii) ensure that all work associated with the Project are carried out in full compliance with the designs and specifications and following international engineering and quality standards;
- (iii) manage contract changes, contractor claims and scope revisions;
- (iv) monitor the Project performance, benefits and ensure compliance with all social requirements; ensure that resettlement and environmental requirements, road safety, health & safety and monitoring are carried out in compliance with the relevant safeguards documents, the ADB safeguards policy and the applicable laws of Armenia;
- (v) liaise with government and municipal authorities, program management Consultants, NGO's, civil society, and other stakeholders concerned with the Project implementation to carry out proper consultation;
- (vi) ensure that the construction contractor prepares the detailed site specific EMP;
- (vii) report to YMPIU.

f) Contractors

36. 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 and the EMP report, update the SEMP during the construction when needed and obtain the Engineer approval of the updated part;
- (ii) hire the services of one Environment Specialist and one Health& Safety specialist or Environmental Specialist with back ground in Health and Safety as defined in the tender document;
- (iii) implement the SEMP as a special part of the contract and particular conditions; coordinate with the Engineer for the implementation of the various components of the EMP including monitoring;

- (iv) in cases of emergencies and accidents or extraordinary situations notify the Engineer and the relevant emergency authorities immediately;
- (v) obtain permits and approvals from relevant agencies and provides copies to Engineer;
- (vi) report on EMP as specified in Annex 3.

g) Asian Development Bank

37. ADB may carry out periodic project reviews, inspections and supervision of the Project throughout the Project cycle in conformity with the principles and requirements embodied in the SPS 2009. ADB will provide assistance to the YM in managing the social and environmental impacts and risks, thus contributing to the promotion of the long term sustainability of investments. To achieve this ADB will ensure that YM comply and adhere to the social and environmental safeguard requirements during project preparation and implementation.

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

39. 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 on no-objection basis;
- (iii) Discloses IEEs/ 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 two annual environmental review missions for environment category "A" and one mission for category "B" projects.

40. The government agencies and their roles that could be involved in the Project implementation are as follows:

h) Ministry of Nature Protection

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

- (i) The 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.

42. 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.

43. The Article 14 of the new law on "Environmental Impact Assessment and Expertise " (22 July, 2014 for "A" category projects that include "construction or reconstruction of new roads with four and more lanes or upgrading of roads with maximum two lanes to four lanes in case the relevant section has continuous length of 10 km or more" an EIA should be submitted to MNP for the expertise. As Davitashen - Ashtarak highway road link length less than 10 km (2.4 km) there is no requirement for positive conclusion of EIEC.

44. 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

45. 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.

46. 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.

47. 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

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

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

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

C. DESCRIPTION OF THE PROJECT

C.1. Type of Project

50. The “Sustainable Urban Development Investment Program” (SUDIP) will be implemented over a period of 9 years. The Program is aimed to improve the urban transport system in Yerevan.

51. The Program has been developed to complement the urban master plan of Yerevan City to promote a sustainable, integrated and cost efficient urban transport system. In the short term, the main objective is to complete the missing road links of the western urban ring.

52. Several road projects will help to divert through-traffic around the city centre. In the midterm, the other missing sections of the western bypass will be constructed namely: Babajanyan - Ashtarak Highway and Davitashen - Ashtarak Highway; and Argavand-Shirak road link.

53. The Government of Armenia through the request from the Yerevan Municipality has received a loan from the Asian Development Bank (ADB) to finance the SUDIP. The SUDIP will be funded through the multitranches financing facility (MFF) of the ADB.

54. This project falls under the Tranche 2 projects that include the following sections:

- Argavand Highway – Shirak Street
- Davitashen - Ashtarak Highway (object of this document)
- Babajanyan - Ashtarak highway

C.2. Location of the Project

55. The project site is located in RA capital of Yerevan. The project is located in the administrative Districts of Davitashen and Ajapniak. The proposed 2.4 km road section would extend the Eghvard highway to intersection of Halabyan St. in the area of Republican Hospital and Davitashen Village. From Davitashen Village it would pass parallel to Melkumov Street before reaching the intersection of Melkumov Street and Chaushi Street. The project design also foresees the construction of a two-level transport interchange. See figure C-1.

Figure C-1 - Location of the project

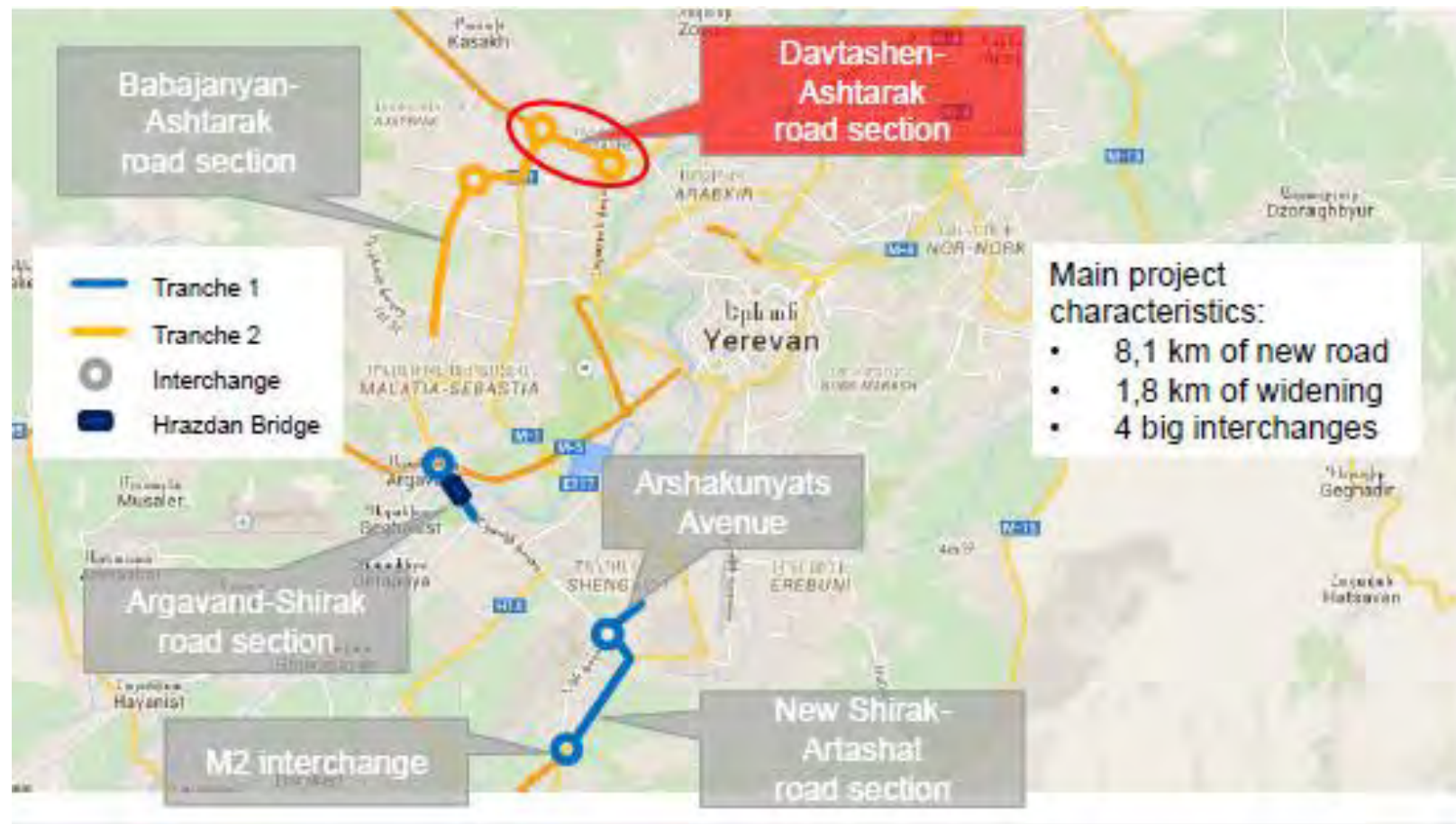


Figure C-2 - Layout Overview-



C.3. Description of the Works

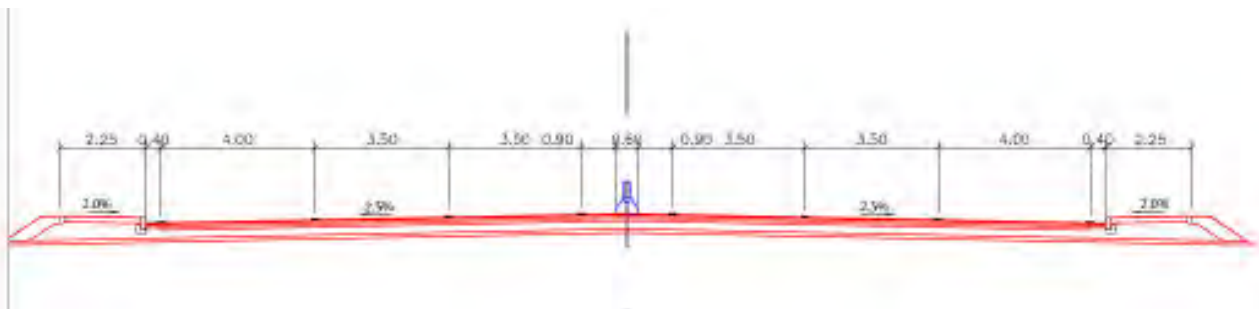
56. The Section envisages a construction of a new dual 3 lanes divided road with a central reservation of 2.4m including a single central concrete crash barrier.

57. Both carriageways are planned with two lanes at 3.50m and one at 4.0m with a footpath of 2.25m.

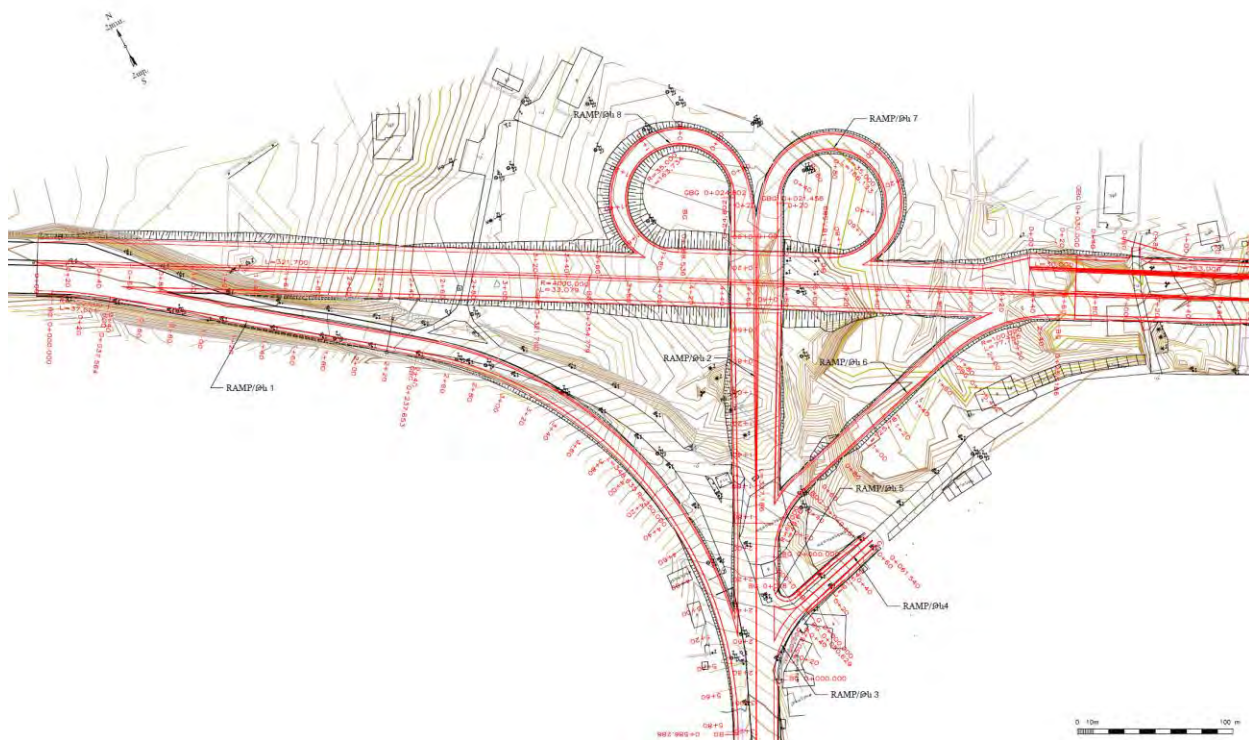
58. It also includes for the construction of 2 grade separated interchanges with 2 overpasses.

59. The works also foresee the diversion of utilities and creation of accesses.

Figure C-3 - Typical cross section



Figures C-3 - detail layouts





C.4. Magnitude of Operation

60. This Road link is part of a program of road section upgrades to complete the Yerevan western bypass, aiming to divert through-traffic around Yerevan's City centre, which will improve traffic flow and reduce congestion on local roads. Presently vehicles from Ashtarak and cities to the West of Yerevan bound for the Northern suburbs need to travel through residential neighborhoods of Yerevan. The proposed road link will change the flow of traffic from radial to tangential relative to the City centre.

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

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

D.1. Physical Resources

a) Climate, Air Quality, Noise & Vibration

62. **Climate** - Yerevan experiences a continental climate, with hot and dry summers and moderately cold winters with unstable snow coverage. The average annual air temperature is 11.5°C, whilst the average low is -2.9°C in January and the average high of 24.5°C is in July. Extreme temperatures range from -30°C to 40°C. Humidity is generally low with 49%-53% in summer and 70%-77% in winter. Average annual precipitation is 353mm, with the highest level in May at 55mm and the lowest in August at only 8mm. The prevailing wind direction is northeast.

63. **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.

64. According to the Yerevan Master Plan, the Project is located in a zone of permissible and moderate air pollution.

65. 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 2000 m east from Project area.

66. 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.

67. 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.

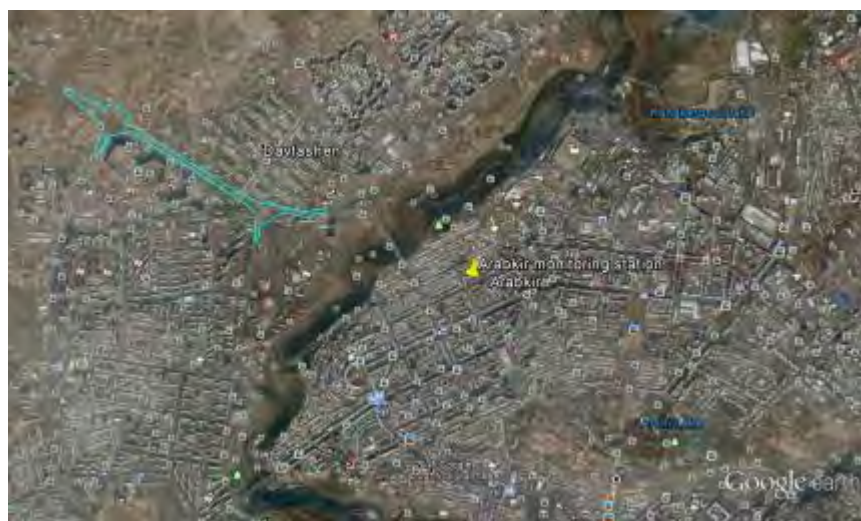
68. Results providing from MNP Air Quality Monitoring Station located at Arabkir confirm what is presented in Yerevan Master Plan: the average Air Quality of the Project's area is close to permissible concentrations.

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 (SO ₂)	0.05	0.04	0.04	0.02	No data	0.02	0.03	0.05	0.05
Nitrogen Dioxide (NO ₂)	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.									

69. 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.

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



70. **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 LAeq dBA	Maximum Level of Noise LA _{max} dBA
Close territories of apartment buildings, polyclinics, 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			

71. Noise & vibration monitoring were performed by a certified Noise & vibration consultant in April 2015 at 5 locations. Those locations are recognized to be sensitive receptor (hospital/military school, residential private houses and buildings) found along Project corridor. Monitoring locations are shown on Figures D-2. Results of monitoring are detailed in Annex 6.

Figure D-2: Location of Noise and Vibration points



72. In Point 1: (residential buildings), Point 3 (private residential houses) and Point 5 (hospital, military school) (See Annex 6). Noise levels exceed threshold values of the sanitary-hygienic norms SN N 2III-11.3.

73. In Point 3 and 4 (private residential houses) noise levels are in below of threshold values of the sanitary-hygienic norms SN N 2III-11.3.

74. For all 5 locations, vibration levels are consistent with the Armenian regulation.
75. Noise and vibration data will also be collected by the Contractor prior commencement of work.

b) Surface and Ground Water

Other than the Hrazdan River, there are no surface water bodies within or close to the site. The closest point of the Hrazdan River is approximately 700 m west of the northern extent of the alignment.

49. The Master Plan indicates that there is a low risk of flooding in the vicinity of the project site, probably because the Hrazdan River is highly regulated to control flooding in the area.
76. According to the Master Plan, Groundwater beneath the majority of the project alignment is at depth of more than 10m-20m. 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

77. The project site occupies a part of the Yeghvard plateau, giving the site a height above sea level of between 900 and 1200m. The eastern extent of the alignment is approximately 600m west of Hrazdan River gorge and it generally slopes down to the south.
78. 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 0.4 g. 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.
79. The geomorphology is a combination of volcanic basalt, faulted uplift and sedimentary infill overlying lava. The soils are mainly mixed clay and sand composition at a depth averaging 30-40cm.
80. The Master Plan indicates that moderately contaminated soils with radionuclides are located at the beginning of project alignment (Davitashen-Halabyan intersection). As per the Master Plan, significant concentrations of radionuclides have been recorded in areas which have been subjected to industrial land uses; such contamination is localized. There is no indication of historical land use for industrial operation along the alignment. However a soil analysis should be implemented by Contractor before construction work starts and SEMP will be prepared corresponding with the laboratory analysis results (Annex 3).
81. 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. There are also some orchards near private buildings.

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

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

D.2. Ecological Resources

83. 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.

84. Survey of fauna and flora along Davitashen-Ashtarak highway project was implemented on April 21-27, 2015. The full report is provided in the Annex 5.

a. Flora

85. 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 within the Project area are halophile, gypsophila and psamophil plants, oshinder-ephemeral, oshinder-cereal, oshider-ohsn and oshan and the typical species are ***Salsola ericoides***, ***Salsona cana***, ***Calligonum polygonoides***, ***Artemisia fragrans***, ***Kochia prostrata***, ***Teucrium polium***, ***Poa bulbosa***.

86. The flora of the study area was studied on the fieldwork, where the known plant species were recorded on place and some herbarium collections were made. Availability of rare and threatened species has been checked by Red Data Book of Armenia (2010) as well as some recent scientific publications. In a result of the flora inventory a list of flora, including 62 vascular plant species was composed (see Annex 5, Table 3). No any specie listed in the Red Data Book of Armenia or IUCN Red List has been found.

87. The territory includes a small fragment of absinth semi desert under the strong human impact, where mostly weed plant species are spread, but also some representatives of aboriginal flora have survived. Other parts of the area are represented with completely transformed landscapes full of tombs and debris.

88. The trees growing on the study area have been counted taking into account the tree species and the girth. The girth was measured on 1,3m height (see Annex 5, Table 4). In total 139 affected trees were recorded in the project right of way.

b. Fauna

89. The studied area contains three parts. The first part starts close to Vahagni taghamas and is situated in the semi desert zone where have been found typical animals for this landscape types. The second part full of habitat houses and garages. The third part near to Halabyan Street mainly is junk yard.

90. The standard methodology of zoological researches were used to survey and census of the different species of animals.

- Invertebrates:

91. The studied area is characterized by acute anthropogenic influence. Large distributed species were found.

- Vertebrates:

92. Amphibians: There were reviewed only one species of amphibians, green toad (*Bufo* / *Pseudopedalia* / *variabilis*): This species is widely distributed in the whole territory of Armenia.

93. Reptiles: The surveys confirmed the presence of four species of lizards Caucasian Agama (***Laudakia caucasia***), ***Lacerta media***, ***Lacerta strigata***, ***Darevskia raddei nairensis*** were recorded in study area. Also have found number of reptiles species: ***Typhlops vermicularis***, ***Dolichophis schmidtii***, ***Eirenis collaris***, ***Eirenis punctatolineatus***, ***Hemorrhoids nummifer***, ***Telescopus fallax***, ***Macrovipera lebetina***.

94. Birds: In the study area 20 species of birds were recorded. 18 were visually recorded (see Annex 5, Table 4). There are no species listed in the Red Book of Armenia. All species can be considered as synanthropic species, successfully adapted to the urban environment.

95. Mammals: Five species of mammals were found during the survey (***Vulpes vulpes*** in particular). There were no burrows in studied area because of degeneration of the ecological community. Common pipistrelle and Kuhl's pipistrelle bats were recorded by ultrasound detectors Pettersson D230, D240x. Four other small mammal species are common in the human habitats, vine yards and junk yards (***Erinaceus concolor***, ***Sylvaemus witherbyi***, ***Rattus norvegicus***, ***Crocidura gueldenstaedti***). There were no species listed in IUCN Red list and in Red Book of RA.

D.3. Social and Cultural Resources

96. 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. 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.

97. 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.

98. This road linked is located in Davitashen and Ajapniak districts. There is hospital, military school and commercial/business areas like petrol station, workshops, and cafe and as well as residential areas near the project route. Residential areas included houses with orchards, garages, as well as residential buildings. There are also community lands which are not used by anyone or used illegally.

99. An archaeological investigation was undertaken by archeological specialist to identify any archaeological sites and items of interest in or around the study area, and that may be affected by the project.

100. The archaeological field investigations were inhabited due to the deposited construction waste along many sections investigated; however two areas containing traces of settlements were identified:

- South-eastern corner of Halabyan Street and Yeghvard Highway – small obsidian artifacts (retouched thin blades and scraper, natural pebble, hammer stones, and Medieval pottery fragments) lying in the sediment, with traces of construction remains; and
- South-western corner of Gevorg Chaush Street – traces of wall structures and houses, however fully destroyed by road construction activities.

101. Neither of these two archaeological structures is recorded in published and archival records, nor in lists of protected sites adopted by the Ministry of Culture (MOC). The two sites have no clear features and are likely to be destroyed. The investigation concluded that there is no need for any special action to protect the sites or to organize recovery excavations before construction begins.

102. There is no other cultural heritage or archaeological sites designated by UNESCO or the MOC within the vicinity of the site.

D.4. Economic Development

103. 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.

104. The project is located in Davitashen Community. Where the alignment meets Ashtarak Highway, the route is surrounded mostly by vacant land and few residential properties. The remainder of the alignment is located within a medium to high-density urban area comprising pockets of single houses and high-rise apartment blocks, commercial buildings, a small military school, and other similar land uses. Some residential properties back onto the alignment and there

are private houses and buildings constructed within the right-of-way, and reportedly without Municipal approval. However all private owners of assets will get appropriate compensation and the LARP will be developed under the Project.

105. Utilities found within the Project Right-of-way include above ground gas pipes, 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

106. The Projects' impacts to the physical, biological, 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 and corresponding mitigating measures proposed based on significance and occurrence throughout the Project cycle from the engineering design, preconstruction, construction to the operation and maintenance period. Mitigation measures are presented in the EMP in Annex 3. (See also Annex 4: Alignment Sheet for localized impacts along the road corridor).

107. In 2010 and on April and May 2015, 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.

108. Anticipated impacts on the bio-physical environment of the project (such as soil erosion, increased levels of noise and vibration, air and water quality) 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

109. Positive Impacts Related to the Design. The Project will provide a link between Davitashen bridge to 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 reduction of congestion.

110. The existing road was designed in the 1980's and construction of fly-over pylons started, but was not completed. The road will be designed and constructed to current high standards, improving 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.

111. 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.

112. The Project 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.

a) Economic Benefits

113. 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.

114. 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.

115. 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.

116. 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, and time savings. These values are based on GDP per capita, and adjusted according to the particulars of the Yerevan area and vehicle category.

E.1. Negative impacts and mitigation measures during construction phase

a) Impacts due to Location

117. No part of the Road link passes through or near any designated ecologically sensitive areas, designated wildlife or other sanctuary, national park, botanical garden, or area of international significance (e.g., IUCN, RAMSAR site).

118. On April and May 2015, a team of local and international environmental specialists conducted a reassessment investigation in area of Road link. The objective was to focus on the appraisal and reassessment of the significance of impacts of Project. The Project impacts on the existing bio-physical environment were re-assessed and in relation to design and location of the proposed road

alignment (see Annex 5).

119. Anticipated impacts on the bio-physical environment of Project (such as soil erosion, increased levels of noise and vibration, air and water quality) 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 mitigation measures proposed in the 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.

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

b) Impacts on Flora and Fauna

121. 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).

122. It was confirmed that there are no endangered species of flora and fauna registered under the Red Book along the Project alignment (**Error! Reference source not found.**). 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.

123. A total of 139 small to large community trees were counted along the Project area. The loss of private trees (and any associated business loss) receives compensation within the scope of Land Acquisition and Resettlement procedures.

124. 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. Cut trees should be replaced with new trees at a ratio of 6:1. Appropriate planting areas are provided in the landscape design (See annex 7) which was approved by Yerevan Municipality.

125. Analyzing of collected data regarding to fauna it was suggested during highway construction works all vertebrate animals should be caught by the specialists, placed in special containers and transported to the area typical for the species, far from human settlements. The mitigation measures are presented in the Flora & Fauna and vegetation clearing Plan in Annex 3.

c) Impacts on historical and archeological monuments

126. As per Archaeological survey 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 - Davitashen–Ashtarak highway Project and cannot be affected by the construction activities.

d) Impacts on Soil, erosion and sedimentation

127. **Topsoil** in Project route will be stripped in road sections where the new alignment is being constructed from the residential areas with orchards or community lands acquired under the LARP. Special efforts need to be made to strip and conserve topsoil for later use for site restoration and in

medians. Topsoil management will be implemented in accordance with Environmental Protection Plan as a part of SEMP, as well as Technical Specifications 1002 Topsoil.

128. Soil erosion and sedimentation. The Project is located on a relatively flat terrain. Soil erosion can be generated from improper stock piling of excavated top soil, sub soil and other materials 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. **Error! Reference source not found..**

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

129. 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 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 roads with water.

130. Particulate matter and gases will be generated by construction vehicle. 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 EMP. **Error! Reference source not found..**

d) Impact related to Noise and Vibration.

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

132. 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.

133. 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 are detailed in the EMP. **Error! Reference source not found..**

134. 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 resettlement

135. 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.

E.2. Construction impacts

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

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

138. **Utilities.** For all urban works, there is potential for disruption to both above and below-ground utilities during construction. This might include above-ground gas mains, water mains, sewers, and electricity lines as well as irrigation facilities. Based on the utility consultations that were undertaken during the design phases the Contractor prior to construction shall prepare temporary or permanent relocation and/or protection plan. Any disruption to services will be short-term and localized and will take into account the time of year and time of day. Affected persons should be notified prior to the works. Management of this issue will be implemented in accordance with Utilities Protection and Relocation Plan in Annex 3.

139. **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 asphaltting, 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.

140. 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 **Error! Reference source not found.**).

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

- (i) Training sessions on ADB Safeguards organized by Engineer for engineering and environmental, health & safety personnel of YM, YMPIU and Contractor.
- (ii) Training on environmental and health & safety issues organized by Contractor's Environmental and Safety specialists in accordance with the Safeguard Orientation Plan presented in **Error! Reference source not found.** 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 to comply with ADB safeguards.

142. **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 could be enhanced by involving NGOs.

143. Excess of material. Some excessive amount of material may be generated during construction. If excess material is generated from the excavation and grading activities, the spoil will be classified and transported and disposed in accordance with MNP requirements. The Armenian Law on Rates of Environmental Charges (2006), Article 3 provides the environmental charge according to waste categorization these are as follows:

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

144. Oil and Fuel Spills. There is potential risk of 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 surface water if carried off site through run-off. Mitigation in the EMP (**Error! Reference source not found.**) 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.

145. 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.

146. Excessive soil, oil and fuel spillages and other waste issues are addressed in EMP (**Error! Reference source not found.**) and will be mitigated by Contractor in accordance with Waste and Material Management Plan as a part of SEMP.

147. 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.).

148. The transportation of material in, from or to the sites of the Project will include approximately 75 000 m³ of common excavation, 200 000 m³ of embankment and 75 000 m³ of pavement layer material. Due to the nature of the project that is located within a preserved corridor along a large part of its length, demolition of existing carriageway will be limited to the connection points. Several structures will also be demolished. Total volume of demolished material is approximately 1 000m³.

149. This equates to an additional 35 000 vehicle movements over an expected construction period of 18 months also.

150. Due to the size of the Works it is not expected that the Contractor will set up an asphalt plant or open a new quarry as he will rely on existing sources. The bidder will provide all the details on his sources of materials (if any) in the bid documents. The transportation routes will depend on the location of the quarries and the borrow pits that the Contractor will use. The awarded Contractor shall obtain all necessary permits for traffic movements and shall prepare a Traffic & Access Management Plan as part of the updated EMP. The relevant transportation scheme shall be inserted in the SEMP.

151. 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.

152. Solid and Liquid Waste arising from the Contractor's activities. Solid waste that may be generated during construction includes redundant road surface, oil filters, material packaging, and solid waste discarded by construction workers. Liquid wastes that will be generated by the Project include construction worker sewage and waste oils. The EMP specifies that waste generated by the Contractor must be collected, stored, transported, and disposed in accordance with RA legislation and MNP regulation.

153. **Site Reinstatement.** By the end of construction phase and prior to handover of the site by the Contractor to the YM, the Contractor will reinstate the site which will include clearing the site of all construction-related material and waste and transporting same to sites approved by the Engineer, and other affected bodies. Landscaping activities should include grass- seeding and planting native trees and shrubs as provided in the project landscaping 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.3. Negative impacts and mitigation measures during operation phase

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

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

156. **Air Quality.** 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 MNP, 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.

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

158. At the same time, based on the results of noise baseline investigations and especially in the areas where the noise level is currently low, noise mitigation measures shall be implemented in order to reduce noise impact during operation phase. These mitigation measures will be detailed as per further noise specialist investigations. The investigations and implementation of mitigation measures should be undertaken by YM.

159. **Improper maintenance of re-instated sites** may result in the losses of planted trees, shrubs, grasses and lawns. To avoid this impact, measures are considered in the EMP in Annex 3.

E.4. Cumulative Environmental Effects

160. During construction, receptors adjacent to the route will be exposed to short-term construction-related nuisance effects, including noise, dust, and altered access resulting in cumulative effects. These impacts will be significantly mitigated through the implementation of measures described in EMP and SEMP. Construction of other road sections of the Yerevan bypass are most likely not going to be constructed simultaneously thus, there will be no adverse combined impacts during construction.

F. ANALYSIS OF ALTERNATIVES

161. 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.

162. 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. 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 Davitashen, and Achapnyak neighborhood.

163. 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.

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

G. INFORMATION DISCLOSURE, PUBLIC COMMUNICATION, CONSULTATION AND PARTICIPATION

165. 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 and EMP and updated by the Contractor.

166. The Public Consultation and Communication plan includes:

- (i) Disclosure of Project related Information to raise the awareness of the public on the Project.
- (ii) Public consultations implemented to meet the ADB SPS (2009) requirements and the requirements of the RA Law on EIA to ensure the participation of the public and APs on the design and EIA and EMP drafting stage. The further public consultations shall be implemented by Contractor with assistance and participation of the Engineer and YMPIU

should the design or another significant change in project implementation occurred.

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

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

G.1. Information Disclosure

168. The final IEE including EMP will be posted on the ADB and YMPIU website and translated into Armenian language for disclosure on the YMPIU website. 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

169. During PPTA stage Public consultation has been organized in 19 March 2010 in minutes has been provided in draft IEE report. Taking into consideration the time gap and to fully comply with the ADB's policy requirements on Public Consultation and Information Disclosure another public consultation has been organized on 05 May 2015 Yerevan, Davitashen community, in N189 school. The notice advertising the public consultation was posted on a daily newspaper Hayastani Hanrapetutyun 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 **Error! Reference source not found.** of the IEE report. 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.

170.

171. 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:

- (vii) begins early in the Project preparation stage and is carried out on an ongoing basis throughout the Project cycle;
- (viii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people;
- (ix) is undertaken in an atmosphere free of intimidation or coercion;
- (x) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and
- (xi) 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.

172. A public consultation event to disclose the initiative and to present the Project took place on 05 May 2015 at Yerevan Davitashen community, in N189 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.

173. During the meeting the results of the Initial Environmental Examination of Tranche 2 Davitashen-Ashtarak highway section 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.

174. The results of the survey of flora showed that 139 trees would be the most significantly affected environmental component of the project. Question was asked in which sections are located this trees and if the number of these trees included also private. It was noted that this number include just community trees that are located along the existing road and as a result of road widening they should be removed. It was also mentioned that for each tree cut a replanting measure with a ratio of 1:6 will be implemented.

175. 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.

176. 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 it was suggested to during construction works all vertebrate animals should be caught by the contractor relevant specialists, placed in special containers and transported to the area typical for the species, far from human settlements.

H. ACCOUNTABILITY & GRIEVANCE REDRESS MECHANISM

H.1. ADB's Accountability Mechanism

177. 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.

178. 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.

179. 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.

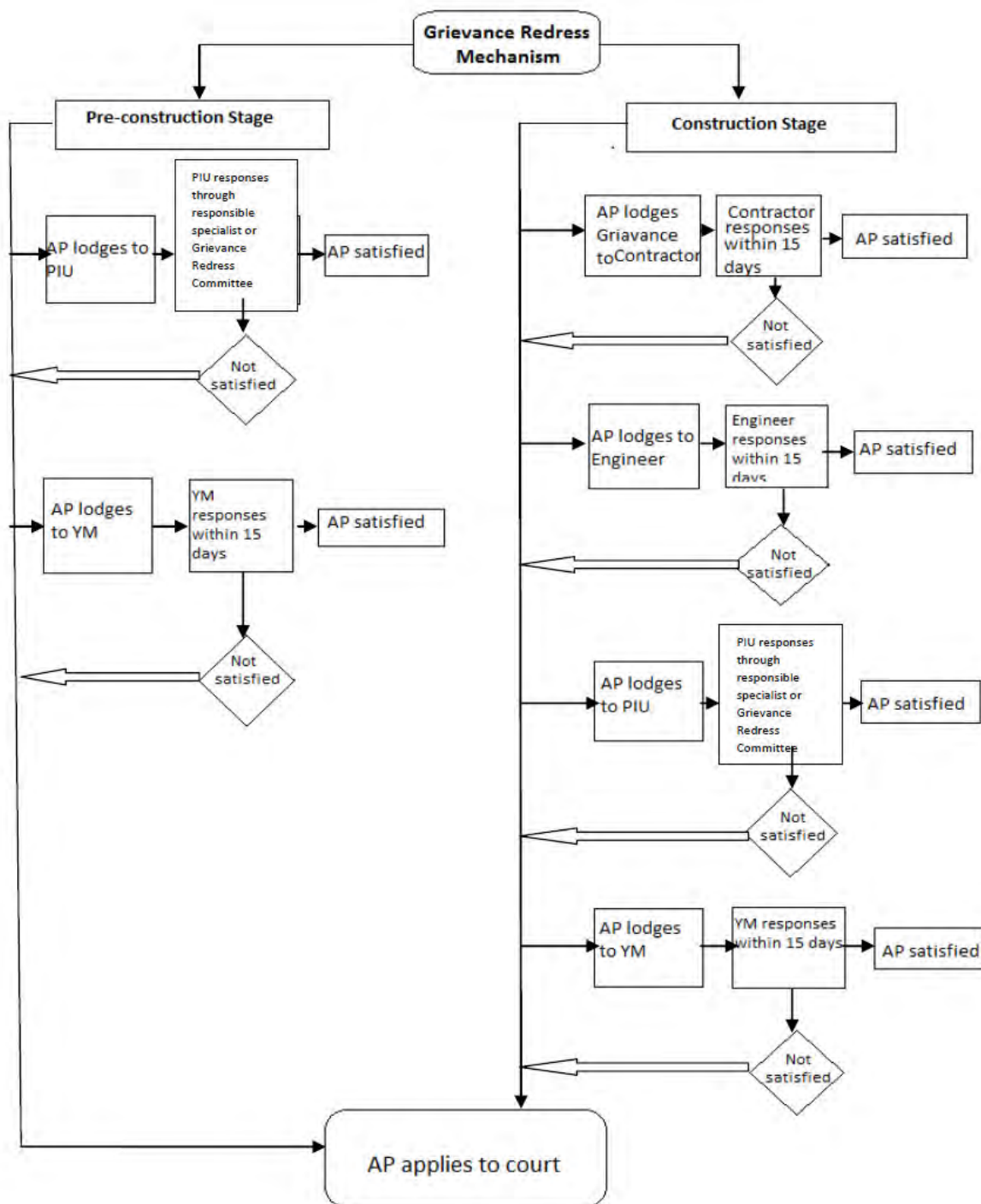
H.2. Grievance Redress Mechanism

180. 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 intend 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.

181. 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.

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

Figure H-1. Grievance Redress Mechanism Flow-Chart



183. 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:

184. 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' grievances.

185. If an AP is not satisfied with the response or PIU responsible staff needs additional capacity to response the APs' grievance, the Grievance Review Group (GRG) can be formulated 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

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

187. 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:

188. **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.

189. Contractor should immediately inform the Engineer and YMPIU if AP lodged the grievance and should send the copy of written complaint to them. Contractor should implement appropriate

mitigation measures to solve the issue and send the written response/reply to the AP with cc Engineer and YMPIU.

190. 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.

191. 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.

192. 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.

193. Step 3. Should the Engineer fail to satisfy the complaint, AP could apply to YMPIU, YM, EA and ADB AM. The complaint in the Construction stage at the PIU level will be preceded with the same scheme 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.

194. 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.

195. 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

196. The Environmental Management Plan is prepared to ensure compliance with the ADB's environmental safeguard requirements and all applicable laws, regulations and standards for environmental protection in Republic of Armenia. The EMP contains the measures to mitigate and prevent the unwanted effects that may arise during the Project implementation, as well as the monitoring actions to check the compliance of construction works implementation process to the planned mitigation measures through the whole Project cycle: from the engineering design phase, preconstruction, construction through the operation and maintenance periods. The EMP as an integral part of the present IEE will be included in the tender and contract documents. The EMP is attached in Annex 3.

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

- a. Boundaries of the site the SEMP is relevant for are defined;
- b. Sensitive receptors and environmental values are identified;
- c. Site-specific construction activities are specified;
- d. The risk of impacts is assessed;
- e. Environmental management measures are assigned for the impacts that need to be mitigated as a result of risk assessment;
- f. SEMP prepared including the sub plans indicated in Annex 3;

I.1. Environmental work plans prepared (maps, drawings, etc.). Mitigation

198. 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.

199. The Environmental Management Plan summarizes the anticipated environmental impacts (as identified in Chapter E). For every identified impact a corresponding mitigation measure is proposed. The mitigation measures will be more specified based on the risk assessment to be conducted during the preparation of the SEMPs. The environmental monitoring activities, the entities responsible for carrying out those activities and the estimated costs of implementation are also

included. The SEMP's 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. According to the recommended Environmental Safeguard Clauses for Civil Works Contracts the Contractor shall undertake the following investigations and activities during the mobilization period:

- (i) Hire a full time environmental specialist (ES) with strong background in health and safety
- (ii) Ensure the participation of the ES, engineering and work's supervision staff in the ADB safeguard presentation training organized by Engineer.
- (iii) 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 or recognition of the data provided in the present IEE as a baseline for the regular monitoring, section D1 Table D-1 and Annex 6.
- (v) Submit for approval by the Engineer 28 days prior to start the works the Site-specific Environmental Management Plan.

200. 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.

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

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

- 1. Occupational Health, and Safety Plan
- 2. Public Consultation and Communications Plan
- 3. Vegetation Clearing Plan
- 4. Utilities Protection and Relocation Plan
- 5. Environmental Protection Plan
- 6. Construction Work Camps Plan
- 7. Site Management Plan (Quarry and borrow pit, dumping sites, concrete batching and

- asphalt plants)
8. Traffic and Access Management Plan
 9. Emergency Response Plan
 10. Waste and Material Disposal Plan
 11. Site Reinstatement, Landscaping, and Revegetation Plan

a) Occupational Health, and Safety Plan

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

204. 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.

205. 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.

206. 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.

207. 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

208. 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.

209. 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.

210. 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.

¹The 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

211. 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 endangered species that might be present in the Project area.

212. 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.

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

d) Utilities Protection and Relocation Plan

214. 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.

215. Utility designs have been validated by utility owner. The Utilities Protection and Relocation Plan will be implemented in accordance with Technical Specifications Section 1200 and 1211: Relocation of Utilities will be taken into consideration.

216. Mitigation measures are presented in **Error! Reference source not found..**

e) Environmental Protection Plan

217. The purpose of this plan is to document the approach of the GCs, SCs and their workers in the implementation of measures to protect the soil, air and water bodies, from the erosion and sedimentation, dust and other emissions, as well as noise and vibration as a result of the construction activities. The Plan contains mitigation measures to reduce the risk of any impacts to an acceptable level for all the used areas: construction sites, camps, haul roads, quarries, borrow pits, dump sites, etc. (See Annex 3 - Environmental Protection Plan) Particularly the following aspects are addressed:

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

218. Technical Specifications SECTION 101 - General Requirements 101.15 Protection of environment and Section 1002 – TOPSOIL are applicable.

219. 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,

220. 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.

221. 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.

222. 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.

f) Construction Work Camps Plan

223. 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.

224. 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.

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

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

226. 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.

h) Traffic and Access Management Plan

The purpose of this Plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to manage traffic and access on the construction site during the construction works. The traffic management and access plan will be developed by the Contractor as a part of SEMP and will be agreed with Police, YMPIU and YM.

i) Emergency Response Plan

227. 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 will allow reducing the risk of any impacts up to an acceptable level.

j) Waste and Material Management Plan

228. 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.

229. 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.

230. 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 and could be completed by Contractor in SEMP.

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

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

232. 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.

l) Post-construction phase (Operation and maintenance)

233. 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

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

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

236. Dust, 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.

237. 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.

238. 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.

239. 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

240. Implementation schedule, responsible entities and estimated costs of implementation are provided in the EMP (see Annex 3).

a) Environmental Staffing

241. 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

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

- (i) The **Contractor** 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 supervises baseline data surveys as required in the Technical Specifications and the Environmental Protection Plan;
 - Environmental specialist carries on site's visits and inspections on a weekly basis;
 - Environmental specialist documents monitoring activities and results in a weekly environmental report;
 - In case of inadequate monitoring results, Environmental specialist identifies the necessary corrective actions through a Corrective Action Plan as soon as possible;
 - In cases of accidents (fire, explosion, oil spill, bitumen overflow, etc.), the Contractor must notify the Engineer immediately. Initial notification might be verbal, but must be followed by a written report within 24 hours after the incident or accident happened;
 - Environmental specialist prepares weekly and monthly environmental report as part of Contractor's monthly progress report.
- (i) The Engineer environmental specialist with a strong background of health and safety has the following responsibilities, roles and tasks:
- Supervise, monitor, inspect and coordinate, on a daily, weekly and monthly basis, the tasks of the environmental, health & safety specialist and the supervising team of the Contractor and the Contractor's construction activities;
 - Inspect sites Contractor are intending to use for construction camp (s), facilities, storage, parking, waste dumping, health & safety, etc. prior the start of operation, prepares the reports on the findings of inspection and submits to the YMPIU for approval, as soon as this information is available;
 - Review Corrective Action Plans provided by the Contractor and transfer to the YMPIU as soon as possible for approval;
 - Inspect and supervise the implementation of corrective actions by the contractor to ensure their effectiveness soon after their implementation;
 - Monitor the 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 and findings from field visits, including environmental safeguards and monitoring implementation;
 - Prepare quarterly reports as well as end of phase report for submission to the YMPIU.
- (ii) 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 (2009), are presented in section B.4 of this report.
- (iii) The **State Environmental Inspectorate** (SEI) of the Ministry of Nature Protection (MNP) has the authority to inspect the Project's compliance with the environmental protection principles and relevant regulations in accordance with Armenian environmental legislation.
- (iv) The MOE has the responsibility to undertake environmental due diligence.

c) Awareness raising and environmental training

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

244. 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 and 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

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

246. The costs for the EMP and its related sub-plans form part of the direct costs for implementing the Project. Thus, costs are estimated by the Contractor as marginal costs of the three general phases of the Project: pre-construction, construction & post-construction operation. Indicative costs are presented in Annex 3, Table 1. The summary table of the costs is presented below:

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

Type of activities	Costs US\$	Sources of findings
Implementing and monitoring of the environmental mitigation measures	422 000	<u>Contractor</u> <u>422 000 US\$ Included in total construction cost</u> <u>Engineer</u>

Type of activities	Costs US\$	Sources of findings
(2 % cost of the works plus cost of utilities relocation)		Remuneration (2 times per week * 4 weeks * 18 months) Surveys are also included in the budget
Strengthening the administration of the EMP including required capacity development and training	89 630	<u>Contractor</u> 50 750 \$ Included in total construction cost <u>Engineer</u> 38 880 \$ included in budget
Raising the awareness of the Project staff and workers	4 675	<u>Contractor</u> 4 675 \$ Included in total construction cost
Total US\$	516305	

I.5. Reporting

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

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

- (i) Initial Environmental Baseline Report. - Required environmental baseline data as specified in the EMP and Technical Specifications.
- (ii) Weekly Environmental Reports. – The results and findings from the environmental monitoring activities will be documented in specially developed by Contractor and approved by YMPIU monitoring check list. The weekly monitoring report shall include the environmental performance indicator and assessment of the effectiveness of the mitigation measures.
- (iii) Monthly Progress Report- summary environmental report shall be submitted as part of the Contractor's Monthly Progress Report. Monthly reports shall be analytical and provide explanations for anomalies, non-compliance and problems encountered.
- (iv) submit to YMPIU end of phase report

249. 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.

250. 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.

251. The Engineer submits to YMPIU monthly monitoring reports on environmental safeguards as part of the Monthly Progress report and quarterly monitoring reports. 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

252. Based on the indication of the Rapid Environmental Assessment in Appendix 1 and the findings of the IEE, the classification of the subproject as Category “B” is confirmed, and no detailed EIA will be needed to comply with the environmental policies of the ADB. At the same time according to Armenian EIA legislation the EIA procedure and expertize is not required for this project. The potential negative impacts (such as nuisances from dust, noise, traffic and access changes, which are likely to be experienced by nearby communities, the impact on Flora and Fauna 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.

253. At the same time, based on the results of noise baseline investigations and especially in the areas where the noise level is currently low, noise mitigation measures shall be implemented in order to reduce noise impact during operation phase. These mitigation measures will be detailed as per further noise specialist investigations. The investigations and implementation of mitigation measures should be undertaken by YM if needed.

254. Key benefits of this project include a reduction in traffic congestion; economic benefits; and improvements to regional air quality once operational.

J.2. Recommendations

255. The construction contractor will consider the present IEE and EMP as part of the Contract.

256. The Contractor shall prepare based on the EMP (Annex 3) 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.

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

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

259. 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.

260. The Contractor's appropriate specialist together with Engineer will 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.

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

ANNEX 1

Rapid Environmental Assessment (REA) Checklist Roads and Highways

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

Davitashen Bridge - Ashtarak Highway section

Sector Division: Roads and Highways

Conducted by / date: Arman Vermishyan and Klaus Schonfeld, 28 Jan 2010

Naomi Hull and Klaus Schonfeld, 10 Feb 2010

Naomi Hull, Davit Yavruyan, and Klaus Schonfeld, 17 Mar 2010

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
1. Cultural heritage site		X	
2. Protected area		X	
3. Wetland		X	
4. Mangrove		X	
5. Estuarine		X	
6. Buffer zone of protected area		X	
7. Special area for protecting biodiversity		X	
B. POTENTIAL ENVIRONMENTAL IMPACTS			
Will the Project cause...			
1. Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		X	
2. Encroachment on precious ecology (e.g. Sensitive or protected areas)?		X	
3. Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by		X	

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

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Հանձնաժողովի անդամները հետևյալ հարցերին պատասխանում են:

1. Կապիտալի և աշխատանքի ծախսերի միջև ընկած տարբերությունը:
2. Կապիտալի և աշխատանքի ծախսերի միջև ընկած տարբերության հարցում:
3. Կապիտալի և աշխատանքի ծախսերի միջև ընկած տարբերության հարցում:
4. Կապիտալի և աշխատանքի ծախսերի միջև ընկած տարբերության հարցում:

Փետրվարի 11-06-ին
Որոշում՝ 19-Ֆետրվարի, 2010թ.
Ֆետրվարի 06-ին ընդունված քաղաքապետարանի, անալիզի հարմար

[illegible]

Stefan Schuster, schuster@math.uni-erlangen.de, 7546
Thurgau, thurgau@math.uni-erlangen.de, 42417-01



Attendance list - translated

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

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

Attendance list – actual (1 of 3)

ՀՀ	Անուն	Հասցե/կազմակերպություն	Ստորագրություն
1	Արմենյան, Եսայի	«Պարզ» ՖԲԸ ԵՊՀ-57 ՄԱՍԿԱՆ ԱՅԽԱՆԱԿԱՆ ՍԵՐՈՒՆ	Ե. Բաբայան
2	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
3	Բաբայան, Եսայի	Երևանի քաղաքապետարան	Բ. Բաբայան
4	Բաբայան, Եսայի	Դուռնի կոյուղի ՄԳԻ	Բ. Բաբայան
5	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
6	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
7	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
8	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան

Attendance list – actual (2 of 3)

ՀՀ	Անուն	Հասցե/կազմակերպություն	Ստորագրություն
1	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
2	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
3	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
4	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
5	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
6	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
7	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
8	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
9	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
10	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
11	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
12	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
13	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
14	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան
15	Բաբայան, Եսայի	ՀՀ Կառավարության կազմակերպություն	Բ. Բաբայան

Attendance list – actual (3 of 3)

No	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
1	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
2	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
3	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
4	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
5	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
6	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
7	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
8	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
9	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
10	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
11	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
12	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
13	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)
14	Begeleitete	Übers	agr. post.	agr. post. (Bsp.)

ANNEX 3

Environmental Management Plan (EMP)

Tranche 2 - Davitashen - Ashtarak Highway urban road link

1. The Environmental Management Plan (EMP) provides the set of mitigation and monitoring measures to be undertaken during project implementation in order to avoid, reduce or mitigate the adverse environmental impacts. It presents the identified potential impacts and their locations or occurrences, proposed mitigation measures, the entities responsible for mitigation and their monitoring activities including the estimated costs.
2. The EMP describes how the mitigation and other measures to enhance the benefits of environmental protection will be implemented and monitored. It explains how the measures will be set up and managed, who will be responsible to implement them, when and where they will be implemented and by whom monitored. The following elements are described in the EMP:
 - (i) Project Activities addressed in the EMP;
 - (ii) Potential environmental impacts (including impacts on archeological resources);
 - (iii) Mitigation measures during pre-construction, construction and operation phases of this Project;
 - (iv) Monitoring activities during pre-construction, construction and operation phases of this Project;
 - (v) Responsibilities of various entities in the implementation of mitigation and monitoring measures; and
 - (vi) Indicative costs of environmental management and mitigation.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
PRE-CONSTRUCTION PHASE				
1. Baseline monitoring surveys (Air quality, Noise & Vibration) Public utilities protection and relocation	Missing baseline information for monitoring during construction phase Interruptions of services due to relocation of utilities	1. Update EMP to reflect baseline monitoring surveys information, detail design and incorporate in tender and contract documents 2. Include specific requirement in tender and contract documents:	<u>Engineer</u> Update EMP and include appropriate clauses in tender and contract documents <u>YMPIU</u> Evaluate the bid and award contract documents <u>ADB</u> 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.	<u>Engineer</u> Develop Technical specifications and update the tender and contract documents to include appropriate environmental clauses <u>YMPIU</u> Review tender and contract documents <u>ADB</u> Be informed on results of YMPIU's review	Costs are accounted in the Engineer budget

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

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).	<u>Contractor</u> Provide specialist (s) and train staff <u>Engineer</u> Monitor the Contractor, construction workers, environmental parameters and reports to YMPIU <u>YMPIU</u> Issues non-compliance notices	<u>Contractor</u> Cost of 1 HSE Specialist available full-time during the 18 months construction period is estimated at: US\$ 45 000 <u>Engineer</u> Remuneration for 18 months included in budget is estimated at: US\$ 38 880 Cost of 1 day induction training program on Health, Safety and Environment for 50 construction workers at US\$ 50 per day plus the fees of 3 days of a trainer at US\$ 75 per day, is estimated at: US\$ 2 950
4. All site construction activities (including activities in Right of way, Borrow pits, Dump sites, Construction	Environmental degradation, Nuisance from dust, air pollution noise & vibration Safety and health hazards to workers and community	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. Environmental Protection Plan 6. Construction Work Camps Plan 7. Site Management Plan (Quarry and borrow pit,	<u>Contractor</u> Prepare and implement <u>Engineer</u> Review and monitor implementation <u>YMPIU</u> Supervise the Contractor	Costs of those plans are accounted for each of the Construction Plans detailed below.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
camps)	residents	dumping sites, concrete batching and asphalt plants) 8. Traffic and Access management Plan 9. Emergency Response Plan 10. Waste and Contaminated Soil Management Plan 11. 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	<u>Contractor</u> Implement the Plan and Prepare the orientation program <u>Engineer</u> Review plan and assist monitor implementation Review incident logs <u>YMPIU</u> 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 4 above. Cost of PPEs for 50 workers at US\$ 250 per worker is estimated at: US\$ 12 500 Information on health risks and illegal trafficking is included in the training session accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		3. Exclude unsafe working practices and unsafe tools from the construction-site. 4. Fire-extinguisher is available and easily accessible in all operating machinery and in all sections of the construction site. 5. Regular medical check-ups of worker's health; Contractor may hire or contract required medical professionals 6. Available and easily accessible first aid kits in all operating machinery and in all sections of the construction site 7. Season- fit uniform and other PPE provided to workers and other staff. Incentive measures and penalties to enforce the use of PPE. 8. Health & safety incidents to be recorded and reported on to the 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	1. Develop an application form for public complains and suggestions and receive DESC approval. 2. Install posters or project informational boards with relevant information for the Public: field office location, operating hours, names of responsible contact persons,	<u>Contractor</u> The HSE specialist hired by the Contractor implements awareness and grievance redress program of the Plan	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
	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.	"hot line" phone numbers, postal address and email addresses, etc. 3. Keep a grievance register book available at the field office or in any other easily accessible location for affected people. 4. Maintain a register of complaints (name, description of the problem, incoming date, response date, further follow-up action and resolution status). 5. Allocate personal responsible for dealing with issues raised by the Public and APs. 6. Organize regular meetings with community members to discuss newly arisen issues if any. 7. Make sure that mechanism of prompt forwarding complains and suggestions to Engineer are in place. The Grievance Redress Mechanism is described in detail in section H of the IEE report.	<u>Engineer</u> Review plan and monitor the implementation <u>YMPIU</u> Supervise the Engineer	
		3. Flora & Fauna Protection and Vegetation Clearing Plan		
7. Earthworks and other construction works	Disturbance and degradation of flora and fauna habitat, especially 139 trees	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 for being easily	<u>Contractor</u> Hire a local Fauna and Flora specialist to help to caught all vertebrate animals and transport to the area typical for the	Cost of developing, implementing and managing this plan by the Contractor's HSE specialist is already accounted in point 4 above. Cost of hiring during 10 days a local

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
	Clearing of vegetation at times detrimental to fauna habitat	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 7. Inform the Engineer in case of an injured animal is found. 8. Undertake the vegetation removal and site clearing preferably during late autumn and/or winter. 9. A register of cut trees and shrubs is created and kept available for review. 10. For vegetation clearance purposes, 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. 11. Ensure that workers are using PPE when using pesticides or other vegetation clearing chemicals. 12. 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 right-of-way before	species, far from human settlements. <u>Engineer</u> Review plans and monitor the implementation <u>YMPIU</u> Supervise the Engineer	Fauna and Flora specialist at US\$ 75 per day, is estimated at: US\$ 750

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		transportation to waste dump.		
		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, Section 1200 and 1211: Relocation of Utilities 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 be paid by the Contractor. 6. Contractor shall restore or compensate all the costs should the undiscovered utilities be found or the existing ones damaged during construction works.	<u>Contractor</u> Survey utilities and prepare plan prior to construction Liaise with local representatives, and service providers Hire approved contractors <u>Engineer</u> Review plan and monitor implementation. Assist with liaison with local representatives and service providers <u>YMPIU</u> Monitor the Engineer	Cost of protecting and relocating utilities cannot be strictly accounted as environmental mitigation measures. But for information purposes, the evaluated costs of construction activities related to utilities is estimated at: US\$ 3 320 000
		6. Environmental Protection Plan		
9. Earthworks Roads works Hauling and	Erosion of soil Excessive dust and air pollution due to vehicle	Environmental Protection Plan is developed as a part of the SEMP. Location and frequency of regular monitoring of Dust, Noise & Vibration are specified below.	<u>Contractor</u> Prepare Environmental Protection Plan Collect baseline data for dust, noise, & Vibration	The following costs are related specifically to the protection of the environment: a) Cost of extraction, stockpiling and

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
transport of materials Other construction activities	emissions Excessive noise and vibration due to construction activities	<i>Soil erosion and sediment control</i> 1. Implement the erosion control in accordance with Technical Specifications Section 1001 – Erosion Control 2. Preserve existing soil layer where practicable. 3. Provide temporary cover such as fast-growing grass species in areas where soil layer is removed and the ground is exposed for a long period. 4. Take the necessary measures to prevent soil erosion and to ensure slopes stability. 5. Implement a radionuclide soil analysis at the Davtashen-Halabyan intersection before construction work starts and based on the laboratory analysis results corresponding measures will be provided. 6. Perform the topsoil stripping and stockpiling in accordance with Armenian legislation and Technical Specifications Section 1002 - Topsoil 7. Manage topsoil to keep its chemical and biological qualities. Reuse it for planting trees, shrubs and for other landscaping needs. 8. Seed grass on surfaces where topsoil is exposed to erosion risks (steep slopes, high embankments, etc.). 9. Seed grass as soon as possible to avoid long period during which the ground is barren. <i>Air pollution and dust control</i> 1. Minimize dust emissions through regular water spraying of construction works surfaces; 2. Minimize the amount of excavated material held on	prepare Dust, 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 <u>Engineer</u> Review and approve Plan developed by the Contractor and monitor implementation <u>YMPIU</u> Monitor the Engineer	reuse of approximately 1 000 m³ of topsoil at US\$ 3 par m³ is estimated at: US\$ 3 000 b) Cost of seeding grass on 20 000 m² of barren ground where risk of erosion and growth of undesirable adventives plants is high, at US\$ 1 par m² is estimated at: US\$ 20 000 c) Cost of spraying water on barren ground and construction tracks to prevent dust emission during 6 months (180 days) out of the 18 months of the construction timeline, at US\$ 100 per day is estimated at: US\$ 18 000 d) Cost of hiring a specialized contractor for collecting baseline data for air, noise & vibration levels is estimated at: US\$ 4 000 e) Cost of hiring a specialized contractor for implementing soil survey in 500 m section is estimated at: US\$ 5 000

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		site and cover all materials wherever possible to prevent dust emissions. 3. Regulate the speed level of vehicles and machinery to minimize dust emissions. 4. Use electricity or battery power where possible (or practical) for hand tools rather than diesel. 5. Avoid the use of diesel or petrol powered generators where practicable 6. Provide to workers and vehicle drivers with dust protective masks and ensure they are using it; 7. Regularly collect baseline data on dust emissions at sensitive receptors and collect data from the same location to describe changes in Air quality. 8. Sensitive receptors are identified in Annex 4—Alignment Sheet and on Figures D-2 of the main IEE study report. They will be confirmed by the Contractor in its SEMP. Noise & vibration control 1. Comply with construction activities related noise & vibration national legislation. 2. Avoid locating construction activities, camps, machinery and equipment near sensitive receptors such as poorly insulated houses, residential buildings, hospital, and 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		

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		the same location to describe changes in Noise levels. 5. Sensitive receptors are identified in Annex 4 – Alignment Sheet and on Figures D-2 of the main IEE study report. They will be confirmed by the Contractor in its SEMP. 6. Ensure that all pieces of machinery are equipped with proper silencers and exclude those that are improper state for minimizing noise generation at source. 7. Ensure workers and drivers are provided with appropriate PPE including ear protective equipment. <u>8. Inventory surveys will be undertaken by the Contractor of the adjacent private properties 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.</u> <u>8-9. Install</u> noise control barriers (e.g. solid walls, earth barriers, noise-reflective panels, double-glazed windows) when necessary and practicable to shield houses and other sensitive receptors;		
		7. Construction Work Camps Plan		
10. Accommodation of workers, equipment, material storage,	Adverse health effects on work force	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	<u>Contractor</u> Prepare plan and monitor implementation	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
machinery and parking	Nuisances on nearby residents Soil compaction of temporary parking areas Pollution of groundwater Dirtying of ambient environment	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.	<u>Engineer</u> Review plan and monitor implementation. <u>YMPIU</u> Monitor the Engineer	Implementation of this plan will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 4 above.
		8. Quarry and borrow pits, dumping site, concrete batching and asphalt plants' Management Plan		
11. Quarrying Concrete batching and asphalt plants	Noise and dust related nuisance, losses to aesthetics, disruption of local livelihood and communications patterns, presence of and interaction with the	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	<u>Contractor</u> Prepare plan and monitor implementation <u>Engineer</u> Review plan and monitor implementation. <u>YMPIU</u> Monitor the Engineer	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
	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.	expertise on operation of quarry and borrow pit, dumping site, concrete batching asphalt plants when needed; 5. In the event, that new quarries, concrete batching and asphalt plants are required, the appropriate agreement/license and nature protection expertise approvals shall be obtained from the Ministry of Nature Protection and Ministry of Energy and Natural 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.		

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		11. Prepare and submit for YMPIU approval the Method statement of works for operation of quarries and borrow pits, dumping sites, concrete batching asphalt plants.		
		9. Traffic and Access Management Plan		
12. 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.	Contractor Prepare, implement and manage the plan Engineer Review plan, monitor implementation and management YMPIU 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. Cost of spraying water on construction dirt roads and tracks is already accounted in point 10 above.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		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. 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		

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		safety issue and for controlling dust emission.		
		10. Emergency Response Plan		
13. Handling hazardous substances and other emergency situations (incidents, accidents, etc.)	Leakage or spillage of diesel fuel, oil or other toxic substances entering soil, and groundwater.	1. Provides to the DESC 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 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	<u>Contractor</u> Prepare plan Dispose of Hazardous Materials per MNP directive get the liaison with MNP <u>Engineer</u> Review plan & Monitor implementation <u>YMPIU</u> Assist in getting the liaison with MNP. Review and monitor the Engineer	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 3 above. Cost of 3 days of training of the 10 members of the Emergency Response Team at US\$ 50 per day, plus the fees of 3 days of a trainer at US\$ 75, is estimated at: US\$ 1725

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		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. 13. Inform the Engineer on any accidents (incidents) immediately and report by filling in the accident report form.		
		11. Waste and Material Disposal Plan		
14. 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	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	Contractor Prepare plan, implement and monitor To get liaison with MNP/YM Engineer Review plan & monitor implementation	Cost of developing, implementing and managing this plan by the Contractor is already included in general construction costs. Implementation of this plan (and related permitting) will be supervised by the Contractor's HSE specialist. Its cost is already accounted in point 4 above.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
	Potential safety hazards related to construction materials not cleared from the construction site	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 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.	<u>YMPIU</u> Assist to getting the liaison with MNP. Review and monitor the Engineer.	

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		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		
15. Site re-instatement of all areas Re-vegetation, and landscaping	Construction waste and materials are not removed and are left on construction sites Refers to construction sites, constructor's camps and facilities, dump sites, borrow pit and quarries, concrete and asphalt plant areas Cleared vegetation and trees are not fully recompensed by vegetation	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. Reinstatement natural drainage and other utilities. 4. Restore the soil layer and loosen soil caused by heavy machinery. 5. Clean the construction site from the litter and traces of oil and fuel spillages if any. 6. Restore the state of construction tracks up to the previous state. 7. Implement check-list prepared for final sign-off by YMPIU. 8. Perform the vegetation restoration works according to the Landscaping plans specifically developed for	Engineer Provide landscaping design Contractor Hire approved landscape contractor to implement plan Engineer Review plan and monitor implementation. Monitor tree and other plants survival during works and defects liability YMPIU Monitor the Engineer and monitor trees and other plants survival	Costs are related to community trees and shrubs only. Costs of private trees, shrubs and crops affected by the Project are compensated as part of the LARP. According to the survey performed in April 2015 on trees and shrubs that will be potentially cut down due to the road extension and the construction activities (see appendix 8), 139 trees will be cut. Cost of planting 834 seedlings of Trees at US\$ 50 is estimated at: US\$ 41 700

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
	restoration works.	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 have been provided in the landscape design or instructed by the Engineer. (See also Annex 7 Landscape design at Concept design stage) • Species should be relatively easy to propagate and to maintain • Replant trees, shrubs and bushes according to the landscape design provided by the Engineer and agreements with heads of affected community. • Plant seedlings of trees at a ratio of 1:6 i.e. 6 seedling trees for every single community tree or shrub cut down in the project right of way. According to the survey performed in April-May 2015 on trees and shrubs that will be potentially cut down due to the road extension and the construction activities (see appendix 8), 139 trees are concerned, therefore 834 seedlings of trees should be planted of which 85% of trees (709 u.) should be planted to respect the ratio between existing trees and shrubs affected by the Project. • Maintain tree and shrub seedlings as well as other plants during the construction. After the defect liability period the maintenance responsibility shall be transferred to the YM.		

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		(Note that defect liability period will continue through the initial period of the Operation phase).		
POST-CONSTRUCTION PHASE (Operation and maintenance)				
16.Defect correction works	All the impacts identified in Construction Phase	1. Activity-specific mitigation measures envisaged in the Construction Phase	<u>Contractor</u> Implements the EMP and SEMP for the time period the Contractor has implemented defect correction works and provides environmental safeguard reports to YM <u>YM</u> Implements works on road maintenance ensuring cleanliness and safety	Cost of long term monitoring by the Contractor cannot be evaluated at the moment.
Noise and vibration	Nuisances from noise and vibration during operation	1. Especially in the areas where the noise level is low based on the results of noise baseline investigations should be implemented noise specialist investigations and based on the survey results mitigation measures should be developed and implemented.	<u>YM</u> Hire appropriate specialist to make investigations and develop appropriate measures if needed in operation stage.	Cost of investigations and father actions by the YM cannot be evaluated at the moment.
17.Re-vegetation	Vegetation does grow as expected	1. Include plants implemented for the Project in Municipality of Yerevan vegetation maintenance operations. 2. Monitor the growth and health state of trees, shrubs, other plants and lawn. Replace any death	<u>YM</u> Maintain trees shrubs and lawns during the defects liability and operation phase	Cost of long term maintenance by the YM cannot be evaluated at the moment.

Table 1: Environmental Management Plan: Mitigation
Davitashen to Ashtarak Highway

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation (US\$)
		damaged or unhealthy specimens. Reseed incorrectly grown surfaces of lawn.		
18.Environmental Audit		1. Post-construction environmental audit will be prepared and submitted to ADB	<u>YM/YMPIU</u>	Cost of environmental audit will be included in YMPIU budget

Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
CONSTRUCTION PHASE (To be updated by the Contractor with the assistance of the DESC Environment Specialist prior to begin construction and thereafter, as required)						
1. Work opportunities for local workers, unskilled workers and women	local workers, unskilled workers and women hired	All Construction sites (Including Right of way, Borrow pits, Dump sites, Construction camps)	Documentation review including number of effective job postings intended to local workers, unskilled workers and women by Contractor	Number of local workers, unskilled workers and women that have been hired on the project.	<u>Contractor</u> Development of an hiring program for local workers, unskilled workers and women <u>Engineer</u> Environmental Specialist reviews the Contractor's hiring program. Supervision cost will be included in Engineer budget <u>YMPIU</u> 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	<u>Contractor</u> Development of the Occupational Health & Safety Plan Monitoring cost to be included in Contractor's budget <u>Engineer</u> Environmental Specialist reviews and monitors the Occupational Health and Safety Plan Monitoring cost to be included in Engineer budget <u>YMPIU</u> Supervise the Engineer	According to regular monitoring schedule Plan must be developed and validated prior the commencement of construction activities
3.	Information of	All	Documentation	The Public Consultation and	<u>Contractor</u>	According to regular

Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway

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

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
Relocation	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 monitors the Utilities Protection and Relocation Plan Supervision cost to be included in Engineer budget YMPIU/PMIC 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	All construction sites Sensitive receptors for Dust, Noise & Vibration located at 50 m or less from construction activities Monitoring points identified in Dust, , Noise & Vibration baseline data and regular monitoring plan	Visual review through the construction sites' inspections Review of the register of complaints Air quality instrumented measurements Noise instrumented measurement Vibration instrumented measurements	The Environmental (Dust, 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 of the Environmental Protection Plan. Monitoring cost to be included in Contractor's budget Engineer Environmental Specialist reviews and monitors the Environmental Protection Plan and follows Contractor's actions to protect the environment. Supervision cost to be included in Engineer budget YMPIU Supervise the Engineer	According to monitoring schedule specified by Contractor in Dust, 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

Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
				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)		frequently during dry 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	<u>Contractor</u> Development of the Construction Work Camps Plan Monitoring cost to be included in contractor budget <u>Engineer</u> Environmental Specialist reviews and monitors the Construction Work Camps Plan Supervision cost to be included in Engineer budget <u>YMPIU</u> 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 batching,	Quarry, borrow pit, concrete batching, asphalt plants and dumping site	Documentation review Sites' visits	The Sites Management Plan is available The layout of the Construction Work Camp(s) complies with specifications of the Plan	<u>Contractor</u> Development of the Sites Management Plan Monitoring cost to be included in contractor budget <u>Engineer</u> Environmental Specialist reviews and monitors the Sites Management Plan Supervision cost to be included in Engineer budget	According to regular formal monitoring schedule The Plan must be developed and validated prior the commencement of

Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
site	asphalt plants and dumping site Nuisances to affected communities			Number and severity of complaints logged in the Register of Complaints	YMPIU Supervise the Engineer.	construction activities
9. Traffic and Access management	Itineraries and accesses location Nuisances and safety issues related to communities Damages to road and utilities (mainly drainage)	Roads use for transportation of equipment, and material Accesses to the construction site	Documentation review Sites' visits	The Traffic and Access management Plan is available for review Itineraries and access locations and layouts complies with specifications of the Plan Number and severity of complaints logged in the Register of Complaints	Contractor Development of the Traffic and Access management Plan Monitoring cost to be included in contractor budget Engineer Environmental Specialist reviews and monitors the Traffic and Access management Plan Supervision cost to be included in Engineer budget YMPIU Supervise the Engineer. Supervision cost to be included in PMIC budget	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 their training	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

Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
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	<u>Contractor</u> Development of the Emergency Response Plan Monitoring cost to be included in contractor budget <u>Engineer</u> Environmental Specialist reviews the Emergency Response Plan Supervision cost to be included in Engineer budget <u>YMPIU</u> 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
Davitashen Ashtarak Highway

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	<u>Contractor</u> 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 <u>Engineer</u> Environmental Specialist reviews Site Reinstatement, Landscaping, and Re-vegetation Plan Monitors vegetation developments Supervision cost to be included in Engineer budget <u>YMPIU</u> 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,	Recorded information	Review	All available, recorded correctly, any follow-up has been carried out as required	<u>Contractor</u> <u>Completes and monitors checklists, logs, consultation records, training records</u> <u>Obtains Licenses, and Permits</u> <u>Engineer</u> Ensure compliance, Report to YMPIU <u>YMPIU</u> Review the Engineer reports	The Contractor transfer documents monthly at minimum Engineer submits a monthly and quarterly progress report YMPIU prepare a biannual

**Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway**

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
	Licenses, and Permits				Report to ADB	report to ADB

Table 2: Environmental Management Plan: Monitoring
Davitashen Ashtarak Highway

Location / Activity / Phase (as relevant)	Parameters to be Monitored	Monitoring Location/s	Instruments & Method	Environmental Performance Indicator	Responsible Entities	Frequency (formal monitoring)
OPERATION PHASE (To be updated by the Contractor with the assistance of YMPIU Environment Specialist prior to start operation and thereafter, as required)						
14. Traffic movements	Noise impacts Air pollutants from vehicle emissions	Project right of way	Complaints from sensitive receptors Noise meter Vibration meter Air quality sampling	Review of Complaints from sensitive receptors Perform Noise & Vibration monitoring and Air Quality samplings to check compliance of levels with RA legislation	<u>YM</u> collects and analysis Noise & Vibration and Air Quality data Monitors specialized monitoring company The cost of monitoring will be included in contractor budget <u>YM</u> Report to ADB	Control Noise & Vibration 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	<u>Contractor</u> 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 <u>YM</u> 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			<u>Safety is Controlled by Police</u>	

ANNEX 4 Alignment Sheet

Tranche 2 - Davtashen - Ashtarak Highway

The following alignment sheet provides an overview of environmentally sensitive hotspots and receptors alongside the Tranche 2: Davtashen Ashtarak Highway Highway with reference to the project chainage. The alignment sheets serve as a base for identifying localized impacts of the project from the road construction and operation.

No.	Location	Km	Issue	Parameters to be checked during Construction and Operation
1.	Davtashen - ashtarak Highway	0+000 - -400 and 1+900 - 2.100	Existing 139 street trees will be cut down	Re-instatement and landscaping (see instructions of the EMP - Annex 5 and Annex 7 Landscaping design)
				
2.	Davtashen - Ashtarak Highway	0+500 - 1+800	Dwellings and adjacent residential buildings situated near the project alignment that will be impacted by the project.	Noise, vibration and Dust (See EMP for parameters to be measured during construction).
				
4.	Davtashen - Ashtarak Highway	0+400 - 0+700	Accumulations of construction wastes in the project right of way	Additional waste accumulation on the archeological site (see instructions given on that matter in the EMP - Annex 4)

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

ANNEX 5



Report of survey of fauna and flora along highway in section S9



Survey of fauna and flora along section S9 of highway was implemented on April 21-27, 2015. The studied area contain three parts. The first part started from near to Vahagni taghamas, is situated in the semidesert zone where have been found typical for this landscape animals. The second part full of in habitat houses and garages. The third part near to Halabyan street, mainly is junk yard.

The standard methodology of zoological and botanical researches were used to survey and census of the different species of animals and plants.



Fauna of Section S9

Methodology.

Observation and collection of the invertebrate have been made over 6 days period. Weather conditions during the survey were sunny and warm.

Survey methods for vertebrates and invertebrates 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, Хейер и др,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.

The registration was carried out mainly in the morning. The route passes at an average speed of accounting course from 0.8 to 2.5 km / h, if possible without lengthy stops. We used the method of spot accounting due to a very fragmented habitats and dissection area with a combination of elements of counts at transects and at the sites (Винокуров, 1963, Muller, 1987). We also recorded the presence of traces, dens and other products of life of animals.

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. When possible, specimens were photographed.

RESULTS

Invertebrates

The studied area is characterized by acute anthropogenic influence, resulting of establishment of formation with the extremely poor animals. We have found large distributed species.

Vertebrates

Amphibians

During our studies reviewed only one species of amphibians, green toad (*Bufo* / *Pseudopedalia* / *variabilis*): This species is widely distributed in the whole territory of Armenia.

Reptiles

Four species of lizards Caucasian Agama (*Laudakia caucasica*), *Lacerta media*, *Lacerta strigata*, *Darevskia raddei nairensis* were recorded in study area. During previous surveys (Aslanyan and others, 2003) we have found number of reptiles species: *Typhlops vermicularis*, *Dolichophis schmidtii*, *Eirenis collaris*, *Eirenis punctatolineatus*, *Hemorrhois nummifer*, *Telescopus fallax*, *Macrovipera lebetina*:

Birds. In the study area we recorded 20 species of birds, 18 of which were recorded visually. The presence of European bee-eater (*Merops apiaster*) confirmed at the hearing. As for the goldfinch (*Carduelis carduelis*), this species is very characteristic for neighborhoods of the city, especially if there are areas with gardens. Such places are present on the territory of the area near to Vahagni taghamas, where the private houses situated. On the studied area is carried out grazing, which leads to the accumulation of manure and attract relevant species of insects, which are food supply for a number of birds such as (*Upupa epops*). Landfills also contribute to attracting some species such as (*Corvus corone* and *Corvus monedula*). In urban areas (middle part and third part of S9 section) the pigeons are marked.

Thus the proximity of the source of food and rise of trophic relations with the settlements, the emergence of convenient nesting niches, lesser amounts of predators - facilitates entry into the anthropogenic landscape of growing number of species. We have not found species listed in the Red Book of Armenia. All species can be considered as synanthropic species, successfully adapted to the urban environment.

As a result of field research in the area we recorded 20 species of birds

Table 1

Family	Species	Red Data Book of RA	IUCN
APODIDAE	<i>Apus apus</i>		LC

MEROPIDAE	<i>Merops apiaster</i>		LC
UPUPIDAE	<i>Upupa epops</i>		LC
COLUBIDAE	<i>Columba livia</i>		LC
COLUBIDAE	<i>Streptopelia senegalensis</i>		LC
ALAUDIDAE	<i>Galerida cristata</i>		LC
HIRUNDINIDAE	<i>Hirundo rustica</i>		LC
MOTACILLIDAE	<i>Motacilla alba</i>		LC
MOTACILLIDAE	<i>Anthus compestris</i>		LC
TURDIDAE	<i>Oenanthe hispanica</i>		LC
TURDIDAE	<i>Oenanthe oenanthe</i>		LC
TURDIDAE	<i>Oenanthe isabellina</i>		LC
TURDIDAE	<i>Phoenicurus phoenicurus</i>		LC
CORVIDAE	<i>Pica pica</i>		LC
CORVIDAE	<i>Corvus monedula</i>		LC
CORVIDAE	<i>Corvus corone</i>		LC
SYLVIIDAE	<i>Phylloscopus sibilatrix</i>		LC
PARIDAE	<i>Parus major</i>		LC
PASSERIDAE	<i>Passer domesticus</i>		LC
FRINGILLIDAE	<i>Carduelis carduelis</i>		LC

Mammals.

Species list of mammals at S9 section made basing on the analysis of our studies. During our survey, we have found only 5 mammals species. First part of Section S9 *Vulpes vulpes* were seen. There were no burrows in studied area because of degeneration of the ecological community. Common pipistrelle and Kuhl's pipistrelle bats were recorded by ultrasound detectors Pettersson D230, D240x. Other 3 small mammals species are common for the human habitats, vine yards and junk yards (*Erinaceus concolor*, *Sylviaemus witherbyi*, *Rattus norvegicus*, *Crocidura gueldenstaedti*).

Table 2

Family	Species	Red data Book of RA	IUCN
Erinacidae	<i>Erinaceus concolor</i>		LC
Soricidae	<i>Crocidura gueldenstaedti</i>		
Vespertilionidae	<i>Pipistrellus kuhli</i>		LC

	Pipistrellus pipistrellus		LC
Leporidae	Lepus europaeus		LC
Canidae	Vulpes vulpes		
Muridae	Sylvaemus witherbyi		LC
	Rattus norvegicus		LC

There were no species listed in IUCN Red list and in Red Book of RA.

Suggestions

During highway construction works all vertebrate animals should be caught by the specialists, placed in special containers and transported to the area typical for the species, far from human settlements.

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Flora of Section S9

The flora of the target territory was studied on the fieldwork, where the known plant species were recorded on place and some herbarium collections were made. The herbarium specimens have been identified using «Flora of Yerevan» by A.Takhtajan and A.Fyodorov (1972) and «Flora of Armenia» (1-11 volumes, 1954-2009): Availability of rare and threatened species has been checked by Red Data Book of Armenia (2010) as well as some recent scientific publications. In a result of the flora inventory a list of flora, including 62 vascular plant species was composed (see the Table 3). The abundance is mentioned for each species. **No any species listed in the Red Data Book of Armenia or IUCN Red List have been found.**

The territory includes a small fragment of absinth semidesert under the strong human impact, where mostly weed plant species (*Lepidium draba*, *Roemeria hybrida*, *Capsella bursa-pastoris*, *Descurainia sophiae*) are spread, but also some representatives of aboriginal flora have survived such as *Artemisia fragrans*, *Ornithogalum navaschinii*, *Cnicus benedictus* and some others. Other parts of the area are represented with completely transformed landscapes full of thombs and debris. These areas are inhabited with weeds, somewhere small shrubberies – the result of natural reproduction of elm are found.

The trees growing on the target territory have been counted taking into account the tree species and the girth. The girth was measured on 1,3m heigh. The data on the trees is given in the Table 4. 139 trees in total have been counted.

Table 3

N	Species Latin name	Dominant	Not many	A few	Presence in the Red data Book of Armenia, IUCN Red List
1	<i>Poa bulbosa</i>	+			
2	<i>Roemeria hybrida</i>	+			
3	<i>Senecio vernalis</i>	+			
4	<i>Ceratocephalus falcatus</i>	+			
5	<i>Descurainia sophiae</i>	+			
6	<i>Lepidium draba</i>	+			

7	<i>L. perfoliatum</i>	+			
8	<i>Arthemisia fragrans</i>	+			
9	<i>Taraxacum officinale</i>	+			
10	<i>Alyssum desertorum</i>	+			
11	<i>A.minus</i>	+			
12	<i>Taeniatherum crinitum</i>	+			
13	<i>Crepis sancta</i>	+			
14	<i>Lithospermum officinalis</i>	+			
15	<i>Chorispota tenella</i>	+			
16	<i>Fumaria officinalis</i>	+			
17	<i>Capsella bursa pastoris</i>	+			
18	<i>Phleum phleoides</i>	+			
19	<i>Galium aparine</i>	+			
20	<i>Anthriscus cerefolium</i>	+			
21	<i>Asperugo procumbens</i>	+			
22	<i>Chenopodium album</i>		+		
23	<i>Achillea millefolium</i>		+		
24	<i>Erodium cicutarium</i>		+		
25	<i>Androsace maxima</i>		+		
26	<i>Euphorbia sequieriana</i>		+		

27	<i>Myosotis heteropoda</i>		+		
28	<i>Carex sp.</i>		+		
29	<i>Capparis spinosa</i>		+		
30	<i>Papaver dubium</i>		+		
31	<i>Rumex acetosa</i>		+		
32	<i>Fragmites australis</i>		+		
33	<i>Stellaria media</i>		+		
34	<i>Polygonum aviculare</i>		+		
35	<i>Rosa sp.</i>		+		
36	<i>Lamium amplexicaule</i>		+		
37	<i>Cnicus benedictus</i>			+	
38	<i>Sisymbrium loeselii</i>			+	
39	<i>Tripleurospermum inodorum</i>			+	
40	<i>Adonis aestivalis</i>			+	
41	<i>Cirsium sp.</i>			+	
42	<i>Callistegia sepium</i>			+	
43	<i>Papaver commutatum</i>			+	
44	<i>Centaurea virgata ssp. squarrosa</i>			+	
45	<i>Glaucium corniculatum</i>			+	
46	<i>Rhamnus pallasii</i>			+	
47	<i>Helianthemum ledifolium</i>			+	

48	<i>Ornitogalum navaschinii</i>			+	
49	<i>Cerasus mahaleb</i>			+	
50	<i>Veronica multifida</i>			+	
51	<i>Verbascum orientale</i>			+	
52	<i>Stipa capillata</i>			+	
53	<i>Anchusa arvensis</i>			+	
54	<i>Malcolmia africana</i>			+	
55	<i>Rubus armeniaca</i>			+	
56	<i>Reseda lutea</i>			+	
57	<i>Arctium lappa</i>			+	
58	<i>Trigonella coerulescens</i>			+	
59	<i>Sclerochloa dura</i>			+	
60	<i>Vicia sp.</i>			+	
61	<i>Malva neglecta</i>			+	
62	<i>Astragalus ornithopodioides</i>			+	

Table 4

Tree name	The number according to the girth				Total number
	5-20cm	21-35cm	36-50cm	100cm	

Ulmus sp. shrublike	13 5	16	17 1		52
Populus nigra		4	6	1	11
Ailanthus altissima	5				5
Fraxinus excelsior Shrublike	36 1				37
Armeniaca vulgaris	2	10			12
Cerasus sp.	3	2			5
Malus sp.		8			8
Eleagnus angustifolia		3	1		4
Juglans regia		1			1
Morus sp.			2		2
Dry trees		2			2
Total					139

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Conclusion

In accordance with the Contract signed by us there were conducted measurements of noise and vibration levels in five Points along Melkumov Street and Yeghvard highway, as well as on intersection of Iosifyan and Halabyan streets (in the middle points of «Reproductive Health, Perinatology, Obstetrics and Gynecology Institute "CJSC and "Radiation Medicine and Burns Scientific Research Center " buildings) of Yerevan town. The measurements have been taken by Sergey Karapetyan, Head of Sanitary-Hygienic Department of “Disease Control & Prevention Center” CJSC, M. of HC, RA and by Moses Yeritsyan, an engineer of the same department. In taking measurements first-class OKTAVA 110A MAXIMA sound level meter produced in 2009 was used. Every year including 14.11.2014 it was calibrated by the National Institute of Metrology of Ministry of Economics, RA, which has been entitled to carry out activities of the kind.

Selection of measurement points has been made by taking into consideration the sections which most typify noise and vibration levels of the given road. The measurements have been taken 24 hours incessantly, which allows to get average figures. Traffic intensity on Melkumov Street and Yeghvard highway, as well as on intersection of Iosifyan and Halabyan streets was taking into account and the picture is the followign: 1100-1300 vehicles per hour during daytime and apprx. 600-700 vehicles per hour during night time.

Noise measurements performed on 24.04.2015 and 25.04.2015 are concluded with the mentioned below results:

- «Point 1» exept from 02:00 to 08:00 and from 20:00 to 22:00, level of sound pressure in octave layers with average geometrical frequencies equivalent sound levels LAeq dBA and maximum sound levels dBA Lmax exceed the requirements specified in the sanitary-hygienic norms /SN N 2III-11.3/, point 5, table 3, sub-point 9.
- «Point 3» from 22:00 to 02:00 and from 08:00 to 22:00 level of sound pressure in octave layers with average geometrical frequencies equivalent sound levels LAeq dBA exceed the requirements specified in the sanitary-hygienic norms /SN N 2III-11.3/, point 5, table 3, sub-point 9.
- «Point 5» almost all the indices, including level of sound pressure in octave layers with average geometrical frequencies equivalent sound levels LAeq dBA and maximum sound levels dBA Lmax exceed the requirements specified in the sanitary-hygienic norms /SN N 2III-11.3/ point 5, table 3, sub-point 8.
- «Point 2» and «Point 4» all the indices of level of sound pressure correspond to requirements specified in the sanitary-hygienic norms /SN N 2III-11.3/ point 5, table 3, sub-point 9.

Vibration measurements in the same point have shown that vibration level in octave layers with average geometrical frequencies (Hz) and adjusted levels are consistent with the requirements defined in ՀՆ N 2.2.4-009-06 sanitary-hygienic norms.

Taking into account the alightment of the future road, it is predicted that level of sound will be changed in Points 2, 3, 4 and in order to improve the situation there can be preformed mitigation measurements, such as: organizational, urbam development, architectual and other. For «Point 1» and «Point 5» as mitigation measurements can be also envisaged the construction of transport junctions, which can also incorporate road widening and upgrading works.

Attached you will find the results of measurements

Sergey Karapetyan

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

Conclusion

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

Note

When summing up the results of measurements, traffic volume/intensity was
taken into account (day time, on the average 1100-1300 vehicles/hour, night
time 600-700 vehicles/hour), UՆ N 2III-11.3 sanitary norms Point 5, table 3,
subppoints 8 and 9, and Point 2 of the Note

Sanitary doctor

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

Signature

RA Ministry of Health Care		Medical Document
Name of the Institution		

Protocol of Noise measurement from 24.04.2015 to 25.04.2015

1. Place of measurement **Yerevan, Melkumov street, Yeghvard highway, Iosifyan and
Halabyan intersections**
(Name of the object)

(address)

2. The measurements have been taken in presence of the representative of the surveyed object

(position, name, second name, middle name, surname)

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

N 3292

(inventory number)

4. Information on state control

(ամիս, ամսաթիվ)

N 006355 as of 14.11.2014թ., is in force untill 14.11.2015թ.

(certificate number, reference)

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

UՆ N 2 III -11.3

6. Main sources of noise and the nature of that noise

Transportation

**THE REPUBLIC OF ARMENIA
MINISTRY OF HEALTH CARE**

17 May 2006
Yerevan

N 533-Ն

DECREE

**WORKPLACES, RESIDENTIAL AND PUBLIC BUILDINGS AND RESIDENTIAL BUILT-UP
AREAS"**

Table 7

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

Octave layers with average geometrical frequency Hz	Permissible values on X_0 , Y_0 and Z_0 axes	
	Acceleration of vibration	
	m/sec $\cdot 10^{-3}$	dB
2	4	72
4	4.5	73
8	5.6	75
16	11	81
31.5	22	87
63	45	93
Adjusted values and equivalent adjusted values and their levels	4	72
1. During daytime it is allowed to exceed the permissible level by 5 dB.		
2. There is correction for permissible levels of non permanent vibration, which becomes 10dB, and absolute values are multiplied by 0,32.		
3. For hospital rooms, resorts, infant and pre-school organizations it is necessary to reduce the permissible levels of vibration by 3dB.		

S9-IC East

TAG	BINOMIAL NAME	COMMON NAME	%	QUANTITIES	SURFACE AREA	DENSITY
A.p	Acer platanoides	Norway maple				Unit
A.c	Acer campestre	Field maple		13		Unit
A.p	Acer pseudoplatanus	Sycamore maple				Unit
A.t	Acer tataricum	Tatarian maple				Unit
C.c	Carpinus caucasica	Caucasian hornbeam				Unit
C.s	Cercis siliquastrum	Judas tree		6		Unit
F.e	Fraxinus excelsior	European ash				Unit
J.r	Juglans regia	English walnut		4		Unit
P.t	Paulownia tomentosa	Empress tree				Unit
P.o	Platanus orientalis	Oriental plane tree		5		Unit
P.a	Platanus x acerifolia	Hybrid plane tree		9		Unit
Q.m	Quercus macranthera	Caucasian oak		1		Unit
Q.r	Quercus robur	Pedunculate oak				Unit
S.b	Salix babylonica	Babylon weeping willow		1		Unit
S.c	Salix caprea	Goat willow				Unit
S.a	Sorbus aucuparia	Mountain ash		4		Unit
U.l	Ulmus laevis	European white elm		1		Unit
B.o	Biota orientalis	Oriental thuja		4		Unit
Co.ho	Cotoneaster horizontalis	Rock cotoneaster	100%	0		5 U/m ²
Ca.ar	Caragana arborescens	Siberian peashrub	100%	330	330	1 U/m ²
Li.vu	Ligustrum vulgare	European privet	100%	0		3 U/m ²
Hi.Sh	Cydonia oblonga	Quince	20%	320	1600	1 U/m ²
	Elaeagnus angustifolia	Russian-olive	30%	480		1 U/m ²
	Sambucus nigra	Elderberry	30%	480		1 U/m ²
	Prunus mahaleb	Rock cherry	20%	320		1 U/m ²
Me.Sh 1	Berberis thunbergii	Red barberry	35%	735	700	3 U/m ²
	Buddleia davidii	Butterfly-bush	40%	280		1 U/m ²
	Forsythia suspensa	Weeping forsythia	25%	350		2 U/m ²
Me.Sh 2	Cornus sanguinea	European dogwood	40%	352	440	2 U/m ²
	Hibiscus syriacus	Rose of sharon	20%	264		3 U/m ²
	Philadelphus coronarius	Sweet mock-orange	30%	396		3 U/m ²
	Quercus pontica	Armenian oak	10%	88		2 U/m ²
Sm.Sh 1	Lonicera tatarica	Tartarian honeysuckle	20%	531	885	3 U/m ²
	Spiraea x vanhouttei	Spiraea	30%	797		3 U/m ²
	Symphoricarpos albus	Snowberry	30%	797		3 U/m ²
	Weigelia florida	Old fashioned weigela	20%	531		3 U/m ²
Sm.Sh 2	Rosa sp.	Rose	20%	1700	1700	5 U/m ²
	Spiraea japonica	Japanese spiraea	60%	3060		3 U/m ²
	Tamarix araratica	Salt-cedar	20%	1020		3 U/m ²



N/Հյ.
S/Հւ.

SCHEDULE OF MATERIALS

CODE	ITEM DESCRIPTION	QTY.
	Cover crop	13730m²
	Boulders formation	1028 m²
	Proposal right of way	
	Trees	48u
	H-sh: High shrubs size	1420 m²
	Me-sh 1: Medium shrubs size - Palette 1	613m²
	Me-sh 2: Medium shrubs size - Palette 2	379 m²
	Sm-sh 1: Small shrubs size - Palette 1	769 m²
	Sm-sh 2: Small shrubs size - Palette 2	1473 m²
	Cotoneaster horizontalis	- m²
	Caragana aphyllascens	291 m²
	Ligustrum vulgare	- m²

TAG	BINOMIAL NAME	COMMON NAME	%	QUANTITIES	SURFACE AREA	DENSITY
A.p	Acer platanoides	Norway maple				Unit
A.c	Acer campestre	Field maple		13		Unit
A.p	Acer pseudoplatanus	Sycamore maple				Unit
A.t	Acer tataricum	Tatarian maple				Unit
C.c	Carpinus caucasica	Caucasian hornbeam				Unit
C.s	Cercis siliquastrum	Judas tree		6		Unit
F.e	Fraxinus excelsior	European ash				Unit
J.r	Juglans regia	English walnut		4		Unit
P.t	Paulownia tomentosa	Empress tree				Unit
P.o	Platanus orientalis	Oriental plane tree		5		Unit
P.a	Platanus x acenifolia	Hybrid plane tree		9		Unit
Q.m	Quercus macranthera	Caucasian oak		1		Unit
Q.r	Quercus robur	Pedunculated oak				Unit
S.b	Salix babingtonia	Babylon weeping willow		1		Unit
S.c	Salix caprea	Goat willow				Unit
S.a	Sorbus aucuparia	Mountain ash		4		Unit
U.i	Ulmus laevis	European white elm		1		Unit
B.o	Bota orientalis	Oriental thuja		4		Unit
Co.ho	Cotoneaster horizontalis	Rock cotoneaster	100%	0		5 U/m²
Ca.ar	Caragana arborecens	Siberian peashrub	100%	330	330	1 U/m²
Li.w	Ligustrum vulgare	European privet	100%	0		3 U/m²
	Cydonia oblonga	Quince	20%	320		1 U/m²
Hi.Sh	Elaeagnus angustifolia	Russian-olive	30%	480	1600	1 U/m²
	Sambucus nigra	Elderberry	30%	480		1 U/m²
	Prunus mahaleb	Rock cherry	20%	320		1 U/m²
Me.Sh	Beberis thunbergii	Red barberry	35%	735		3 U/m²
	Buddelia davidii	Bittern-bush	40%	280	700	1 U/m²
	Forsythia suspensa	Weeping forsythia	25%	350		2 U/m²
	Cornus sanguinea	European dogwood	40%	352		2 U/m²
Me.Sh	Hibiscus syriacus	Rose of Sharon	20%	284		3 U/m²
	Philadelphus coronatus	Sweet mock-orange	30%	366	440	3 U/m²
	Quercus pontica	Armenian oak	10%	88		2 U/m²
	Lonitica tatarica	Tartarian honeysuckle	20%	531		3 U/m²
Sm.Sh	Spiraea x vanhouttei	Spiraea	30%	797	885	3 U/m²
	Symphoricarpos albus	Snowberry	30%	797		3 U/m²
	Weigelia florida	Old fashioned weigela	20%	531		3 U/m²
	Rosa sp.	Rose	20%	1700		5 U/m²
Sm.Sh	Spiraea japonica	Japanese spiraea	60%	3060	1700	3 U/m²
	Tamarix araratica	Salt-cedar	20%	1020		3 U/m²

REFERENCES

REVISIONS

2 25/05/2015 Updated according to comments and new design project

1 08/12/2014 First Issue for Approval

COPIES: 10

DATE: 25/05/2015

PROJECT: Yerevan Bypass Interchange East

SCALE: 1:1000

PHASE: 3

DESIGN: 9

STRUCTURES: 1

SUBJECT: 5

TYPE: D

FREE NUMBER: 501

REV.: 2

REPUBLIC OF ARMENIA Հայաստանի Հանրապետություն

YEREVAN MUNICIPALITY Երևանի քաղաքապետարան

CONSULTANT

egis

FUNDING AGENCY

ADB

IMPLEMENTING AGENCY

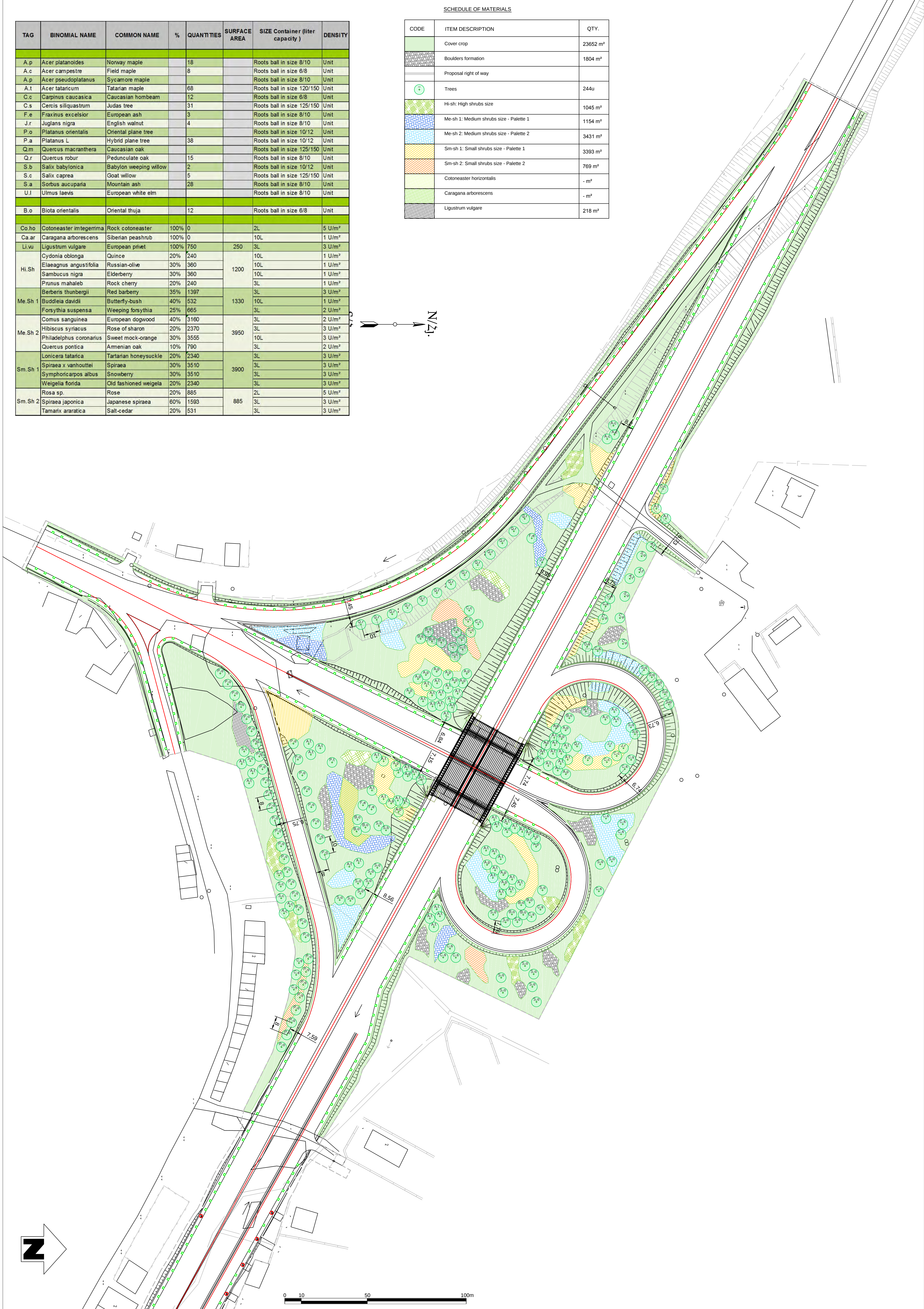
YEREVAN AGENCY

LANDSCAPE DESIGN PLANTING PLAN INTERCHANGE EAST

YEREVAN BYPASS Task 03

CODE	ITEM DESCRIPTION	QTY.
	Cover crop	23652 m²
	Boulders formation	1804 m²
	Proposal right of way	
	Trees	244u
	Hi-sh: High shrubs size	1045 m²
	Me-sh 1: Medium shrubs size - Palette 1	1154 m²
	Me-sh 2: Medium shrubs size - Palette 2	3431 m²
	Sm-sh 1: Small shrubs size - Palette 1	3393 m²
	Sm-sh 2: Small shrubs size - Palette 2	769 m²
	Cotoneaster horizontalis	- m²
	Caragana arborescens	- m²
	Ligustrum vulgare	218 m²

TAG	BINOMIAL NAME	COMMON NAME	%	QUANTITIES	SURFACE AREA	SIZE Container (liter capacity)	DENSITY
A.p	Acer platanoides	Norway maple		18		Roots ball in size 8/10	Unit
A.c	Acer campestre	Field maple		8		Roots ball in size 6/8	Unit
A.p	Acer pseudoplatanus	Sycamore maple				Roots ball in size 8/10	Unit
A.t	Acer tataricum	Tatarian maple		68		Roots ball in size 120/150	Unit
C.c	Carpinus caucasica	Caucasian hornbeam		12		Roots ball in size 6/8	Unit
C.s	Cercis siliquastrum	Judas tree		31		Roots ball in size 125/150	Unit
F.e	Fraxinus excelsior	European ash		3		Roots ball in size 8/10	Unit
J.r	Juglans nigra	English walnut		4		Roots ball in size 8/10	Unit
P.o	Platanus orientalis	Oriental plane tree				Roots ball in size 10/12	Unit
P.a	Platanus L	Hybrid plane tree		38		Roots ball in size 10/12	Unit
Q.m	Quercus macranthera	Caucasian oak				Roots ball in size 125/150	Unit
Q.r	Quercus robur	Pedunculate oak		15		Roots ball in size 8/10	Unit
S.b	Salix babylonica	Babylon weeping willow		2		Roots ball in size 10/12	Unit
S.c	Salix caprea	Goat willow		5		Roots ball in size 125/150	Unit
S.a	Sorbus aucuparia	Mountain ash		28		Roots ball in size 8/10	Unit
U.l	Ulmus laevis	European white elm				Roots ball in size 8/10	Unit
B.o	Biota orientalis	Oriental thuja		12		Roots ball in size 6/8	Unit
Co.ho	Cotoneaster integerrima	Rock cotoneaster	100%	0		2L	5 U/m²
Ca.ar	Caragana arborecens	Siberian peashrub	100%	0		10L	1 U/m²
Li.yu	Ligustrum vulgare	European privet	100%	750	250	3L	3 U/m²
	Cydonia oblonga	Quince	20%	240		10L	1 U/m²
	Elaeagnus angustifolia	Russian-olive	30%	360		10L	1 U/m²
	Sambucus nigra	Elderberry	30%	360		10L	1 U/m²
	Prunus mahaleb	Rock cherry	20%	240		3L	1 U/m²
	Berberis thunbergii	Red barberry	35%	1397		3L	3 U/m²
	Buddleia davidii	Butterfly-bush	40%	532	1330	10L	1 U/m²
	Forsythia suspensa	Weeping forsythia	25%	665		3L	2 U/m²
	Comus sanguinea	European dogwood	40%	3160		3L	2 U/m²
	Hibiscus syriacus	Rose of sharon	20%	2370		3L	3 U/m²
	Philadelphus coronarius	Sweet mock-orange	30%	3555		10L	3 U/m²
	Quercus pontica	Amenian oak	10%	790		3L	2 U/m²
	Lonicera tatarica	Tartarian honeysuckle	20%	2340		3L	3 U/m²
	Spiraea x vanhouttei	Spiraea	30%	3510		3L	3 U/m²
	Symphoricarpos albus	Snowberry	30%	3510		3L	3 U/m²
	Weigelia florida	Old fashioned weigela	20%	2340		3L	3 U/m²
	Rosa sp.	Rose	20%	865		2L	5 U/m²
	Spiraea japonica	Japanese spiraea	60%	1593		3L	3 U/m²
	Tamanix araratica	Salt-cedar	20%	531		3L	3 U/m²



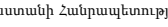
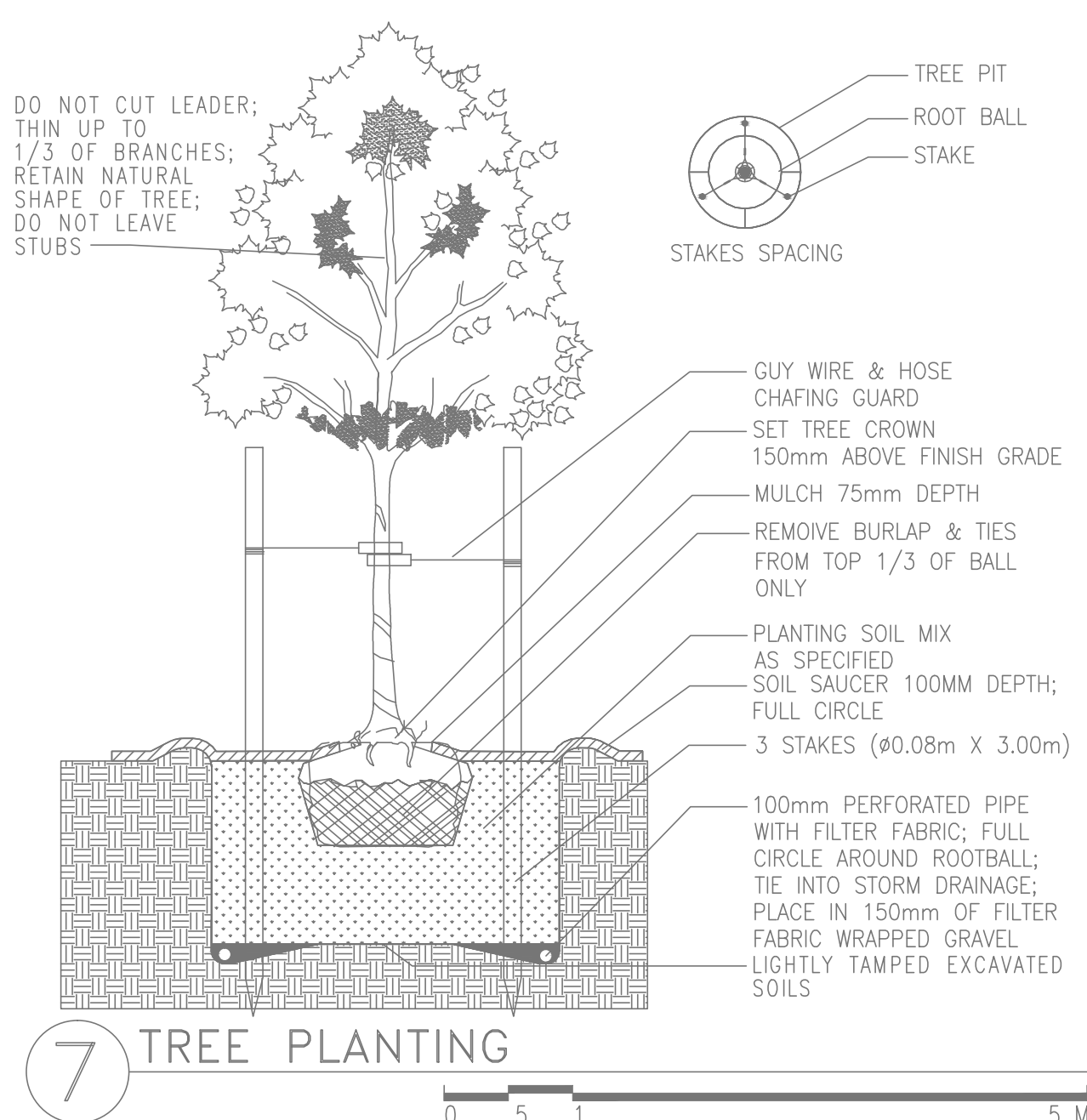
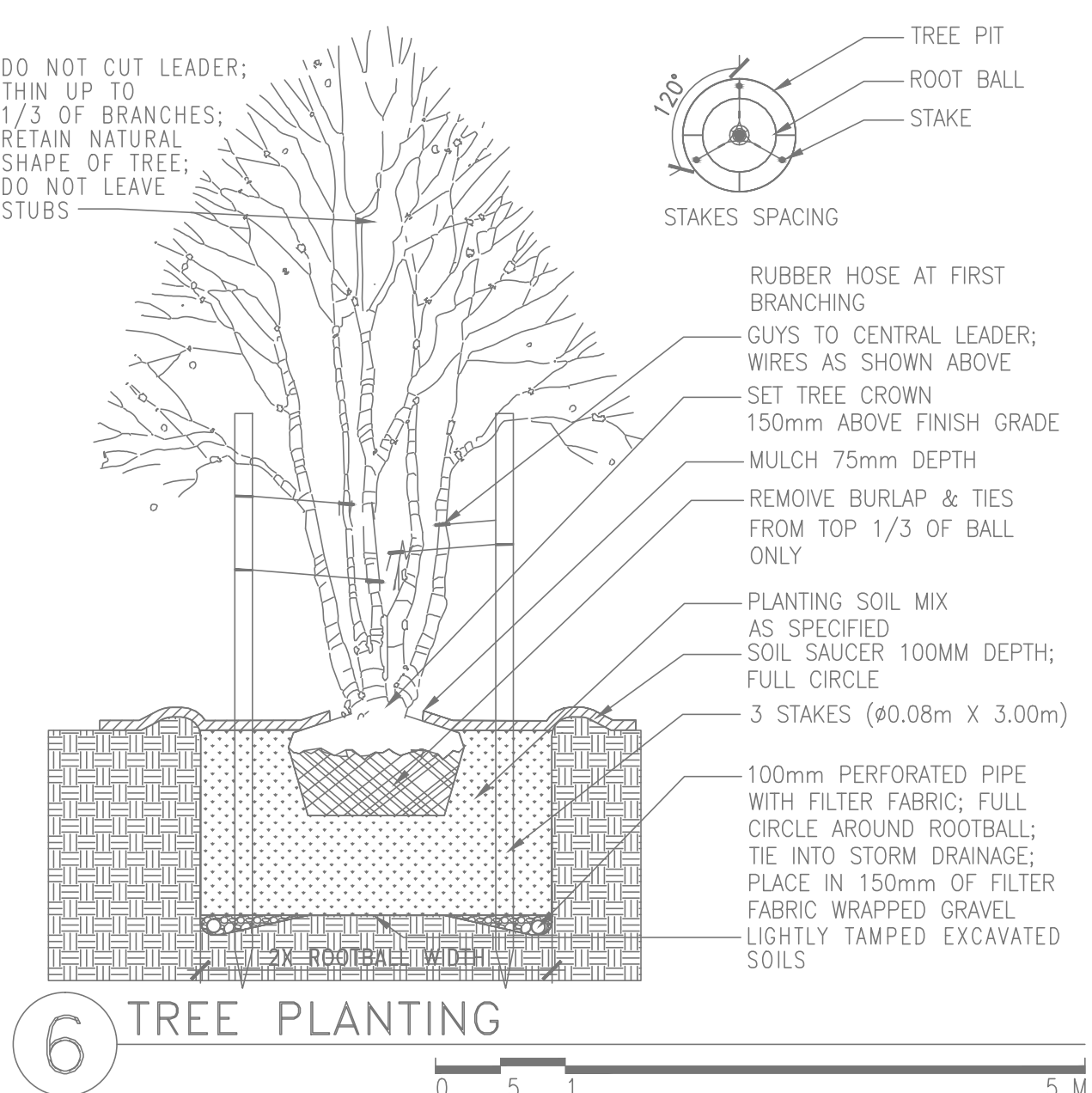
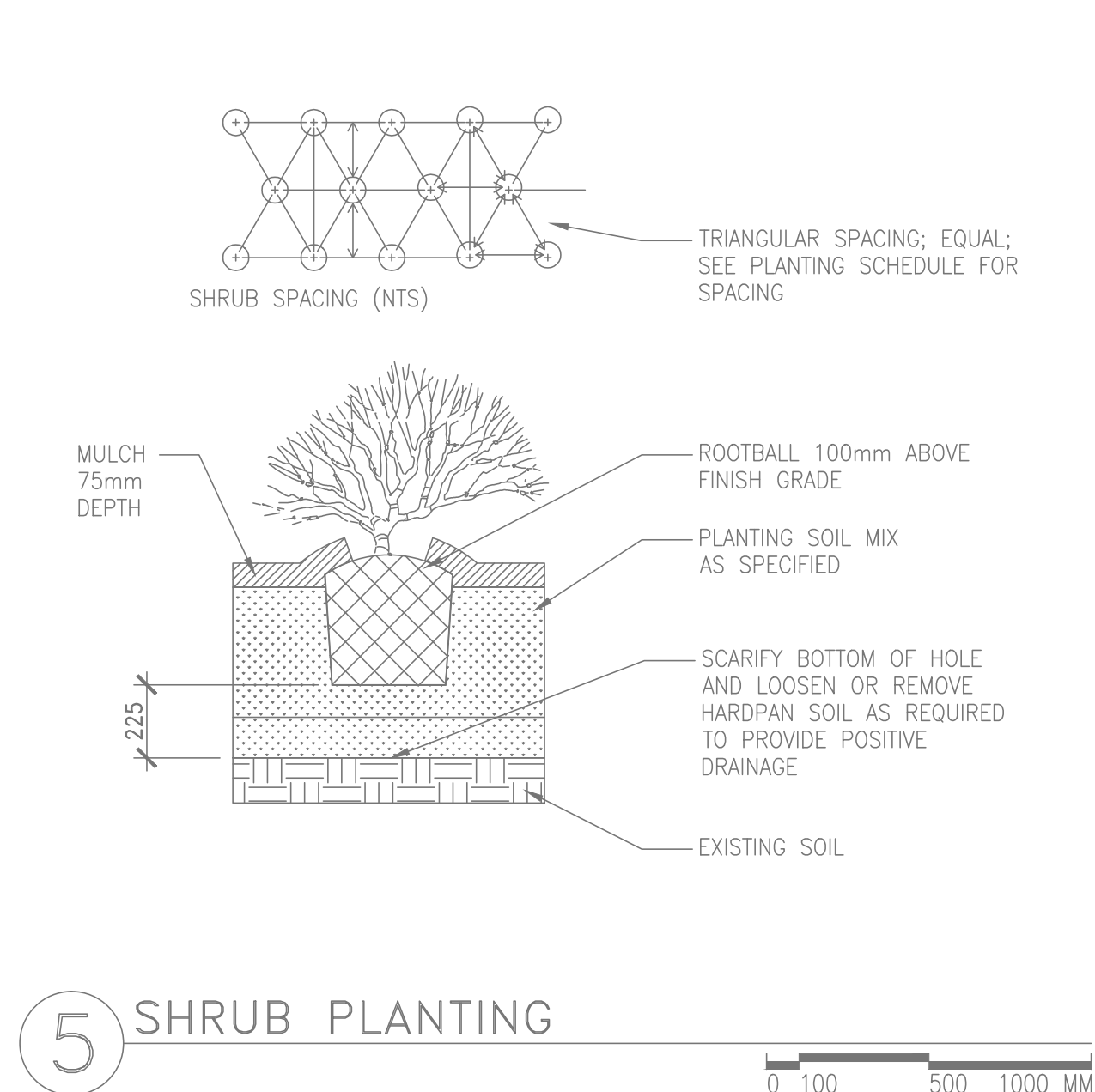
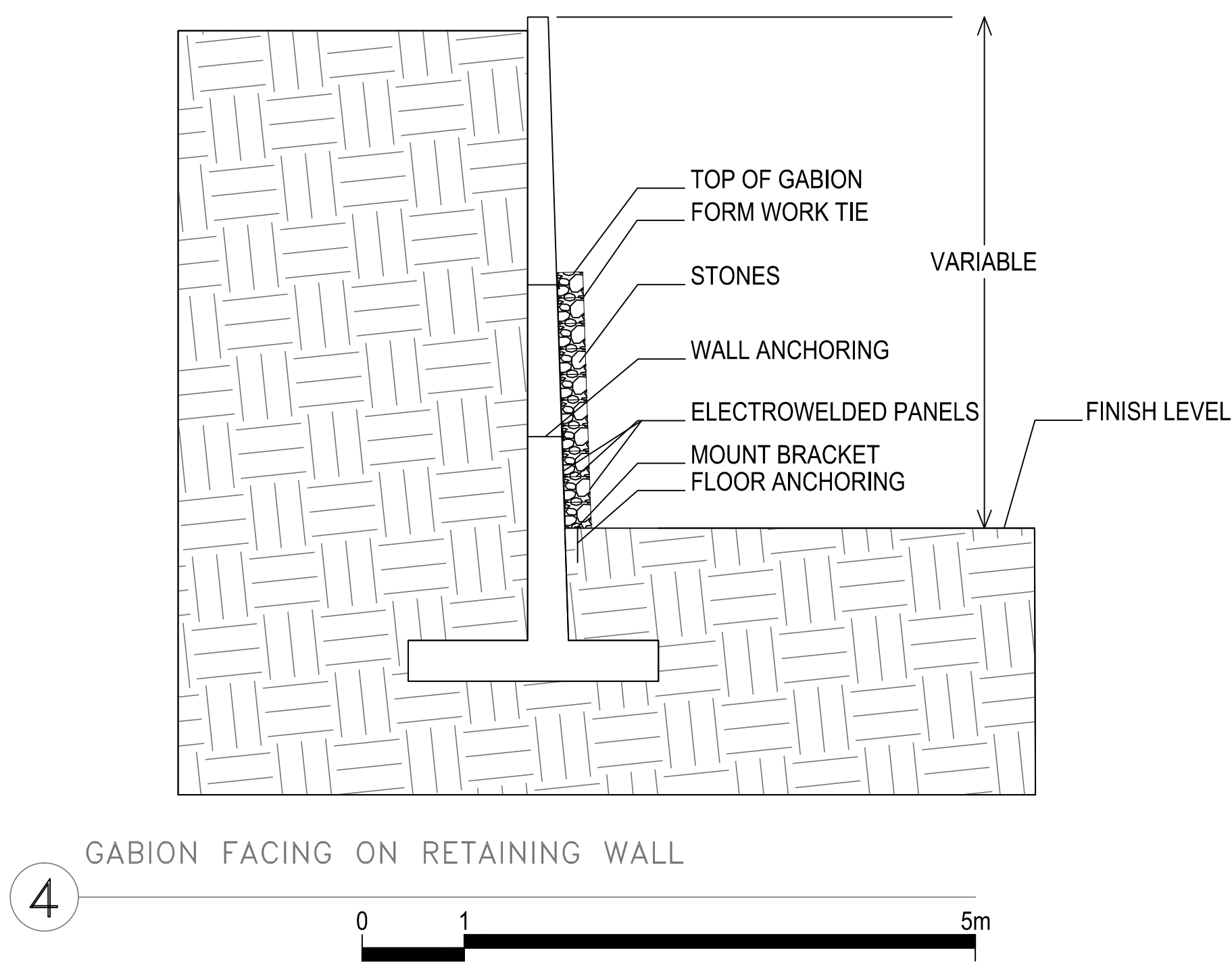
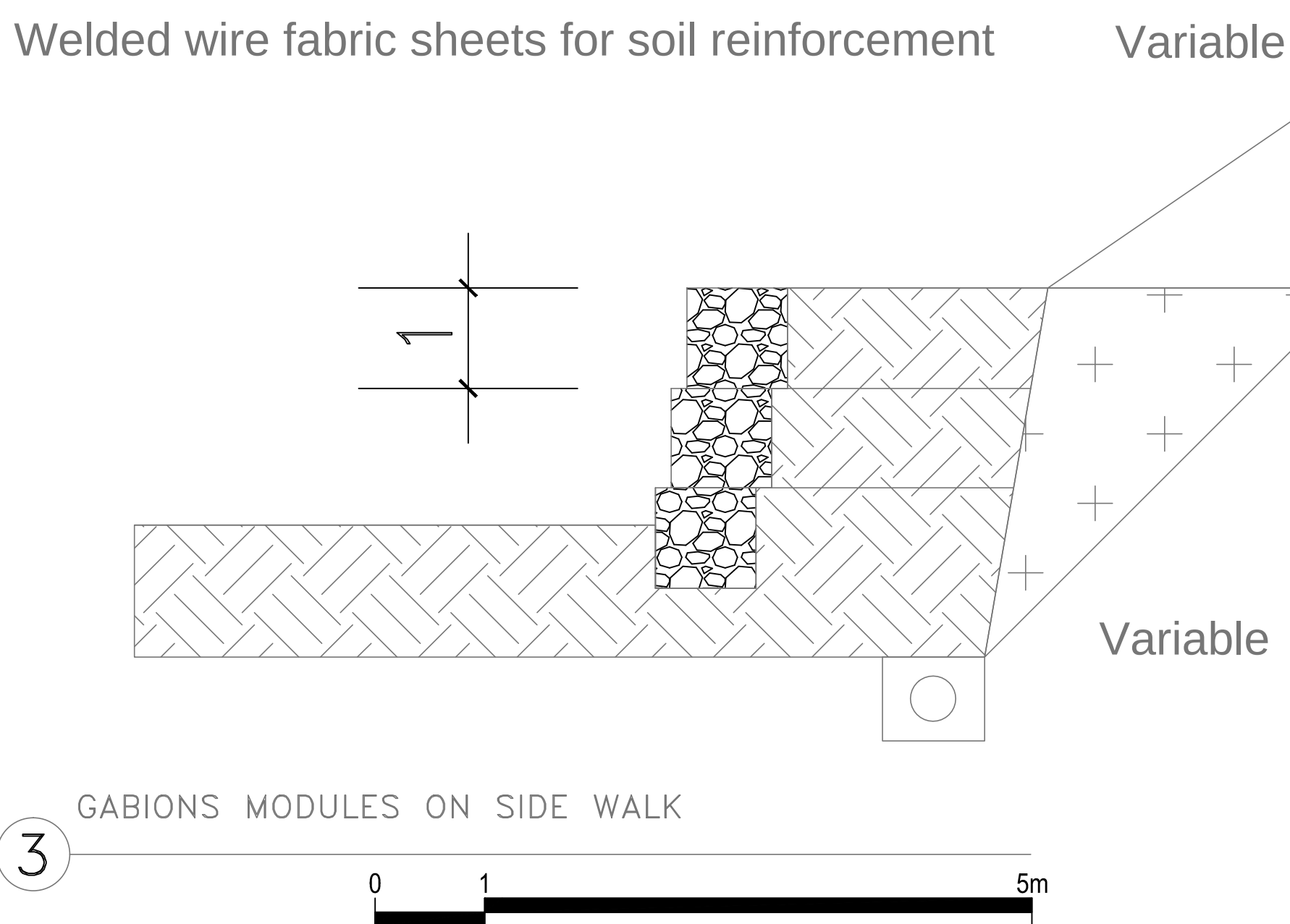
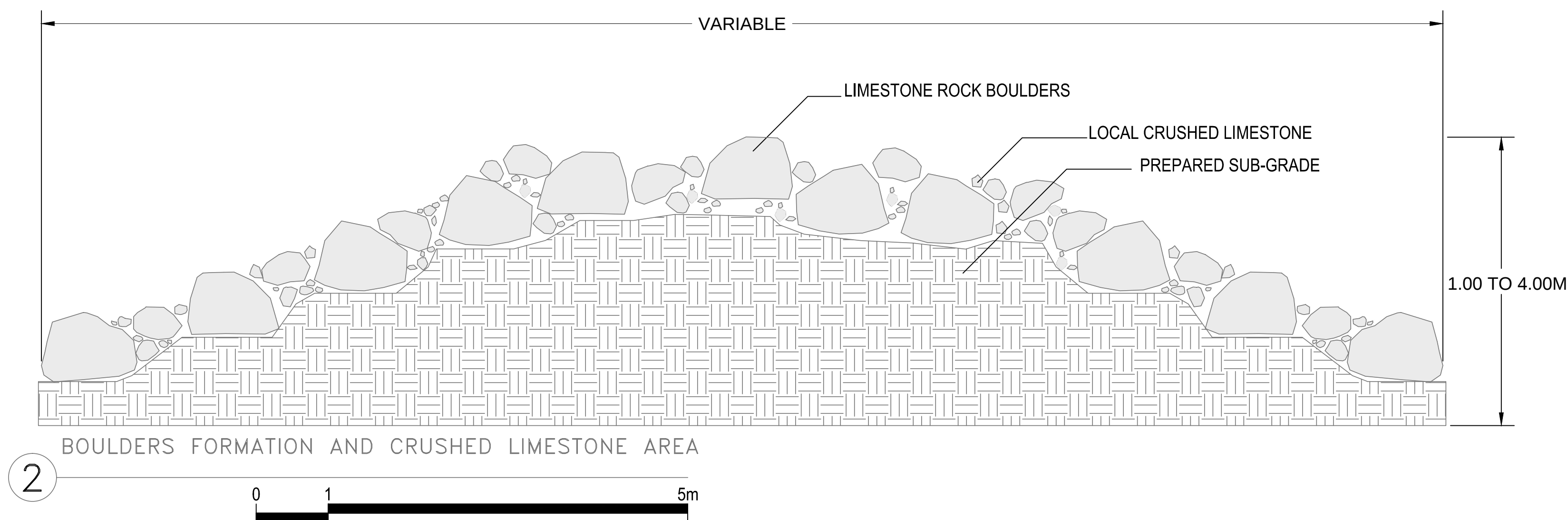
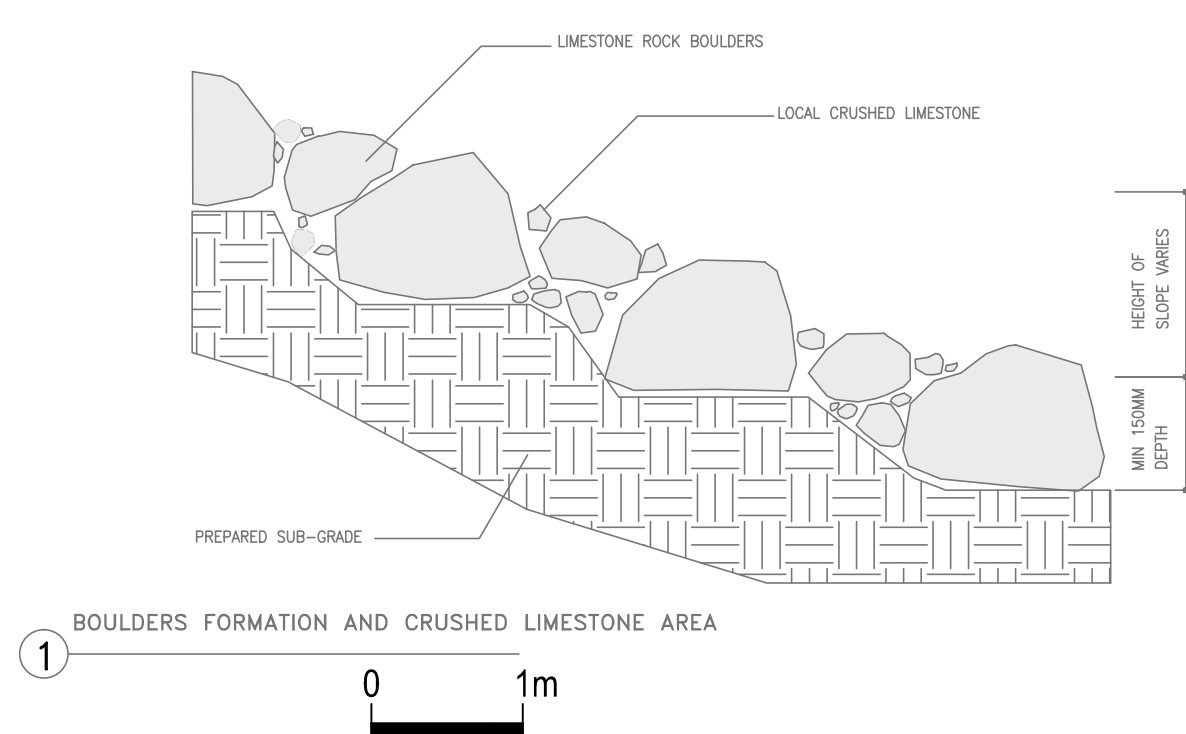
REFERENCES				REVIEWS				REPUBLIC OF ARMENIA Հայաստանի Հանրապետություն  YEREVAN MUNICIPALITY Երևանի քաղաքապետարան	CONSULTANT 	FUNDING AGENCY  ASIAN DEVELOPMENT BANK	IMPLEMENTING AGENCY  YEREVAN MUNICIPALITY	YEREVAN BYPASS Task 03		LANDSCAPE DESIGN PLANTING PLAN INTERCHANGE WEST															
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												FORMAT:	A1	3	9	1	5	E	V	L	S	-	-	-	D	4	0	1	2
CAD FILENAME: PLOT DATE: _				No	DATE	DESCRIPTION	Eng.	Dr.	Ch.																				

Figure 1 consists of three diagrams illustrating the density of a triangular lattice for different values of u . Each diagram is set within a 100x100 grid.

- Density for $3u/m^2$:** A triangle is formed by three points on the grid. The base is horizontal and has a length of 65. The height is 64. The triangle is shaded pink.
- Density for $4u/m^2$:** A triangle is formed by three points on the grid. The base is horizontal and has a length of 50. The height is 48. The triangle is shaded pink.
- Density for $6u/m^2$:** A triangle is formed by three points on the grid. The base is horizontal and has a length of 40. The height is 32. The triangle is shaded pink.

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Advertisement in Hayastani Hanrapetutyun

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

N	Name, Surname	Position	E-mail/Tel	Signature
1	Armine Yedigaryan	ADB, National Environmental Consultant	ayedigaryan.consultant@adb.org	Signed
2	Pierre Bourguignon	Egis HSE	Pierre.bourguignon@egis.fr	Signed
3	Sergey Petrosyan	Inhabitant	091430889	Signed
4	Razmik Vardanyan	Inhabitant	094361458	Signed
5	Edita Vardgesyan	EGIS environmental specialist	095090212	Signed
6	Vardan Karapetyan	PIU Engineer	vardan.karapetyan@yerevan.am	Signed
	Anna Malikoyan	PIU, PR specialist	anna.malikoyan@yerevan.am	
	Arsen Mejlumyan	PIU,	arsen.mejlumyan@yerevan.am	
7	Astghik Ghazaryan	Egis fauna and flora consultant	astbat@yahoo.com	Signed
8	Anna Asatryan	Egis flora consultant	crocus@post.com	Signed
9	Marine Aragelyan	"Biodiva" NGO	arakelyanmarine@gmail.com	Signed
10	Ashot Aslanyan	"Biogama" LTD	aslanyanav@gmail.com	Signed
11	Marine Gevorgyan	Inhabitant		Signed
12	Gyurjinyan Arpine	Inhabitant		Signed
13	Martirosyan Lusine	Inhabitant		Signed
	Sargsyan Gohar	Inhabitant		
14	Nora Martirosyan	Director of PIU	nora.martirosyan@yerevan.am	Signed
15	Tigran Grigoryan	Uptime Project team leader	tgrigoryan@uptimeilc.org	Signed
16	Ruzanna Voskanyan	Environmental specialist of PIU	ruzanna.voskanyan@yerevan.am	Signed

Attendance sheet

ՔԱՂԱՔԱՅԻՆ ԿԱՅՈՒՆ ԶԱՐԳԱՑՄԱՆ ՆԵՐԴՐՈՒՄՅՈՒՆ ԾՐԱԳԻՐ ՏՐԱՆՇ 2

Դավիթաշեն-Աշտարակ ճանապարհահատվածի

Շրջակա միջավայրի նախնական ուսումնասիրության հանրային լսման մասնակիցների ցանկ

N	Անուն Ազգանուն	Պաշտոն	Էլ. Հասցե / հեռ.	Ստորագրություն
1.	Արսևտ Երզնգյան	ADB National Cons.	ayedipayan.consultant@adbg.org	AA
2.	Pierre BOURGIGNON	Egis HSE	pierre.bourgignonegis.fr	PZ
3.	Արթուր Մեղանյան	բազմա	082430883	Արթուր
4.	Լուսինե Բալասանյան	Բազմա	094361458	Լ
5.	Նիկոլայ Զարգարյան	Բազմա	095090212	Զարգարյան
6.	Լուսինե Զարգարյան	Բազմա	Varolav.Karapetyan@gerkor.am	Լ
7.	Նիկոլայ Զարգարյան	Բազմա	Varolav.Karapetyan@gerkor.am	Նիկոլայ
8.	Արսևտ Երզնգյան	Բազմա	ayedipayan@gerkor.am	Արսևտ
9.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ
10.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ
11.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ
12.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ
13.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ
14.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ
15.	Նիկոլայ Զարգարյան	Բազմա	ayedipayan@gerkor.am	Նիկոլայ

PROTOCOL Of Public Consultation on Initial Environmental Examination (IEE)
within Sustainable Urban Development Investment Program, Tranche 2
Davtashen-Ashtarak Highway

Date/Time: May 05, 2015, at 16:00

Location: City Yerevan, Davtashen Community, Secondary School N189

The list of participants is attached.

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

- Opening speech
- Presentation of Initial Environmental Examination 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 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 Design of Davtashen-Ashtarak Highway road link has been prepared by Egis International, and Initial Environmental Examination was updated based on the final design.

The first item of the agenda was introduced by Ruzanna Voskanyan, Environmental Specialist of the PIU.

Ruzanna Voskanyan introduced the results of the Initial Environmental Examination of Tranche 2, Davtashen-Ashtarak highway section. It was mentioned that the draft IEE report for this section has been prepared in 2010 by PPTA consultant. But as the project design has been updated so new investigations has been implemented to update the final IEE. 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 139 small to big trees will be affected during project implementation. For each tree cut a replanting measure with a ratio of 1:6 will be implemented.

Further Ruzanna Voskanyan 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 11 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 item of the agenda was introduced by Astghik Ghazaryan and Anna Asatryan, who had implemented a survey on fauna and flora of the Project. They 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 for each tree cut a replanting measure with a ratio of 1:6 and during highway construction works catching of all vertebrate animals by the specialists, and

transportation to the area typical for the species, far from human settlements would be important mitigation measures.

Tigran Grigoryan asked if the amount of affected trees includes also private trees and in which sections has been done the survey.

Astghik Ghazaryan noted that only community trees have been investigated during the assignment. Private trees will be calculated during LARP preparation works. Main part of trees is located near the sections of existing road which should be widened.

The Engineer stated that these suggestions are provided in the IEE and EMP. EMP will be a part of bidding documents and its implementation is obligation of Contractor.

Minutes of the meeting were taken by
Egis International