

Initial Environmental Examination Report (Final)

Project Number: 51162-001
February 2018

ARM: High-Efficiency Horticulture and Integrated Supply Chain Project

Prepared by ERM Eurasia Limited in association with ATMS Solutions for Spayka LLC

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Prepared for:

SPAYKA

ADB ASIAN DEVELOPMENT BANK

Prepared by:

ERM Eurasia Limited in association with
ATMS Solutions

Initial Environmental Examination Spayka LLC

Final report

Project 0419151

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GLOSSARY AND ABBREVIATIONS

a.m.	ante meridiem, before midday
ADB	Asian Development Bank
AESPR	Annual Environmental and Social Progress Report
ALARP	As Low as Reasonably Practicable
AMD	Armenian Dram (currency)
AoI	Area of Influence
CAPEX	Capital Expenditure
CIS	Commonwealth of Independent States
CJSC	Closed Joint Stock Company
CLS	Core Labour Standard
CSO	Civil Society Organization
DFI	Development Finance Institutions
EE	Expert Examination
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIEC	(State) Environmental Impact Examination Centre
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
EUR	Euro (currency)
GAD	Gender And Development (Policy)
GDP	Gross Domestic Product
HR	Human Resources
IEE	Initial Environment Examination
ILO	International Labour Organisation

IPP	Indigenous Peoples Plan
IPPF	Indigenous Peoples Planning Framework
ISO	International Organization for Standardization
LLC	Limited Liability Company
MoA	Ministry of Agriculture
MoES	Ministry of Emergency Situations
MoH	Ministry of Healthcare
MoNP	Ministry of Nature Protection
NGO	Non-Governmental Organization
NSS	National Statistical Service
p.m.	post meridiem, past midday
PPP	Public Private Partnership
PR	Public Relations
PVC	Polyvinyl Chloride
RF	Resettlement Framework
RFI	Request for Information
RoA	Republic of Armenia
RP	Resettlement Plan
SEP	Stakeholder Engagement Plan
SNCO	State Non-Commercial Organization
SPS	Safeguards Policy Statement
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

ERM Eurasia Limited (*ERM*) has been commissioned by the Asian Development Bank (*ADB*) and Spayka LLC (*Spayka* or *the Company*) to undertake Initial Environmental Examination (*IEE*), Social Compliance Audit (*SCA*), and develop an Environmental and Social Management Plan (*ESMP*) in relation to the development of a 30-hectare greenfield greenhouse project (*the Project*) at Yerevan Municipality, Yerevan, Republic of Armenia, proposed for ADB financing.

WHO IS THE PROJECT PROPONENT?

Spayka was established in 2001 as an Armenia-based freight forwarding and transportation business. The Company exports fruits, vegetables, and dairy products. Spayka has a diversified set of operations that ranges from their own greenhouses and orchards to processing facilities, cold storage warehouses, and other logistics assets. Currently, the Company manages an own fleet of over 213 trucks, more than 200 contracted trucks, and containers in Yerevan and along the Armenia-Georgia border. Spayka seeks to expand its greenhouse business to ensure enough load of its freight fleet, and the Project is a part of this expansion.

WHAT IS THE PROJECT?

The Project entails the construction of 30-hectare greenhouse facilities on a 47.76 hectares land plot in Yerevan, Armenia's capital city. The Project is being planned as a new energy saving and energy efficient semi-closed greenhouse for tomatoes and bell peppers with indoor and limited outdoor vegetable production.

Spayka has planned several utility components into the Project including approach roads, parking, water/steam pipelines, power transmission lines, and a gas pipeline.

At the time of the issuing the report design solutions are not available. It is considered that the Project will be a copy of greenhouses currently operated and constructed by Spayka in Artashat.

Project's water requirements, which is at the pick of the season is 3,600 cubic meters per day (m³/day), will be met through connecting to the local water distribution network. Rainwater from sealed surfaces and greenhouses' roofs will be harvested and recovered by the rainwater recovery system. Water for crops production will be stored in galvanised steel aboveground tanks. Stored water will be treated before used for fertilization / irrigation.

Project construction will be powered by diesel generators and / or local power distribution network. The source of power supply during operation will be local power distribution network.

Other utilities (e.g. firefighting system) will be installed as required by Armenian legislation.

The Project will require large quantities of sand and gravel for the site levelling. These materials will be sourced from authorized quarries in and around the region. Steel constructions and glazing for the greenhouses will be partially pre-fabricated and transferred to the site by equipment suppliers and their contractors.

About 300 workers will be working at site at the peak of construction. The workers will include local labourers as well as a temporary influx of people from outside areas. During the operation, the total Project staffing will comprise 275, including 240 greenhouse workers and 35 administrative staff.

The Project will be connected to the municipal sewer network. Project's wastewater will be discharged into existing municipal sewer connections.

The Project is not expected to generate large amounts of construction waste during short (7-8 months) construction phase. Operational waste will comprise of 91 tonnes per year (t/yr) of solid domestic waste along with waste plastic/wood package, plant residues, contaminated fertilizers' and chemicals' package, etc. Project's waste will be collected and transferred to specialist contractor companies for utilization and disposal.

WHAT IS THE LOCATION OF THE PROJECT SITE?

The Project site is situated in the southern part of Yerevan, within the administrative boundaries of Shengavit administrative district. It is surrounded by the Noragavit settlement from the north-west, Nor-Kharberd settlement from the south, and an abandoned industrial area from the east. Noragavit cemetery is located near the northern border of the Project site, while another one (Nor-Kharberd cemetery) neighbours to the southern perimeter of the greenhouse area. Two thermal power plants are situated in industrial zone to the north-east of the Project site. One is operated since 2010, while the second is under construction now and will be commissioned in 2019.

The Project site has been purchased by Spayka from the municipal authorities of Yerevan under the investment support policy decision. Neither involuntary resettlement nor economic displacement has been associated with the land acquisition.

The Project will be implemented on the western part of the land plot, while the eastern part will also be used for similar greenhouse project, however funded from other lenders.

WHAT ARE THE PROJECT'S ECONOMY AND TIMELINE?

Target export markets for the Project will be the Russian Federation and the United Arab Emirates.

The Project will be developed over the period of 2017-2018.

The proposed greenhouse investment program will be implemented in two phases, of which the first phase is under consideration for potential financing through the ADB. Total Project cost is estimated at \$36.8 million. Spayka intends to fund \$4.8 million through internally generated cash flows and ADB will extend up to \$32 million loan to the Company for its greenhouse expansion.

HOW IS THE PROJECT CATEGORISED ACCORDING TO ADB REQUIREMENTS?

Given the nature and the scale of the Project, it has been preliminary categorized as Category B per ADB's Safeguard Policy Statement (2009).

WHAT DELIVERABLES HAVE BEEN DEVELOPED FOR THE PROJECT?

To ensure the Project's compliance with applicable ADB standards, ERM has prepared the IEE, SCA, and ESMP of the Project. These documents also address the gaps identified during the audit and formulate the ESMP with mitigation measures and monitoring indicators to be used during the Project lifecycle.

WHAT STAKEHOLDER ENGAGEMENT ACTIVITIES HAVE BEEN MADE TO THE DATE?

Spayka has been engaging with the following key stakeholder groups with respect to the Project:

- Local authorities in Shengavit administrative district, as well as Yerevan City Administration departments – this engagement has focused on the allocation of land for the Project, as well as any other permits that may be required.
- Representatives of the Yerevan Thermal Power Plant (privately operated) to pursue opportunities to share resources (steam, water, and electric power);
- Representatives of Project's partners, i.e. Avagyan Construction LLC for proposed construction activities and Richel for provision of equipment and technology.

Several stakeholder interactions have been made by ERM during the IEE-SCA-ESMP assignment.

WHAT ARE THE BASELINE CONDITIONS OF THE PROJECT SITE?

The Project site is placed in semi-desert / dry steppe zone at the altitude of about 900–920 meters above sea level. This region is characterized by long hot summers and short, but relatively cold winters. Overall precipitation is low.

As of November 2017, pollutants' contents in the ambient air on the Project site have showed no exceedances over the national threshold values.

Site's soils are of grey and light-grey type with low content of humic matter and macronutrients. Contents of organic pollutants in soils do not exceeded national and international threshold levels.

Vegetation cover of the Project site is typical Artemisia-dominated dry-steppe communities with rare trees and shrubs. Ecosystems of the Project site are slightly modified by human activities. The Project site is littered with minor quantities of domestic and construction waste. No rare and protected species of plants were found at the site.

The site's fauna is typical of dry steppe with minor occurrence of synanthropic species, which is a result of that the Project site is neighboured by urban and

industrial areas. No rare and protected animal species were found inhabiting the site.

No ecologically sensitive areas are located in the vicinity of the site.

WHAT ARE THE KEY ENVIRONMENTAL RISKS AND IMPACTS OF THE PROJECT?

Results of the Initial Environmental Examination showed that generally, the Project will not generate severe environmental impacts on environment during both construction and operational phases.

The most significant environmental impacts during the construction phase will be caused by the loss of soil cover, emissions to ambient air, and noise generation resulting from different types of construction activities. These impacts have been preliminary assessed as *minor*. Other construction environmental impacts (i.e. impacts on surface water and terrestrial vegetation/wildlife) have been assessed as *negligible*.

WHAT ARE THE KEY SOCIO-ECONOMIC RISKS AND IMPACTS OF THE PROJECT?

During the operational phase, product transportation, operation of greenhouses, and waste management activities will be generating *minor* impacts on ambient air and acoustic environment. The rest of predicted environmental impacts are expected to be *negligible*.

The Project will use truck transportation to deliver construction materials to the site, which will increase the traffic load on regional roads. Impacts related to this issue have been assessed as of *medium* significance. *Minor* socio-economic impacts will be related to land acquisition and alterations in landscape visual characteristics. Construction works will also produce *minor* risks in occupational health and safety and several other socio-economic impacts of *negligible* significance.

Crops transportation during the operational phase will cause *medium* impact on road traffic along with *minor* impacts and risks to health and safety of Projects' workers and local communities. *Medium* impact on road traffic will also be caused by waste transportation.

Apart from the negative impacts, the Project will have a positive effect on local economy by providing additional taxes, creating new jobs, and generating a multiplier effect to different economy sectors.

HOW IS THE PROJECT GOING TO MANAGE ITS RISKS AND IMPACTS?

In accordance to the ADB Safeguard Policy Statement 2009 the impacts over the Project lifecycle need to be adequately mitigated and managed through an Environmental and Social Management Plan (*ESMP*) that has been developed by ERM and will be implemented by Spayka in conjunction with other management plans where applicable.

1 INTRODUCTION

1.1 PREAMBLE

ERM Eurasia Limited (*ERM*) has been commissioned by the Asian Development Bank (*ADB*) and Spayka LLC (*Spayka* or *the Company*) to undertake Initial Environmental Examination in relation to the development of a 30-hectare (ha) greenfield greenhouse project (*the Project*) at Yerevan Municipality, Yerevan, Republic of Armenia, proposed for ADB financing.

This Initial Environmental Examination Report (*IEE Report*) includes the Initial Environmental Examination and Environmental and Social Management Plan (*ESMP*) of the Project. Environmental data have been collected during studies conducted by ERM and Spayka (following ERM recommendations regarding sampling and chemical tests). The IEE Report also addresses the gaps identified during the audit and formulates the ESMP with mitigation measures and monitoring indicators to be used during the Project lifecycle.

1.2 PURPOSE OF THE STUDY

1.2.1 Project Proponent

Spayka was established in 2001 as an Armenia-based freight forwarding and transportation business. The Company exports of fruits, vegetables, and dairy products. Spayka has a diversified set of operations that ranges from their own greenhouses and orchards to processing facilities, cold storage warehouses, and other logistics assets. Currently, the Company manages an own fleet of over 213 trucks, more than 200 contracted trucks, and containers in Yerevan and along the Armenia-Georgia border. Spayka has over 1,020 staff and workers on the direct payrolls of the Company along with another 500 temporary harvesting workers and 100 third-party entities.

Spayka recently acquired an operational greenhouse from a company named Greenhouse LLC in Shahumyan village, Ararat region, which was redesigned from radish to tomato growing and enhanced twice by Spayka. In addition, the Company plans to establish a semi-closed greenfield greenhouse for tomato and bell pepper in the Shengavit administrative district of Yerevan Municipality.

1.2.2 ADB Transaction Context

It is understood that the proposed greenfield greenhouse investment program will be implemented across two phases, of which the first phase is under consideration for potential financing through the ADB. The Project entails the construction of a 30-ha greenhouses over a 47.76 ha land plot through the use of semi-closed technological solutions. Target export markets will be the Russian Federation and the United Arab Emirates. The Project will be developed over the 2017–2018 period. Total Project cost is estimated at \$36.8 million, including construction of semi-closed greenhouse, civil work, installation of heating system and drip irrigation system, and other capital and

operating expenditures. Spayka intends to fund \$4.8 million through internally generated cash flows and ADB will extend up to \$32 million loan to the Company for its greenhouse expansion. Other part of the land plot will also be used for construction and operating of similar greenhouses, however funded from other lenders.

1.3 *APPLICABLE REFERENCE FRAMEWORK*

The IEE-ESMP has been conducted based on the following reference framework:

- Applicable Armenian environmental, social and health & safety regulations;
- Applicable environmental and social permits and clearances for the Project;
- ADB's Safeguard Policy Statement (SPS), 2009;
- ADB Gender and Development Policy, 1998;
- ADB Public Communications Policy, 2011; and
- ADB Social Protection Strategy, 2001.

1.4 *OBJECTIVES AND SCOPE OF THE STUDY*

The objective of the IEE-ESMP was to suggest safeguard mechanisms to meet the adverse impacts and enhance positive impacts identified during the environmental and social compliance audit as per ADB requirements.

The scope of work for the IEE-ESMP implied the following:

- Determine resource requirements (land, manpower, water, power, etc.) for the Project and evaluate the semi-closed greenhouse technology that will be applied by Spayka.
- Establish baseline environmental (land use, air, soil, water, etc.), social (education, occupation, cultural heritage sites, etc.), and ecological (proximity to sensitive ecological sites) conditions for the Project site.
- Identify environmental and social risks/impacts that would result in a negative or positive change on the established baseline.
- Provide mitigation measures that can be implemented to reduce the identified impacts for the Project.
- Address environmental and social gaps as identified in the audit through mitigation options and/or monitoring programs; and
- Develop an Environmental and Social Management Plan that provides specific time-bound actions that can be implemented at site to improve the environmental and social performance of the Project.

1.5 *ERM'S APPROACH AND METHODOLOGY*

ERM's approach to the IEE-ESMP for the Project has been provided in subsequent sections.

1.5.1 *Inception*

ERM mobilized a team across its offices in Russia and India (along with local experts based in Armenia, i.e. ATMS Solutions) to provide E&S specialists for undertaking the assignment. Discussions were held between ADB and ERM in August and October 2017 to confirm the scope of the assignment; the status of operations/activities on site and the planned timelines to undertake documentation review and the site visit.

1.5.2 *Documentation Review*

ERM conducted a desktop review of relevant environmental and social documents provided by Spayka based on the Request for Information (RFI) sent to the Company. Subsequent to the site visit, the RFI was updated with additional documents and clarifications. *Annexure A* captures a summary of the key documents/information that was made available.

External Factors Review

ERM also undertook a review of available public information on Spayka with respect to the following:

- available information on any regulatory and/or civil society litigation against the Project; and
- available public information on any specific aspects that concern previous transactions of development finance institutions (DFIs), if any.

1.5.3 *Site Visit*

An ERM and ATMS core team of two environmental and two social consultants undertook a site assessment of Spayka’s activities from 18th to 22nd September 2017. Thereafter, ATMS specialists undertook two other stakeholder interactions on 4th and 5th of October, 2017 and during ADB’s visit to the site between 2nd and 3rd November 2017. Based on the updated terms of references, local experts also have conducted terrestrial ecology study of the Project site and the area of potential influence.

Table 1.5-1 provides an overview of the key activities and stakeholder consultations undertaken during the site visit.

Table 1.5-1 *Summary of Site Visit Activities*

Date	a.m.	p.m.
18 September 2017	Arrival into Yerevan, Armenia and interactions with ATMS	Brief Discussions with Spayka’s Corporate Finance Representatives on the transaction
19 th September 2017	<ul style="list-style-type: none"> • Opening Meeting at Spayka office with Project Team, Finance Team; • Interview with representatives of the Human Resources Department 	<ul style="list-style-type: none"> • Visit to Spayka corporate facilities including cold storage warehouses and food processing set up; • Interview with representatives of the Fleet Management Department;

Date	a.m.	p.m.
20 th September 2017	<ul style="list-style-type: none"> • Visit to the radish and apple orchard at Alapars Village (~40 kilometres from Yerevan); • Discussion with female workers at the orchard and the orchard management team 	<ul style="list-style-type: none"> • Discussion with Narck-Khasrasher Municipality on Spayka's fruit and vegetable procurement process; • Discussion with small and medium farmers that supply to Ararat Fruit; • Discussion with coordinator of Ararat Fruit for Artashat Region
21 st September 2017	<ul style="list-style-type: none"> • Visit to the Operational Greenhouse Facility; • Discussions with two groups of workers (male and female); • Discussions with Avagyan - construction contractor 	<ul style="list-style-type: none"> • Visit to the Project site in Shengavit district, Yerevan
22 nd September 2017	<ul style="list-style-type: none"> • Documentation review at Spayka LLC Corporate office in Yerevan; • Discussions with sample Spayka drivers 	<ul style="list-style-type: none"> • Wrap up discussions and clarifications
4 th October 2017	To understand overarching community feedback, expectations and to obtain a sense of any offsite impacts around the existing operational and under-construction warehouse, a meeting was held with Mr. Serjik Babayan- the head of Shahumyan rural community	
5 th October 2017	Group Discussions with sample workers of Spayka's food processing facilities: A meeting was held at Spayka head office with three male workers (Ararat Fruit workmen) and four female workers (Ararat Fruit sorters) on their working conditions.	
2 nd November 2017	<ul style="list-style-type: none"> • Visit to the Project site in Shengavit district, Yerevan • Meeting with the Head of Nor Kharberd rural community Mr. Kamo Kakosyan; • Interview with Nor Kharberd community resident Mrs Ruzanna Mkrtychyan; • Interviews with the residents of Noragavit district of Yerevan; • Interview with Noragavit resident Mrs Karine Mkrtychyan; • Group discussions with Noragavit residents 	
3 rd November 2017	<ul style="list-style-type: none"> • Meeting in Yerevan City Administration with the Legal Department and head of Shengavit administrative district • Meeting in the Ministry of Labour and Social Affairs with Mr. Jora Sargsyan the head of Labour and Employment Department. 	

1.5.4

Management Interactions

The activities listed in *Table 1.5-1* included discussions and interactions with key management personnel that represent departments such as Projects; Corporate Finance; Fleet Management; Ararat Fruit/Procurement; Logistics; Human Resources; Security; Head of EHS, etc. At the time of the assessment Spayka did not have a dedicated/separate environment and social manager/function. Duty to comply with requirements of local regulation regarding occupational health and safety and prepare reports on environmental issues to authorities is on Chief engineer.

1.5.5

Stakeholder Consultations

Some of the key internal and external stakeholder consultations that have helped in substantiating ERM's findings include:

- Discussions with fence line communities (especially around the Project site and around the vicinity of the existing greenhouse). These included interviews with individual residents and group discussions that were conducted using local language with participation of Spayka, ATMS, and ADB. Interviews were held in local administration building and supported by the head of rural community (municipality).

The main purpose of discussion was identification of community perceptions about the operational (at Shahumyan community) and planned (at Nor Kharberd and Noragavit) greenhouses.

For operational greenhouse no complaints and concerns regarding environmental or traffic safety issues have been raised, however no formal grievance mechanism is in place. At the same time head of community is ready to be a mediator between the community's population and Spayka.

For the proposed construction main expectations are associated with new work places and especially jobs for women. There were also some concerns regarding potential pollution and noise during the construction of greenhouses, community representatives were informed that the potential environmental impacts are under the consideration of Spayka, no significant environmental hazards/risks are expected.

- Discussions with male and female staff and workers of Spayka (over 40 personnel were covered through different group discussions).

The main purpose of the discussion was identification of compliance with national requirements and IFC PS requirements of existing formal and informal procedures and mechanism, i.e. recruitment process, contract structures and terms, social benefits, work schedule, working conditions, provisions of PPE, drinking water, sanitation, safety trainings, growth opportunities, workers concerns.

In general it was found that workers are satisfied with working conditions provided by Spayka and no specific suggestions for improvements have been mentioned.

- Interactions with Avagyan Construction, LLC, engaged in ongoing construction activities, considering their involvement in the Project; and

Conversations were held with General Director of the Company and Chief Construction Engineer were present on construction site during the visit. The interviews were aimed at identification of EHS obligations of the construction contractor and the compliance of its activities with national and international regulations.

It was understood that Construction Contractor acts in full compliance with national regulations, however no provisions of compliance with international standards have been made by the contract with Spayka.

- Representatives of rural municipalities and Yerevan city as well as key government sector representatives (such as the Department of Labour and Employment).

Yerevan city administration shared details on the terms of provision of the Project land plot to Spayka (outcomes are provided in Section 2.1).

Ministry of Labour and Social Affairs in Yerevan city provided general clarifications on socio-economic profile of the Project area and perceptions towards the Project, including implementation of specific requirements of local labor and social regulations.

Minutes of stakeholder consultations are provided in *Annexure B* to this report. Summary and outcomes of these discussions are provided in *Section 5 "Public Consultation and Stakeholder Engagement"*.

No additional consultations/engagements with communities were held by Spayka outside of the activities listed above.

1.6 LIMITATIONS

1.6.1 Specific Limitations

The IEE Report is to be reviewed keeping in mind the following specific limitations:

- It is understood that Spayka intends to develop a blue cheese facility north of the Project site. This information was not provided during ERM's initial site visit and hence, the IEE Report does not include any findings pertaining to this activity;
- *Annexure A* provides an overview of the information/ data provided by Spayka that has been reviewed (including documents in Armenian and Russian). In addition, this annexure also captures specific information gaps that have limited our regulatory compliance assessment on labour and working conditions for Spayka as well as their construction-phase contractors (Avagyan Construction, LLC);
- The scope of work included sampling, analysis of environmental media, collection of primary data; however, as suggested by the ADB, some secondary data were obtained from Spayka as well.
- No engineering design, technical specifications or cost estimates among others have been provided to ERM to support Project description (*Section 2*) and subsequent environmental impact assessment (*Section 6*). Where applicable ERM has made assumptions considered by us reasonable based on the knowledge of the Project area, as well as on our experience in similar projects.

1.6.2 Uses of the Report

ERM is not engaged in consulting or reporting for the purpose of advertising, sales promotion, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes. Client acknowledges this report has been prepared for their and their clients' exclusive use and agrees that ERM reports or correspondence will not be used or reproduced in full or in part for such purposes, and may not be used or relied upon in any prospectus or offering circular. Client also agrees that none of its advertising, sales promotion, or other publicity matters containing information obtained from this assessment and report will mention or imply the name of ERM. Nothing contained in this report shall be construed as a warranty or affirmation by ERM that the site and property described in the report are suitable collateral for any loan or that acquisition of such property by any lender through foreclosure proceedings or otherwise will not expose the lender to potential environmental or social liability.

1.7

LAYOUT OF THE REPORT

The layout of the IEE Report is as follows:

Executive summary

- Section 1* (this section) provides an introduction, Project background, objectives, scope of work, and methodology adopted along with limitations of the IEE study;
- Section 2* provides a description of the Project and its components, Project design, resource requirements, and analysis of alternatives;
- Section 3* discusses the applicable environmental and social regulatory framework and its relevance for the Project;
- Section 4* describes the environmental and social baseline of the Project;
- Section 5* assesses the key stakeholders for the Project and their expectations as well as influence levels;
- Section 6* presents impact assessment methodology;
- Section 7* identifies potential environmental and social impacts from the Project;
- Section 8* outlines the ESMP taking into account identified impacts and planned mitigation measures and monitoring requirements;
- Section 9* presents conclusions and recommendations.

Report is supplemented with Annexures:

- *Annexure A – Summary of the Key Documents/Information*
- *Annexure B – Records of Consultations with Stakeholders*
- *Annexure C – Sampling Reports*
- *Annexure D – Response from Water Distribution Company*

2.1 INTRODUCTION

Spayka LLC is Armenia's largest exporter of fruits and vegetables to Russia and other CIS countries and is an international transportation company with annual export volume of more than 95 thousand tonnes of products (2016). The Company was established in 2001 as a freight forwarding and transportation business and has seen an organic phase of growth and diversification from fruit procurement and processing to its own greenhouses and orchards between 2012 and 2016.

The existing key Spayka facilities are as follows:

Table 2.1-1 Overview of Existing Spayka Facilities

Detail	Description
Spayka Corporate Office	This includes the key management and staff, food processing and canary activities and cold storage warehouses in Yerevan occupying approximately 2.5 ha in the industrial zone of Yerevan
Volvo Service Centre in Yerevan	Spayka operates approximately 213 Volvo truck refrigerators for international freight forwarding
Warehouses	Modern cold storage warehouses with a total area of approximately 15,000 square meters (m ²)
Spayka plastics and packaging	Fruit and vegetable sorting/packaging facilities, and a plant manufacturing package boxes and pallets made of polystyrene foam and polypropylene
Orchards	<ul style="list-style-type: none"> 72 ha of orchards in Shenik, Armavir marz (30 ha cherries, 17 ha apricot, 4 ha plum); 75 ha of orchards in Alapars, Kotayq marz for apple and radish; Orchards are operated by local operational managers by control of agronomists from central office
Operational greenhouse in Artashat district (55 ha) that was obtained through an acquisition of Greenhouse LLC	Company is operating 35 ha (A, B, and C blocks) agriculture complex in Shahumyan village including seven blocks of greenhouses 5 ha each, cold storage for short term store, sorting and packaging facilities in Shahumyan village. New 20 ha greenhouses (D and E blocks) have recently commenced operations at the same site. Total permanent workforce is more than 460 people.
Logistics centre	Logistic centre in Bagratashen, Tavush marz with a cold storage facility of 2,000 m ²

The key expansion plans of Spayka entail ongoing construction (blocks D and E) at the Shahumyan operational greenhouse in Artashat district (*Figure 2-1*) and the new greenfield greenhouse within Yerevan (*Figure 2-2*).

Figure 2-1 Construction blocks D and E at the Shahumyan operational greenhouse in Artashat district

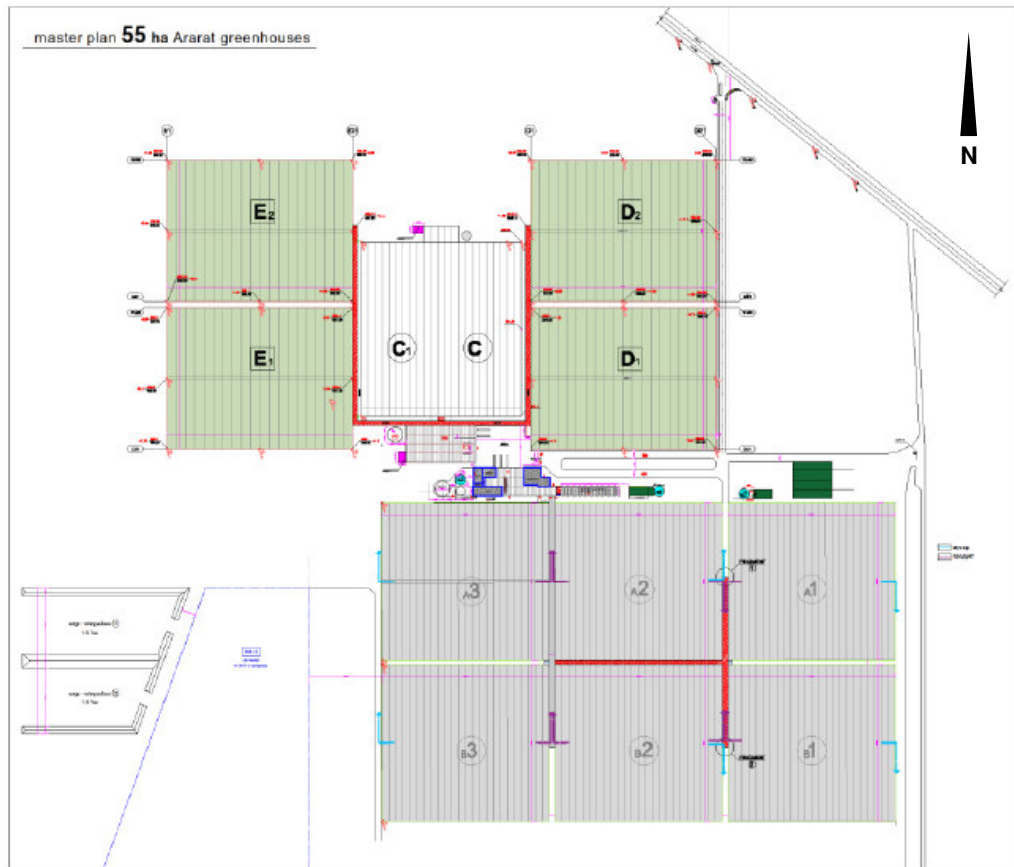
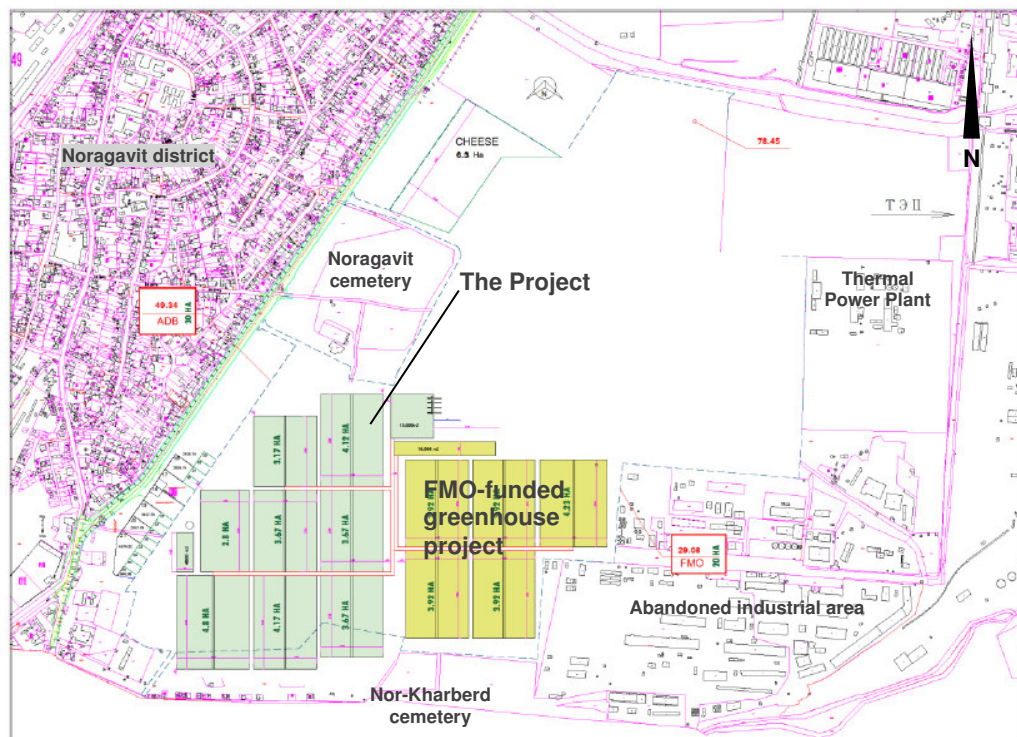


Figure 2-2 The new greenfield greenhouse within Yerevan



The Project is being planned as a new energy saving and energy efficient semi-closed greenhouse for tomatoes and bell peppers with indoor and limited outdoor vegetable production.

The greenhouse complex will be located within the boundaries of Yerevan Municipality in Shengavit administrative district, approximately 5 kilometers (km) from Spayka's corporate office. The other adjacent administrative settlements include Noragavit district of Yerevan and Nor-Kharberd rural community of Ararat Region (marz).

The site for the greenhouse complex with area of 47.76 ha has been allocated by the Yerevan Municipality within the frame of investment support policy of the Government of the Republic of Armenia according the decision N 762-A of June 23, 2017 (according 605 paragraph of Civil Code and 6th part of paragraph 65 of Land Code of the Republic of Armenia).

In May 2012, the Yerevan authorities decided to create investment platform for greenhouses on the same site without success.

Information on the area and the history of the land has been provided in *Section 2.2*. The subsequent figure illustrates the onsite status as of September, 2017.

Figure 2.1-3 Illustrative Site Photographs



**Source: ERM Photographs, September 2017*

2.2

SITE SETTING

A 47.76 ha of land plot was allotted by Yerevan Municipality to Spayka through a donation agreement in July 2017, after which a land property certificate was registered. While the land is formally owned by the government and was found to be devoid of any settlement, cultivation or any other use at the time of Spayka's interest in early 2017, the municipality had compensated erstwhile land users in 2012 based on their rights of use for the land as a communal farm (kolkhoz) during the Soviet era. Spayka has confirmed that the land has been registered in its favour and that there are no litigations or disputes associated with the same.

Geographically, the Project site is situated in the southern part of Yerevan, within the administrative boundaries of Shengavit administrative district. The Project site is surrounded by the Noragavit settlement from the north-west, Nor-Kharberd settlement from the south, and abandoned industrial area from the east. Noragavit cemetery is located near the northern border of the Project site, while another one (Nor-Kharberd cemetery) neighbours to the southern perimeter of the Project site. Two thermal power plants are situated in the

industrial zone to the north-east of the Project site. One is operated since 2010, while the second is under the construction now and will be commissioned in 2019.

2.3 *PROJECT UTILITIES AND RESOURCES*

Project construction and operation will require the following utilities and resources:

- Land plot;
- Soils required for the site levelling;
- Water to feed the circulating system;
- Potable water;
- Wastewater discharge.

2.4 *PROJECT UTILITIES AND RESOURCES*

Spayka has planned several utility components into the Project including approach roads, parking, water/steam pipelines, power transmission lines, and a gas pipeline. The primary utilities required for day to day functioning of the Project as assessed and studied in details are:

- Water Requirement, Supply and Storage system;
- Sewage Disposal System;
- Solid Waste Disposal System;
- Power Supply and Backup system;
- Storm water drainage system;
- Fire Fighting system;
- Parking Arrangements; and
- Pesticide and Fertilizer application.

At the time of the issuing the IEE Report design solutions are not available. The description of those facilities is provided in brief considering the new Project will be a copy of greenhouses operating and constructing by Spayka in Artashat.

2.4.1 *Water Requirement, Supply and Storage System*

Construction Phase

Water requirement for the construction phase will be utilized for curing, concrete mixers, dust prevention, and domestic consumption of construction workers. Information on the estimated water requirement was unavailable at the time of writing. All water requirements will be met through connecting to the local water distribution network. Spayka has a 'Technical Conditions' document in place.

Operational Phase

The daily water demand for the operational phase will reach 3,600 cubic meters per day (m³/day) in the peak season.

Rainwater Harvesting

Rainwater harvested from the sealed surfaced and greenhouses' roofs will be collected and recovered by the rainwater water recovery system.

Rainwater will be collected by PVC piping and driven through racks into the underground drainage water recovery tanks. Water from the tanks will be further treated and as required.

Water Storage Tanks

Water for crops production will be stored in galvanised steel aboveground tanks. Stored water will be treated before used for fertilization/irrigation.

2.4.2 Sewage Disposal System

Wastewater will be generated by the Project during both construction and operational phases.

The estimated quantity of sewage for the construction phase is unknown.

During operational phase, it will form about 1/3 of the water consumption, which equals to 1,200 m³/day. The Project will be connected to the municipal sewer network. The generated sewage will be discharged into existing municipal sewer connections.

2.4.3 Solid Waste Management

Construction Phase

Construction waste will be generated over the short period of 7-8 months when the Project is built.

The main types of waste during construction phase are expected to be domestic solid waste, steel/aluminium waste, cement waste, waste package, etc. Other types of construction waste include waste that may be generated by construction equipment and vehicles (e.g. spent oil, tyres, accumulators, etc., see *Hazardous Waste*).

Given the approximate number of construction workers and based on a 0.5 kilogram/person/day estimate, the Project will generate about 32 tonnes of solid domestic waste during the construction. Approximate quantities of construction waste have not been determined yet, however the Project is not expected to generated large amounts of construction waste during construction.

Project's waste will be collected and transferred to specialist contractor companies for utilization and disposal.

Operational Phase

A total of 91 tonnes of solid domestic waste is expected to be generated annually by the Project based on a 0.5 kg/person/day estimate.

Other waste form operational phase include waste plastic/wood package, plant residues, contaminated fertilizers and chemical package, etc.

All solid domestic waste will be collected and transferred to specialist contractor companies for utilization and disposal.

Crop residue will be composted in traditional way and sold to the interested third parties. An in-house composting system for that is on design stage. The estimation of amount of crop residue is not available at the time of reporting.

Hazardous Waste

Some amount of spent oil will be generated from operation of diesel generator sets on the site during the construction phase of the Project. Oil contaminated rags will also be generated during construction activities and will be sent to an authorized treatment, storage, and disposal facility.

During operational phase, negligible amount of hazardous waste will be generated from emergency diesel generators.

Other hazardous waste is expected to be reverse osmosis membranes, water treatment sludge, and contaminated package.

2.4.4 *Power Requirement, Supply and Back-up Systems*

The source of power supply during construction is diesel generators and/or local power network.

The source of power supply during operation is local power network. Emergency power will also be provided by emergency diesel generators.

Project will put up appropriate transformers in the substation as required by the electricity providers.

2.4.5 *Fire Fighting System*

Project facilities will be equipped with firefighting systems as required by Armenian legislation.

2.4.6 *Raw Materials*

All of 30 ha will be levelled as per general plan of construction, including the preparation of the roads. Backfill material will be taken from the same 30 ha land plot, no additional material needed.

Steel constructions and glazing for the greenhouses will be partially pre-fabricated and transferred to the site by equipment suppliers and their contractors.

2.4.7 *Manpower Requirement*

The construction phase for Project will take 7 to 8 months. At its peak, it is estimated that about 300 workers will be working at the site. The workers will include local labourers as well as a temporary influx of people from outside areas.

During the operation, the total Project staffing will comprise 275, including 240 greenhouse workers and 35 administrative staff

Spayka and its contractors and subcontractors will comply with Armenian labour laws and take measures to comply with the relevant ILO core labour standards. These will be reflected in Spayka's Human Resource Policy.

2.4.8 *Arrangements to Supply Expandable materials*

Spayka has developed a list of quality suppliers of seeds, pesticides, and fertilizers. The Company sources its seeds from big seed companies around the world. Quality seeds will be procured from European suppliers, such as Enza Zaden, De Ruiter, and Rijk Zwaan, and fertilizers will be supplied by Koppert, Bio Best and Haifa.

Beehives are being used to ensure proper pollination within the greenhouse. The beehives will be supplied by European suppliers from the Netherlands, Belgium or Israel. The pollination period lasts up to 8 months, and after that those beehives are to be renewed.

2.5 *ASSESSMENT OF PROJECT ALTERNATIVES*

2.5.1 *"Zero Alternative"*

The Project is viewed by Spayka as a part of its strategy of business enhancement and diversification, which overall makes the Company more sustainable. At the same time the Project brings several important socio-economic benefits to the area of Project implementation:

- Implementation of investment project at the land plot, which was designated by Yerevan authorities for same purposes, however no investors were found during the past 5 years;
- Provision of more than 370 jobs for local communities, including lots of opportunities for women;
- Taxes paid by the Company to Yerevan Municipality will increase the budget of municipality and will give the opportunity to make some municipal improvements or cover other needs.

Considering few environmental impacts associated with the Project, which all assessed as *minor* (please refer to *Section 7.1* of this report) or *negligible*, the Project provides more benefits than impacts. Therefore "no project" alternative is not reasonable.

2.5.2 *Site location alternatives*

Any alternative site location potentially considered by Spayka would require additional time and costs to perform land acquisition and environmental audit of the plot, however this documents for the one proposed by Yerevan Municipality were already prepared and provided to Spayka upon the contract conclusion.

Moreover, the Project site has the following advantages:

- It is located close to utilities, and requires minimal earthworks to be connected to the grid;
- It has comfortable (plain) topography, which minimises site levelling work and volume of soils to be used for it;
- The site is located close to Yerevan and main transportation routes, which minimises transportation costs and environmental impact associated with emissions from vehicles.

Therefore from Company's prospective it was unnecessary to consider any other land plot for Project implementation.

2.5.3 *Alternative technologies: glass vs. plastics*

Spayka has considered different greenhouse technologies. However glass greenhouses are both exposed and represent high safety risks due to high seismic activity in Armenia.

Moreover, financial analysis showed that a glass greenhouse required 1.5 times more CAPEX than a plastic one.

Therefore plastic greenhouses technology has been chosen by Spayka for the Project implementation.

2.5.4 *Alternative technologies: closed vs. semi-closed*

At the initial Project examination stage the Company has considered two different technologies: closed greenhouses and semi-closed greenhouses.

The semi-closed greenhouse technology was originally invented and tested in the United States in 2005 and has been widely used in Europe and the United States, especially for growing tomatoes.

Semi-closed technology creates the optimal microclimate environment inside the greenhouse thanks to the advanced ventilation system, which is the main difference between semi-closed and closed greenhouse. The ventilation system in closed greenhouse is implemented by simply opening the ventilation transoms to bring air in, whereas in semi-closed technology air exchange takes place through two air distribution corridors where air is being prepared and pumped into the greenhouse.

Semi-closed greenhouse includes technological corridors on both walls of the greenhouse, equipped with pad and fan cooling system, air heating system, and special fans, which provide active and optimal air conditioning and cooling inside the greenhouse during hot times and provide moisture and cool climate during fall and winter time.

Overall, semi-closed greenhouses have 2-3 times higher yields and are 3-4 times more water efficient than traditional open-field horticulture because climate-controlled semi-closed greenhouse technology can control temperature, humidity, CO₂ and biological disease in the greenhouse.

Semi-closed technology also decreases the operational costs by reducing:

- (i) heating cost as warm air from the greenhouse is mixed with outside air to reach the right temperature and humidity and pumped back into the greenhouse, creating a higher-pressure environment; and
- (ii) chemical treatment cost because pests cannot enter the greenhouse as there is no access to greenhouse.

Drip irrigation systems can provide exact amounts of water and fertilizer for each plant at the different growth stages to optimize the growth of plants by strictly controlling the nutrient supply. As such, climate-controlled greenhouses effectively address a wide range of issues associated with climate change (e.g. increased temperature, more irregular precipitation, floods and storms).

Therefore semi-closed technology has been chosen by the Company for the Project implementation, as well as Spayka has reconstructed the existing operating greenhouses to apply semi-closed technology.

This section highlights environmental and social regulations applicable to the Project. The regulatory framework analysis is limited to specific laws and regulations having implications for the Project.

The section broadly focuses on:

- Institutional Framework;
- Environmental Laws, Regulations and Policy;
- Social Laws, Regulations and Policy;
- Applicable Permits – Licences, approvals and consents;
- Applicable Standards.

3.1 NATIONAL LEGAL REQUIREMENTS

National legal requirements applicable to the Project are presented in the table below (*Table 3.1-1*).

Table 3.1-1 National legal framework

Laws	Description
Law on Environmental Impact Assessment and Expert Examination (EIA&EE)	<p>The main document that regulates EIA process in the Republic of Armenia (RoA) is the Law on Environmental Impact Assessment and Expert Examination (EIA&EE). The Law has been adopted in 2014 and contains standard steps of the EIA for various projects and activities to be implemented in the country. The scope of EIA&EE law is defined in Article 2, while main definitions applied in the Law are described in Article 4, which among others defines the main subject of the Law - Intended activity as study, production, construction, operation, rehabilitation, expansion, technical and technological modernization, conservation, liquidation and closure that has possible impact on the environment.</p> <p>According to the Law there are 2 types of documents, which are subject of environmental impact assessment and expert examination. These documents are:</p> <ul style="list-style-type: none"> - Framework Document - project document (policy, strategy, concept, scheme of utilization of natural resources, program, master-plan, urban development document), which can possibly have impact on environment. - Design Document - technical report, feasibility study and construction-engineering design of intended activity. <p>Article 14 defines main types of areas and activities which are subject of EIA. This includes: (i) Framework documents in the area of socio-economic, energy, urban development, transport, communication, agriculture, mining, industrial, health care, environmental, recreation, service, forestry, waste and water management; (ii) Design documents of intended activities described in item 4 of Article 14. According to the same article types of activities, which should undergo EIA are divided into 3 (A, B and C) categories depending on their impact on environment.</p> <p>According to the EIA&EE law "the architectural constructions/structures that occupy area more than 1500m²" are</p>

Laws	Description
	<p>included in "C" category.</p> <p>The procedure of EIA and expert examination consists of initial (preliminary) and basic stages. Duration of the initial stage is 30 working days starting from the date of EIA initial application submission to the State authorized body¹. As a result of this, the Terms of Reference (ToR) for elaboration of EIA report is developed by the State authorized body and submitted to the Applicant (for Framework document or Intended activities of "A" or "B" category).</p> <p>According to the Article 19 of EIA & EE law, basic stage of State expert examination process requires up to 60 working days for Framework document or "A" category intended activity and 40 working days for "B" category intended activity. If intended activity is of "C" category then after initial stage (30 working days) the professional conclusion is issued by the State authorized body to the Undertaker/Applicant (basic stage isn't needed).</p> <p>According to the EIA & EE Law the Project is classified as "C" category intended activity (the architectural constructions/ structures that occupy area more than 1,500m². This means that the Greenhouse Construction Project expert examination should be done within 30 working days based on Initial EIA application.</p> <p>For "A" and "B" categories the professional conclusion is issued after completion of basic stage (60 and 40 working days accordingly). If during the EIA process it becomes evident that additional assessment will be needed the State authorized body can extend EIA period, but not more than for 30 working days (for "A" category) and for 20 working days (for "B" category).</p> <p>Article 26 of the Law defines mechanism of affected community/communities notification, public hearings/ discussions and applied requirements. The procedure for public notification and discussions is given in the RoA Government Decree №1325-N dated 19.11.2014.</p>
Public notification and discussion procedure	<p>According to the RA EIA&EE Law and Public notification and consultation procedure², four public discussions (for Framework documents and Intended activities of "A" or "B" category) are envisaged during the entire environmental permitting process, i.e. at the i) initial impact assessment, ii) initial examination, iii) basic impact assessment and iv) basic examination stages. However, if the intended activity is of C category, only two public discussions should be done.</p> <p>As set in the Article 6 of Public consultations procedure, the list of affected communities is defined by the State Environmental Impact Examination Centre (EIEC) at the initial stage.</p> <p>The public notification is conducted through mass media, e-mail as well as advertising. The notification includes information on the Project Applicant, the area of project implementation, the potential environmental impacts, date for holding of public discussions, date for submission of comments/remarks as well as contacts of public discussions responsible.</p> <p>Before public discussions the e-copies of documentation relevant to the each of environmental permitting stages should uploaded to web site of discussions responsible. Draft copies should be available at discussions responsible office. Based on the available documentation the public can provide written comments and objections. For concepts/strategic documents as well as "A" category projects comments/objections submission deadline is set as 15 days after the</p>

¹ State Environmental Impact Examination Center, see Section 2.1

² Public notifications and discussions procedure, approved by the RoA Government Decree №1325-N dated 19.11.2014

Laws	Description
	<p>notification.</p> <p>Public discussions are held by public discussions responsible or by an authorized person, who is in charge for video recording and protocoling of discussions. The experts representing the considered domain/sector might be invited to public discussions. Video records and protocols of public consultations should be submitted to the EIEC within 5 days after consultations date.</p> <p>Two public discussions/consultations on Project environmental impact assessment with Project stakeholders were conducted. The protocols of public discussions are presented in <i>Annexure B</i>.</p>
Water Code	<p>The main purpose of the Water Code is to provide the legal basis for the protection of the water resources, the satisfaction of water needs of citizens and economic sectors through effective management of water resources and ensuring the protection of water resources for future generations. The Water Code addresses the following key issues: responsibilities of state/local authorities and public, development of the national water policy and national water program, water cadastre and monitoring system, public access to the relevant information, water use and water system use permitting systems, trans-boundary water resources use, water quality standards, hydraulic facilities safe operation issues, protection of water resources and state supervision.</p> <p>Adoption of the Water Code in 2002 generated the need for development of a number of Governmental regulations and procedures, including permitting procedures, drainage water use, water alternative accounting, access to information on trans-boundary water, water use for fishery purposes, reservation of underground water sources, registration of documents in state water cadastre, public awareness and publicity of the documents developed by Agency of Water Resources Management and other normative documents which provide guidelines directly linked with water and environmental issues.</p> <p>Currently, the quality of surface water in the RoA is monitored in accordance with the principles of EU water framework directive. This system is defined by the RoA Government Decree №75-N (dated 27.01.2011) and applied since January 2013. The classification scheme that envisaged 5 classes for each parameter of surface water quality has been elaborated. These 5 classes are: excellent (class I), good (class II), average (class III), poor (class IV) and bad (class V) and vary depend on the intended purpose of surface water.</p>
Land Code	<p>The Land Code defines the main directives for use of the lands in the RoA. The land fund of Armenia is classified in according to designated which depend on the specification of usage is classified into the soil type and functional designation.</p> <p>The procedure for providing land that are under the State ownership or community is defined by the RoA Government.</p>
Code on Underground Resources	<p>This Code contains the main directives for use and protection of mineral resources and underground water, including the sanitary protection zones for the underground water resources</p>
Law on Waste	<p>The Law provides legal and economic basis for collection, transportation, disposal, treatment, re-use of wastes as well as prevention of negative impacts of waste on natural resources, human life and health. It defines the roles and responsibilities of state authorities as well as of waste generator organizations in waste management activities.</p> <p>According to the Law "specially provided areas" are sites where waste can be placed and disposed (landfilled). For landfills a permit is required. Landfills are specifically mentioned as "licensed landfills", which means a "permit" has been issued as established by Law.</p>
Law on Atmospheric	<p>The purpose of Law on Atmospheric Air Protection is to define main</p>

Laws	Description
Air Protection	<p>principles of the RoA directed to provision of purity of atmospheric air and improvement of air quality, prevention and mitigation of the chemical, physical, biological and other impacts on air quality and regulation of public relation. This Law also regulates the emission permissions and provides maximum allowed limits/concentrations for atmospheric air pollution, etc.</p> <p>RoA Government decree № 160-N dated 02.02.2006 defines maximum permissible concentrations of air pollutants in atmosphere of residential areas.</p>
Law on Nature Protection and Nature Utilization Payments	<p>The Law defines the concept of nature protection and utilization payments, identifies the potential taxpayers and types of payments, determines the methodology for calculation and payment, as well as assigns responsibilities for the violation of the Law.</p>
Law on Flora and Law on Fauna	<p>The Laws on Flora and Fauna outline the State'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 to the sustainable protection and use of flora/fauna and the conservation of biodiversity. There are provisions for assessing and monitoring species, especially rare and threatened ones.</p>
Law on Environmental Oversight	<p>Regulates the issues of organization and enforcement of oversight over the implementation of environmental legislation of the RoA and defines the legal and economic bases underlying the specific characters of oversight over the implementation of environmental legislation, the relevant procedures, conditions and relations as well as environmental oversight in the RoA. The existing legal framework governing the use of natural resources and environmental protection includes a large variety of legal documents. Government decrees are the main legal implementing instruments for environmental laws. The environmental field is also regulated by presidential orders, Prime-Minister's decrees and ministerial orders.</p>
Law on Special Protected Areas of Nature	<p>The Law on Special Protected Areas of Nature regulates the special protected areas of the RoA as an eco-systems that have environmental, economic, social, scientific, educational, historical, cultural, healthcare, and recreation value as well as outlines the legal basis of state policy in the field of sustainable development, restoration, protection, reproduction and utilization of natural complexes and separate objects.</p>
Law on the Protection and Use of Fixed Cultural and Historic Monuments and Historic Environment	<p>The Law 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 among others describes procedures for 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.</p>
Law on Sanitary and Epidemiologic Security of Population	<p>This Law defines the legal, economic and organizational basis for provision of sanitary and epidemiological security of the RoA population, as well as the State guarantees, eliminating negative impact of the harmful and dangerous parameters of working area on the human health and makes provision for the creation of favourable conditions for human life and vital activities of future generations.</p>
Law on State Regulation of Technical Safety	<p>The main purpose of the Law on State Regulation of Technical Safety is to define the State strategic principles and their implementation mechanisms in the field of technical safety, directed to prevention of incidents (and accidents), elimination of their consequences, minimization of the damages and losses arose due to that incidents and protection of population and environment. This Law defines the legal, economic and social basis for ensuring of the technical safety in RoA, as</p>

Laws	Description
	well as the system of technical safety provision and regulates the relationship connected with technical safety. The Law also defines main types of industrial dangerous objects, which should be registered and controlled by the National Technical Safety Centre.
Labour Code	The RoA Labour Code (2004) regulates the collective and individual employment relationship; defines the basis and procedure of implementation for the establishment, revision and cessation of that relationship; assigns duties, authorities and responsibilities of the parties of employment relationship, as well as defines conditions for the provision of occupational health and safety of workers.

3.2

RELEVANT INTERNATIONAL CONVENTIONS

Republic of Armenia is a signatory to a number of international agreements related to the protection and management of the natural environment and communities. The list of conventions and ensuing responsibilities summarised in the table below (Table 3.2-1) is not an exhaustive list, but is limited to the environmental and social conventions and agreements signed by the country and which are directly relevant to the Project.

Table 3.2-1 *Applicable international conventions*

International Convention or Protocol	Summary of Responsibilities
Paris Convention for the Protection of the World Cultural and Natural Heritage (1972)	The Convention establishes the need to preserve natural and cultural heritage and the balance between the two. Armenia became a State party in 1993.
Basel Convention on the control of transboundary movements of hazardous wastes and their disposal (1989)	Following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad, the Convention aims to respond to the awakening environmental awareness on industrial environmental regulation. The main objective is to protect human health and the environment against the effects of hazardous wastes. Armenia has ratified this convention in 1999.
The Convention on the Conservation of Migratory Species of Wild Animals (1979) (Bonn Convention)	The objective of the Bonn Convention, which was adopted in 1979, is to ensure the conservation of land, marine and air migratory species over the whole of their area of distribution. Armenia is a State party since 2011.
The Convention on Biological Diversity (1992)	The three main objectives of the Convention are: the conservation of biological diversity; the sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Signed by Armenia in 1993.
Vienna Convention on the Protection of the Ozone Layer (1988) and related Montreal Protocol on Substances that Deplete the Ozone Layer (1989)	The Vienna Convention aims to promote international cooperation in the legal, scientific and technical fields to protect the environment against the activities which effect or modify the ozone layer. Under the Vienna Convention, the Montreal Protocol controls the production and consumption of the most commercially and environmentally significant ozone-depleting substances.

International Convention or Protocol	Summary of Responsibilities
	Signed by Armenia in 1999
United Nation Framework Convention on Climate Change (1992)	<p>The UNFCCC is one of the “Rio Conventions” adopted at the Rio Earth Summit in 1992. The principal objective is to prevent “dangerous” human interference with the climate system. The UNFCCC entered into force in March 1994 and the first Conference of the Parties of the Convention took place in Berlin, 1995.</p> <p>Armenia became a state party in 1993.</p>
Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998)	<p>The Aarhus Convention is a multilateral environmental agreement through which the opportunities for citizens to access environmental information are increased and transparent and reliable regulation procedure is secured.</p> <p>Armenia became a State party in 2001.</p>
<p>Fundamental ILO conventions:</p> <p>Forced Labour Convention, 1930 (No. 29)</p> <p>Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)</p> <p>Right to Organise and Collective Bargaining Convention, 1949 (No. 98)</p> <p>Equal Remuneration Convention, 1951 (No. 100)</p> <p>Abolition of Forced Labour Convention, 1957 (No. 105)</p> <p>Discrimination (Employment and Occupation) Convention, 1958 (No. 111)</p> <p>Minimum Age Convention, 1973 (No. 138)</p> <p>Worst Forms of Child Labour Convention, 1999 (No. 182)</p>	<p>Armenia ratified all eight of the fundamental ILO conventions. Relevant requirements are embedded into the Armenian Labour Code:</p> <p>Child Labour</p> <p>Child labour issues are set by the RoA Labour Code (2004). As per the Labour Code, employment of children under 14 is prohibited. Employment of children of 14-16 is allowed only in the event of consent of one of the parents, adopter or guardian¹. There are some special provisions for the work time for underage employees². As per the article 257 of the Labour code, the Government should adopt the types of work prohibited for underagers, pregnant, and lactating women. This list is set by the Government Decision No 2308 dated by 29.12.2006. Underagers are subject for medical check-up before signing of labour contracts. Employees under 18 years of age must undergo a medical examination upon employment and with the defined regularity until they reach 18 years of age³.</p> <p>Forced Labour</p> <p>One of the core principles of the national labour legislation (Article 3 of the RoA Labour Code) is prohibition of any type forced labour and violence with respect to employers.</p> <p>Discrimination</p> <p>Discrimination on the bases of sex, race, nationality, language, origin, citizenship, social status, religion, marital status, age, beliefs, membership to parties, trade unions, is not connected to working skills and hence is prohibited in RoA (Article 3 of the RoA Labor Code).</p> <p>Freedom of Association</p> <p>Freedom of association is stipulated by the RoA Labour Code. As per the Article 21, to protect and represent their rights and interests the employers and employees can join and create trade and employers unions.</p>

¹ Article 4 of the Labor Code

² Those limitations are: 24 hours per week for persons aged 14-16 and 36 hours per week for persons aged 16-18 (Article 140 of the Labour code)

³ Article 249 of the Labour Code

3.3 NATIONAL ADMINISTRATIVE FRAMEWORK

The administrative and institutional structure applicable to the environmental and social impact assessment process and the Project (to be implemented in the Republic of Armenia) is described below.

3.3.1 Ministry of Nature Protection

Ministry of Nature Protection (MoNP) is the State body responsible for elaboration and implementation of national policy in the area of environmental protection and sustainable use of natural resources. The main roles of the MoNP are as follows:

- Development and coordination of the implementation of the state policy and strategy on environmental protection and efficient use and reproduction of the natural resources;
- Elaboration of the environmental regulations;
- Development of the economic instruments for efficient use and reproduction of environment and national resources;
- Facilitation of fulfilment of international environmental commitments;
- Development of the main directions of environmental education and awareness raising strategy;
- Execution of the state environmental monitoring;
- Investigation on the negative impact on the environment;
- Regulation of sustainable use of natural resources.

According to the RoA Law on Environmental Impact Assessment and Expert Examination the MoNP is the State authorized body responsible for organization of environmental impact assessment and expert examination. Implementation of MoNP roles are divided between the Staff of the Ministry and following agencies and separate institutions:

- **"Environmental Impact Examination Centre" State Non-Commercial Organization (SNCO)** conducts environmental assessments and expert examinations of framework documents and intended activities for construction, reconstruction, extension and maintenance of industry related production units, auxiliary facilities and infrastructure according to the requirements of National legislation and ratified International agreements and issues experts' conclusions. The roles/authorities of Environmental Impact Examination Centre also includes: 1) participation in development and implementation of policy related to expert examination process; 2) participation in elaboration of legal acts for regulation of examination process, 3) involving of experts in the expert examination process on a contract basis; 4) reconciliation of the framework document and intended activities with the involving bodies, if necessary; 5) securing of its representative participation in public hearings; 6) Elaboration of terms of reference and its presentation to the initiator.

- *Agency of Water Resources Management* with its six water basin management territorial departments is the key institution responsible for the water resources management. Main roles of the Agency include, but not limited to the development and implementation of the National water policy, National water program and Water basin management plans; regulation of water use by issuance of permits for use of surface and ground water resources; assessment and classification of water resources by their use; participation in development of water standards and control of application; approval of quantitative and qualitative criteria for maximum permissible water discharges, etc.
- *Agency of Bioresources Management* participates in the environmental impact assessment of eco-systems; ensures protection, reproduction and rational usage of bioresources; draws up inventory and carries out monitoring of flora and fauna, etc.
- *Agency of Waste and Air Emissions Management* is responsible for: 1) approval of waste disposal limits of legal entities and individuals; 2) management of the state cadastre as well as register of waste generation, treatment, utilization and disposal sites; 3) verification of hazardous waste passports, 4) issuing of permissions for procurement (import, export, transit) of ozone depletion materials and substances; 5) discussion of maximum permissible air emissions projects and issuing of air emissions permissions; etc.
- *State Environmental Inspectorate* with its 11 regional offices oversees the implementation of legislative and regulatory standards on natural resources protection, use and renewal.
- *Information Analytical Centre* provides data concerning environmental issues and natural resources for stakeholders, such as state authorities, non-governmental organizations (NGOs), mass media, community, etc.
- *Environmental Impact Monitoring Centre* monitors water and air quality in different areas of Armenia through its network of observation points.

3.3.2 *Ministry of Agriculture*

The Ministry of Agriculture (MoA) is a state body of executive authority, which develops and implements RoA government's policies in the field of agriculture and forestry management. The MoA develops and implements projects relating to the spheres of production and supply of agricultural products, intergovernmental cooperation in the field of agriculture, forestry, plant-growing, cattle-raising, irrigation and projects increasing the productivity of the soil usage. The *State Service for Food Safety* with its 11 regional centres is a state body under the administration of the MoA that implements assessment of food products' conformity with the applicable standards, regulates the administration of veterinary and sanitary services, as well as ensures control and imposes sanctions acting on behalf of the Republic

of Armenia. The State Service for Food Safety acts established based on RoA Government decree №1730-N dated 30.12.2010.

3.3.3 *Ministry of Emergency Situations*

Ministry of Emergency Situations (MoES) is responsible for development and implementation of RoA policy in the area of civil defence and protection of the population in emergency situations. The following separate divisions and state agencies, such as State Hydrometeorology and Monitoring Service of Armenia, National Technical Safety Centre, Armenian Rescue Service, National Reserves Agency and National Seismic Protection Service Agency, are also included in the structure of the Ministry.

- *Armenian State Hydro-Meteorological Monitoring Service* conducts regular monitoring of meteorological and hydrological conditions in different areas of Armenia through its network of metrological stations.
- *National Technical Safety Centre* organizes and carries out measures and actions for provision of technical safety in the industrial dangerous objects operated (constructed, modernized, decommissioned, demolished) in Armenia except nuclear and power stations, radioactive substances treatment, aviation, auto and railway transport as well as military objects.

3.3.4 *Ministry of Healthcare*

Ministry of Healthcare (MoH) elaborates and implements the policy of the Republic of Armenia in the healthcare sector. The structure of the Ministry includes main staff and two subordinate bodies: State Healthcare Agency and National Hygiene and State Health Inspectorate.

- *State Health Agency* provides health services in the state-guaranteed free medical care and services under contracts with health care practitioners from the actual disbursement of funds for the work done in providing targeted public health programs through the state medical care and services provided by the state budget for efficient and effective use of financial resources.
- *State Health Inspectorate* implements MoH entrusted supervisory functions. Acting on behalf of the Republic of Armenia, the Inspectorate may impose sanctions for breach of healthcare, work safety and labour legislation standards and provisions.

3.3.5 *The Ministry of Labour and Social Affairs*

The Ministry of Labour and Social Affairs (MoL&SA) among others is responsible for development and implementation of the state policy, legislation and programs in the following areas: social security, labour *and employment, social assistance, social assistance to disabled and aged people, social protection of families, women and children*, etc.

3.3.6 *Non-Governmental Organizations*

NGOs have dealt with environmental and social issues in terms of research, including data and information gathering, public awareness and training. Within the scope of this project it is expected that NGO's will be involved in public discussions, social welfare and other social management plans.

3.4 *INTERNATIONAL STANDARDS*

The Project will be conducted with respect to Asian Development Bank's Safeguard Policy Statement, 2009 and other relevant ADB policies listed subsequently.

3.4.1 *ADB Safeguard Policy Statement, 2009*

In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The SPS builds upon ADB's previous safeguard policies on the Environment, Involuntary Resettlement, and Indigenous Peoples, and brings them into one consolidated policy framework with enhanced consistency and coherence, and more comprehensively addresses environmental and social impacts and risks. The SPS also provides a platform for participation by affected people and other stakeholders in the Project design and implementation.

The SPS applies to all ADB-financed and/or ADB-administered Projects and their components, regardless of the source of financing, including investment Projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees. ADB works with borrowers and clients to put into practice the requirements of SPS.

The objectives of ADB's safeguards are to:

- Avoid adverse impacts of Projects on the environment and affected people, where possible;
- Minimize, mitigate, and/or compensate for adverse Project impacts on the environment and affected people when avoidance is not possible; and
- Assist borrowers and clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary Resettlement safeguards; and
- Indigenous Peoples safeguards.

To help borrowers and clients and their Projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers and clients are required to meet in addressing environmental and social impacts and risks. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 1 of SPS);

- Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 4 of SPS).

In addition, ADB does not finance activities on the prohibited investment activities list (Appendix 5 of SPS). Furthermore, ADB does not finance Projects that do not comply with its safeguard policy statement, nor does it finance Projects that do not comply with the host country's social and environmental laws and regulations, including those laws implementing host country obligations under international law.

3.4.2 *Consultation and Disclosure requirements of ADB*

ADB's *Safeguard Policy and Public Communications Policy (2011)* sets out disclosure requirements for various ADB activities, including safeguard requirement. Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS); and Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS) sets out the need for meaningful consultation and information disclosure during Project preparation and operation to the affected peoples and other stakeholders. Key requirements include:

- **Information Disclosure:** The borrower/client will submit the following documents to ADB for disclosure on ADB's website as per the applicability with respect to the Project:
 - Draft EIA/IEE including draft EMP;
 - Final EIA/IEE;
 - Updated EIA/IEE and corrective active plan;
 - Environmental Monitoring Reports;
 - Resettlement Plan (RP)/Resettlement Framework (RF) (if required);
 - Indigenous Peoples Plan (IPP)/Indigenous Peoples Planning Framework (IPPF) (if required);
 - Monitoring reports.
- **Information disclosure to affected people or stakeholders:** The borrower/client will provide relevant environmental information in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.
- **Consultation and Participation:** The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation.
- **Timing and Frequency for consultation and participation:** Meaningful consultation begins early in the Project preparation stage and is carried out on an ongoing basis throughout the Project cycle.

3.4.3 *ADB Gender and Development Policy, 2003*

The Gender and Development Policy (GAD Policy) of ADB is aimed at integrating gender issues in the Bank's macroeconomic sector and Project work. The GAD strategy is based on consideration of social justice, gender equity and on substantial evidence that investments in women are vital to achieving economic efficiency and growth. ADB Social Protection Strategy, 2001

3.4.4 *ADB's Social Protection Strategy*

ADB's Social Protection Strategy includes a range of approaches to manage social risk. Under this policy ADB projects are designed and implemented in accordance with national labour laws and internationally-recognized core labour standards (CLS). With respect to CLS, the Borrower is expected to take the following measures to comply with the core labour standards for the ADB financed portion of the Project:

- (a) carry out its activities consistent with the intent of ensuring legally permissible equal opportunity, fair treatment and non-discrimination in relation to recruitment and hiring, compensation, working conditions and terms of employment for its workers (including prohibiting any form of discrimination against women during hiring and providing equal work for equal pay for men and women engaged by the Borrower);
- (b) not restrict its workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment;
- (c) engage contractors and other providers of goods and services:
 - (i) who do not employ child labour or forced labour;
 - (ii) who have appropriate management systems that will allow them to operate in a manner which is consistent with the intent of (a) ensuring legally permissible equal opportunity and fair treatment and non-discrimination for their workers, and (b) not restricting their workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment; and
 - (iii) whose subcontracts contain provisions which are consistent with paragraphs (i) and (ii) above.

3.4.5 *ADB Safeguard Categorization*

The Projects are screened on the following criteria:

1. *Environment* -Proposed Project was screened according to type, location, scale, and sensitivity and the magnitude of their potential environmental impacts, including direct, indirect, induced, and cumulative impacts.
2. *Involuntary Resettlement* - The involuntary resettlement impacts of an ADB-supported Project are considered significant if 200 or more persons will be physically displaced from home or lose 10% or more of their productive or income-generating assets.
For those involving involuntary resettlement, a resettlement plan is prepared that is commensurate with the extent and degree of the

impacts: the scope of physical and economic displacement and the vulnerability of the affected persons.

3. *Indigenous People* - The impacts of an ADB-supported Project on indigenous peoples is determined by assessing the magnitude of impact in terms of
 - Customary rights of use and access to land and natural resources;
 - Socioeconomic status;
 - Cultural and communal integrity;
 - Health, education, livelihood, and social security status; and
 - The recognition of indigenous knowledge; and
 - The level of vulnerability of the affected Indigenous Peoples community.

As per these criteria, Projects are classified into any of the four categories: A, B, C and F1. The criteria and categories are further explained in *Table 3.4-1*.

Table 3.4-1 ADB Safeguard Categories

Category/ Criteria	Environment	Involuntary Resettlement	Indigenous People
A	A proposed Project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.	A proposed Project is likely to have significant involuntary resettlement impacts. A resettlement plan, which includes assessment of social impacts, is required.	A proposed Project is likely to have significant impacts on indigenous peoples. An indigenous peoples plan (IPP), including assessment of social impacts, is required.
B	The proposed Project's potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A Projects. An initial environmental examination (IEE), including an EMP, is required.	A proposed Project includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, which includes assessment of social impacts, is required.	A proposed Project is likely to have limited impacts on indigenous peoples. An IPP, including assessment of social impacts, is required.
C	A proposed Project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.	A proposed Project has no involuntary resettlement impacts. No further action is required.	A proposed Project is not expected to have impacts on indigenous peoples. No further action is required.
F1	A proposed Project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities have minimal or no environmental impacts or risks.	A proposed Project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities are unlikely to generate involuntary impacts.	A proposed Project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities unlikely to have impacts on indigenous peoples.

Project Categorization

The Project has been categorized as per ADB SPS (2009) for Environmental Assessment, Involuntary Resettlement and Indigenous Peoples in the Environmental and Social Compliance Audit Reports. The selected categories and their justification have been presented in the table below:

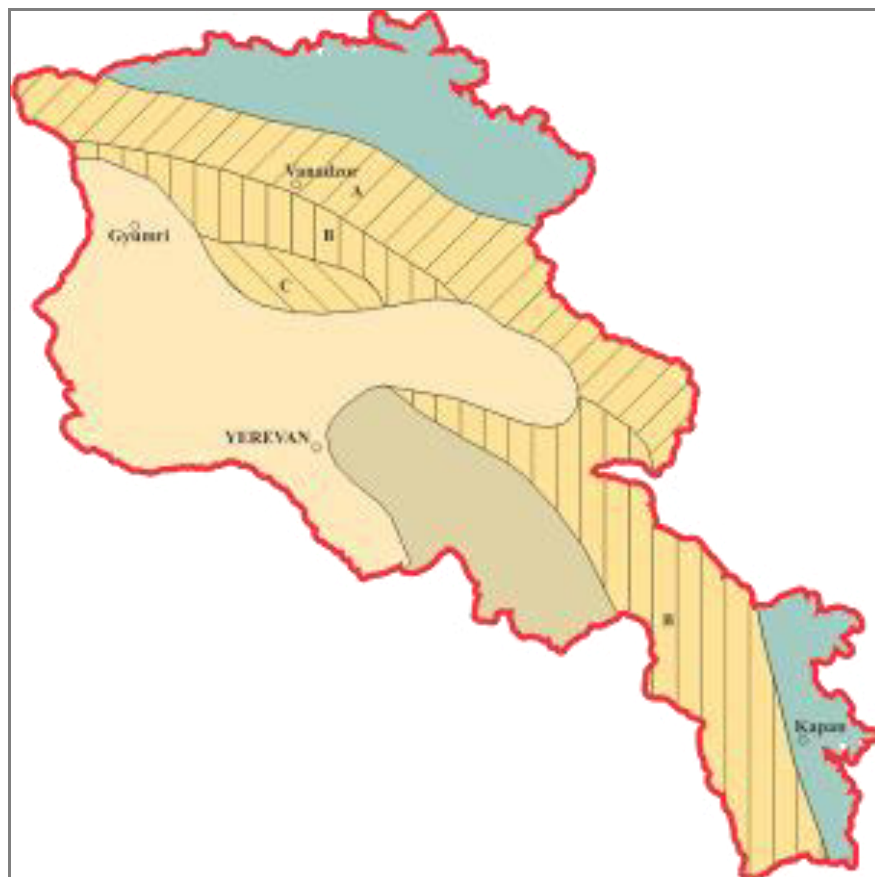
Table 3.4-2 ADB Categorization of Project

ADB Safeguard	Chosen Category	Justification
Environmental Assessment	Category B	The Project site is located in on a boundary of the Yerevan industrial zone and rural communities with no ecologically sensitive areas in the vicinity. The plan for the project will need to account for sewage management, solid waste management, traffic management and debris. According national regulations the Project requires state expert based on Initial EIA application.
Involuntary Resettlement	Category C	The land procurement for the new greenhouse at Yerevan Municipality did not entail any economic and/or physical displacement of local communities with respect to Spayka’s project. It is understood that this land belonged to the government/municipal authorities and had been made available for individuals for de facto use prior to 2012. In 2012, the Municipality came up with an Investment Plan for the land to develop a greenhouse and reportedly provided compensation to households of Noragavit. The government appointed the “Armenian Crop Promoting Centre” CJSC (a company with 49% stocks in Government ownership) to conduct project management. The idea was to establish a PPP, where Yerevan Municipality was to provide land plots for potential investors and “Armenian Crop Promoting Centre” CJSC was to mobilize investors in greenhouse business and to provide services to investors. Discussions with local residents and local authorities indicate that to the extent feasible, principles around consideration of informal rights (usage of the land), compensation that was at replacement cost (based on consent of communities) and prior information was provided to minimize any loss of livelihoods.
Indigenous Peoples	Category C	In accordance to the Census of Armenia (2001), 98% of the total population is ethnically Armenian. The rest comprise of ethnic minority groups: notably Greeks, Russians, Assyrians, Kurds, Yezidi Kurds and Ukrainians. Of these the Yezidi Kurds are a culturally distinct group that practice their own religion and have nomadic and agro pastoral livelihoods sources. Spayka’s activities do not entail any specific adverse E&S impacts on Yezidi Kurds or any other ethnic minority groups that are distinct from their general interface with the Armenian community. Their facility (especially the new greenhouse location) has not impacted any Yezidi Kurd communities with respect to their livelihoods or cultural heritage.

4.1 GEOTECTONIC ZONATION, GEOLOGY AND HYDROGEOLOGY

According to the Geological Map of the Republic of Armenia, prepared by Geological agency under the Ministry of nature protection (2005), Yerevan is situated in super-positioned orogenic basin zone (see Figure 4-1) and is part of the quaternary geologic unit.

Figure 4-1 Tectonic zonation scheme of the Republic of Armenia



Legend

	Somkhel - Kapan undulated tectonic complex
	Bazum - Zangazour Intensely folded suture zone : A - Sevan - Armasia ophiolite zone; B - Karlovavan - Zangazour subzone; C - Tsakhkuntate antiformorium
	Trans-Araksian moderately folded zone
	Superpositioned orogenic basin zone

Source: Geological Map of Republic of Armenia, 2005

The Project area is located in Ararat valley, the geological settings of which in general have formed as a result of depressions and the eruption of the Upper and Lower Quaternary basaltic lavas exposed to intense erosion, which continues up to now. The geological structure of the Ararat valley involves

limno-fluvial and effusive water bearing formations, which thickness reaches 500 m. Beneath those formations, a folded water resistant formation is found, which is represented by Palaeozoic and Mezocainosoic sandstone, clayey and carbonate rocks.

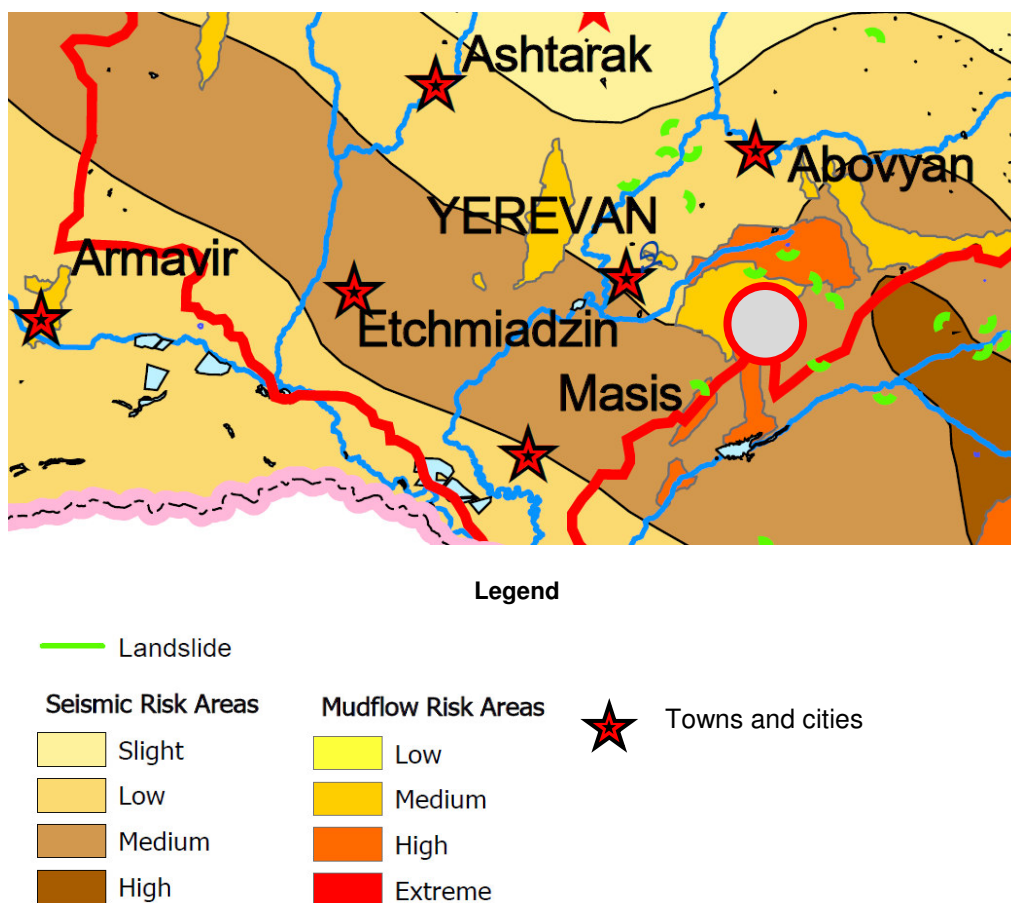
Aquifers are the lava (porous and fractured basalt, slagged basalts, andesite-basalts), tuffs, lakewater-bearing fluvial deposits. 80% of springs are originated from the lavas. The water balance of the Ararat basin involves ground waters which differ by conditions of formation, chemical composition and bedding conditions. The basic feeding source for aquifers is atmospheric precipitation and infiltration of surface waters. Water accumulation and flow mostly occurs through andesite-basalts and loose fragmented materials of under-bed Quaternary sediments. Data from numerous wells and geophysical surveys prove that the basin feeding ways mostly coincide with the modern river network.

4.2 SEISMICITY AND GEOLOGICAL HAZARDS

The territory of Armenia is located in interfacing zone of Eurasian and Arabic large lithospheric plates. This basically determines the high seismicity of the region. The displacement velocity maximum values of 3.6 millimetres per year (mm/year) in the territory of Armenia were recorded in the Garni fault segment zone, from Garni to Meghradzor village. This fault zone is located about 20-22 km away from the Project site. According to National Atlas of Armenia the seismic activity magnitude at the site is estimated to be around 9.0 and the ground peak acceleration is about 0.3-0.4 meters per second squared (m/sec^2). The probability of not exceeding this magnitude in five hundred years is 90%. Major earthquake activity in the proximity of the Project site could result in ground shaking and shearing-induced displacements along pre-existing faults.

The map of natural hazards with indication of landslides, seismic and mudflow risks is presented below in *Figure 4.2-1*. Yerevan is classified as low-medium seismic risk area. The potential landslide and mudflow zones are located quite away.

Figure 4.2-1 Citation of the map of natural hazards of Republic of Armenia



Source: Geological Map of Republic of Armenia, 2005

4.3 SURFACE WATER AND GROUNDWATER RESOURCES

4.3.1 Ground water

According to geological study, conducted by Armhydroenergyproject CJSC for the area of the new thermal power plant¹ (located at the distance of 900-1000 m to the east of Project site), the main water horizon at the area is connected with quaternary age sediments, which are spread on Miocene age hydrophobic clays. In quaternary water sediments the ground waters have widespread diffusion. These waters have non-pressure ground water flow, which is directed towards the inclinations of the relief. The mentioned water horizon is fed by water through precipitation, which penetrate into the area from Artashat channel underground drain and irrigation waters.

In addition to the above mentioned, the described ground water main horizon has water layers with low pressure, the depth of which from hole mouth is 0.3 m and extends to Miocene age clays, to upper layers and sub layers of sand. These layers have weak water basin; in some places they supply the water horizon and somehow effect on chemical composition of water.

¹ Armpower CJSC (2017): Geological Report of Armhydroenergyproject CJSC

According to the archival materials the water in the Project area is characterized by sulphate-sodium and partly chlorine-sulphate-magnesium chemical composition. The groundwater is considered to be strong saline. The content of dissolved minerals is between the 1,949 milligrams per litre (mg/l) and 10,884.4 mg/l and characterized by the sulphate aggressive attitude to the concrete marks. Based on the geological study conducted by Geoterproject Ltd.¹, the groundwater level near the Project area can be found at the depth of 0.5 to 7.0 m and shows a seasonal fluctuation of 0.5 to 1.0 m.

4.3.2 *Surface water*

Rivers of Armenia are tributaries of the two major rivers of the South Caucasus, the Arax and the Kur. There are about 9,480 small and large rivers in Armenia, with a total length of about 23,000 km. Although Armenia is considered a country with an average reserve of water, the distribution of water resources in the country is extremely uneven. The density of the river network ranges from 0 to 2.5 km/km², and the average density is about 0.8 km/km².

Yerevan is located in Hrazdan River basin (water shade) management area, which is the primary waterstream of Armenia and the country's second largest river. While Hrazdan river receives effluent from various agricultural, commercial, industrial, and residential sources, it is most significantly impacted by the discharge of Yerevan's almost entirely untreated wastewater.

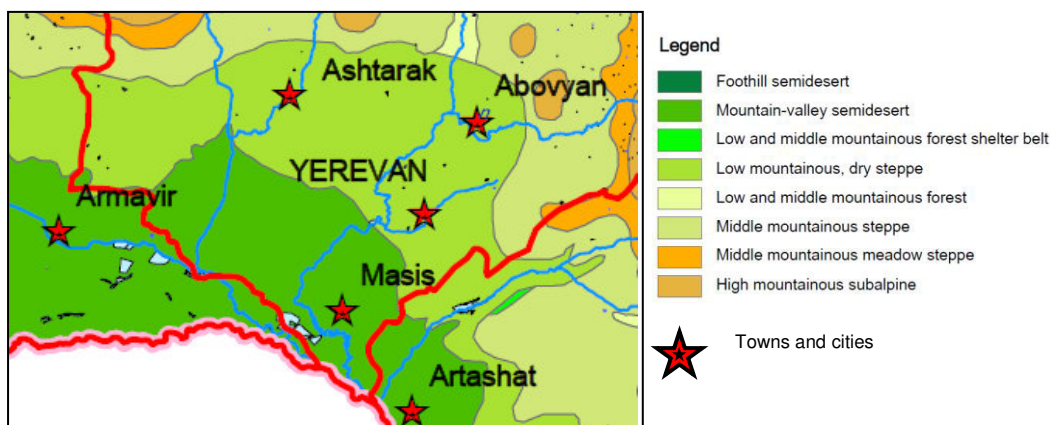
The nearest surface water stream of the Project site is Artashat irrigation channel that feeds from Hrazdan River and moves across the Yerevan to Nor-Kharberd settlement and rural communities of Ararat region.

4.4 *CLIMATE AND METEOROLOGY*

Yerevan is located in low mountainous dry steppe climatic zone (see *Figure 4-2*) and characterized by mountainous continental climate with long, hot and dry summers and short, but cold and snowy winters. The summers are usually very hot with the temperature reaching up to 40°C, and winters generally carry snowfall and freezing temperatures with January often being as cold as -15°C and lower. The amount of precipitation is relatively low and depends on the district location ranges annually between 290-350 mm. Yerevan experiences an average of 2,700 sunlight hours per year.

¹ Geoterproject Ltd. (2016): Report on engineering-geological survey of Yerevan TPP new energy block area

Figure 4-2 Climatic zones of Yerevan and surroundings



Source: Water resources atlas of Armenia, 2008

Monitoring data of the "Yerevan-Erebuni" station, presented in the RoA Construction Norms II-7.01-2011 "Construction Climatology" (HHSN) approved by the Minister of Urban Development on 26.09.2011, was used to describe the baseline meteorological conditions in the Project region. The meteorological data for Erebuni region are quite similar to Noragavit region since the two sites are rather close. The summary of meteorological data (air temperature, relative humidity and precipitation) was presented below in Table 4.4-1-Table 4.4-3.

Table 4.4-1 Average air temperatures by months

Settlement / meteorological station	Elevation, meters above sea level	Average temperature by months, °C												Average annual temperature, °C	Absolute lowest temperature, °C	Absolute highest temperature, °C
		January	February	March	April	May	June	July	August	September	October	November	December			
Yerevan / Erebuni	888	-3.6	-1.0	5.3	12.5	17.4	21.8	25.8	25.2	20.5	13.3	6.3	-0.2	11.9	-28	42

Table 4.4-2 Relative humidity data by months

Settlement / meteorological station	Relative humidity, %														
	By months												Average annual, %	Average monthly at 15:00	
	January	February	March	April	May	June	July	August	September	October	November	December		For the coldest month, %	For the warmest month, %
Yerevan / Erebuni	79	75	62	56	57	49	45	46	49	62	73	79	61	67	28

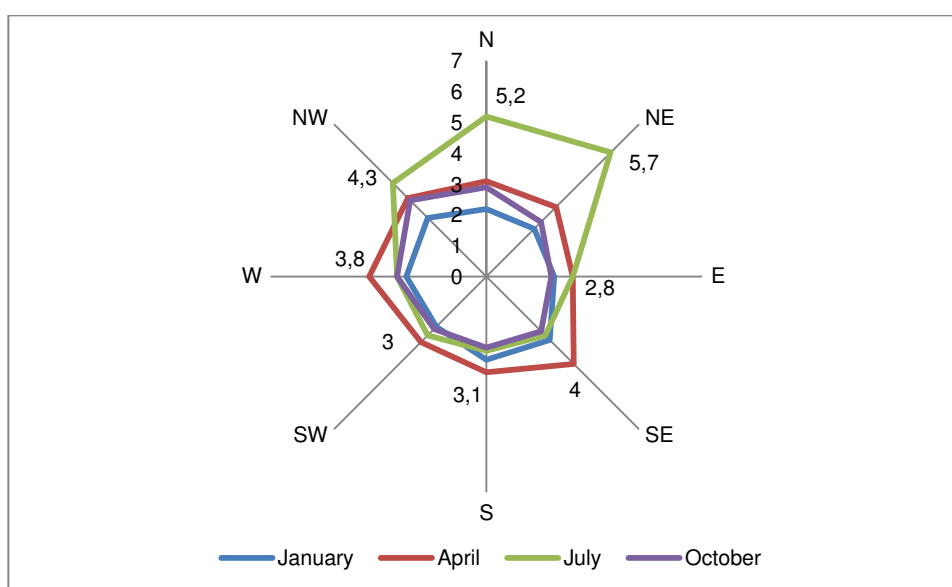
Table 4.4-3 Precipitation data

Settlement/ meteorological station	Precipitation: Average monthly / Maximum daily, mm													Snow cover		
	By months												Annual	Maximum ten-days level, mm	Number of snow cover days	Maximum quantity of water in snow, mm
	January	February	March	April	May	June	July	August	September	October	November	December				
Yerevan / Erebuni	24	23	32	35	45	23	11	8	12	29	28	21	291	58	47	-
	24	23	34	29	42	34	29	37	51	35	36	28	51			

The average annual temperature is 11.9°C (summer 25.5°C; winter 3.9°C). The coldest month is usually January (average air temperature is -3.6°C) and the warmest is August (average air temperature is 25.2°C). Absolute lowest temperature is -28°C, while the absolute highest is 42°C. The average annual relative humidity is 61%, the average monthly relative humidity for the coldest month (January) is 67% and for the warmest months (July-August) is 28%.

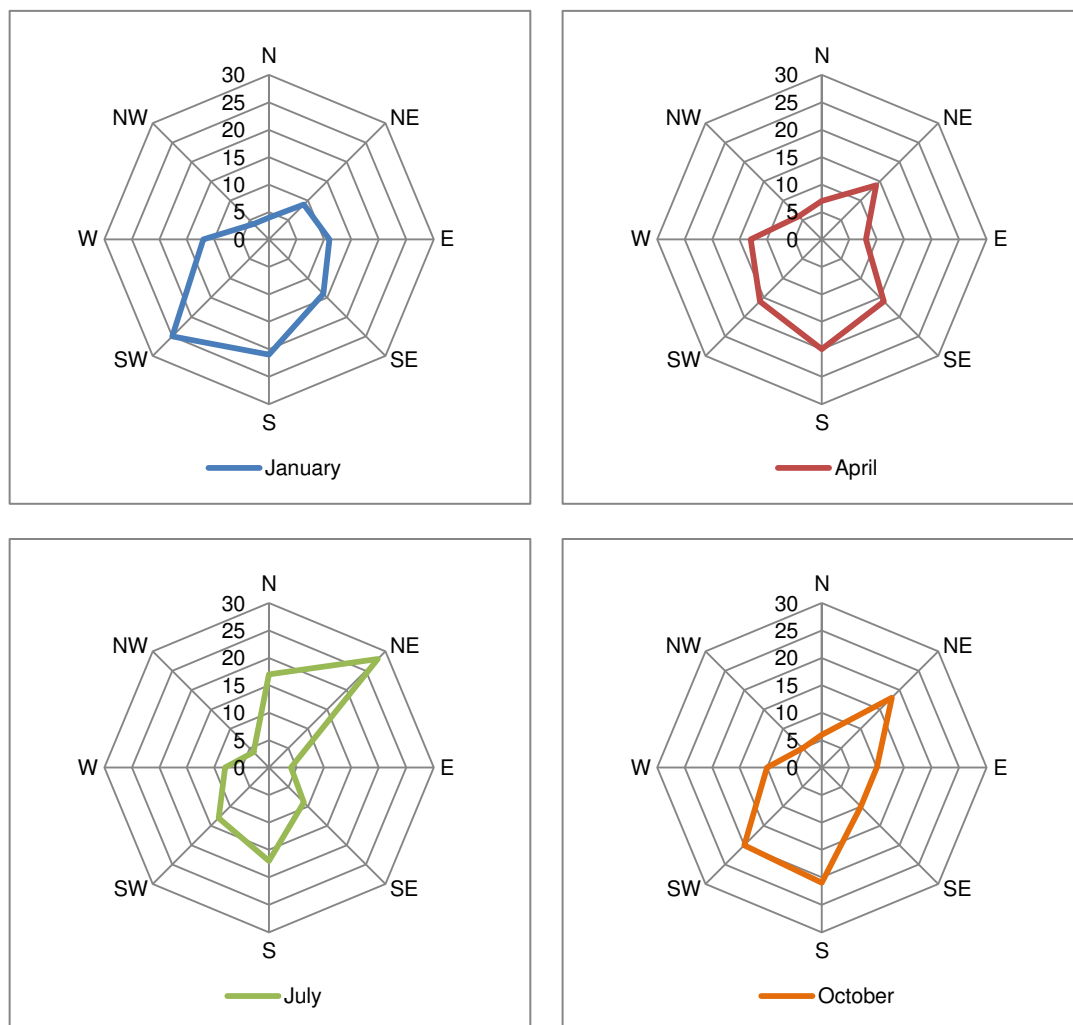
Average annual precipitation is 290 mm. The majority of precipitation occurs between March and May (112 mm), while July, August and September are the driest months. Maximum daily precipitation occurs in September (51 mm). The snow cover maximum height for ten-day period is 58 centimetres (cm); snow pressure is 70 kg/m². The soil frost line is 60 cm. The average number of days with lying snow is 48. Solar radiation balance exceeds 60 kilocalories per square centimetre (kcal/cm²).

Figure 4-3 *Distribution of wind average velocities*



The wind blowing direction varies and there is no prevailing direction. North easterly and south easterly winds dominate in April, south westerly winds - in June, north easterly winds - in July and north easterly, south and south easterly winds - in October.

Figure 4-4 Wind predominant directions



4.5 *TERRESTRIAL ECOLOGY SURVEY*

A flora and fauna survey in and around the Project area, consisted of desk study and short-term field investigations, was undertaken and conducted between 6th and 10th of November 2017. The main results of Survey are presented below.

4.5.1 *Fauna survey*

Methodology

The survey of terrestrial fauna has been conducted by combination of methods proposed by Formozov and Novikov. As the field investigations were conducted in the late autumn, the insects, birds, reptiles and most of the mammals, and amphibians were migrated or in hibernation/passive state. However, potential habitats and few traces of their activities were observed, in particular: (i) footprints on soil and mud, (ii) traces of animals feeding, (iii) animals scats, (iv) nests, holes, dens, etc.

Information about the insects, reptiles, and amphibians were mainly obtained from the literature materials. Species of birds and mammals were identified by the combination of field survey and literature review. The literature sources, used for the terrestrial fauna survey, are listed below:

- Bannikov and others. Amphibians and reptiles of USSR, 1971
- Dal S.K. Insectivorous and chiropterans of Armenian SSR, 1940
- Dal S.K. Animals of Armenian SSR, 1954
- Darevski I.S. Rocky lizards of Caucasus, 1967
- Yablokov-Khndzoryan S.M. Fauna of Armenian SSR, Insects, Coleoptera, 1967
- Adamyan M.S. Birds of Armenia, Yerevan, (book 1 and 2) 1995, 1997
- Adamyan M.S., Clem D, Jr., Birds of Armenia, Field guide, 2000
- Martirosyan B.A., Papanyan S.B. Wild mammals of Armenia, 1983
- The Red book of animals of the Republic of Armenia, 2010.

The following animal species are typical to the Project area:

Invertebrates

The invertebrates of the study area are *Mollusca /Gastropoda/ Crustacea /woodlice/Chelicerata /spiders, scorpions, Acari/ insects: Orthoptera /grasshoppers, long-horned grasshoppers, crickets/ Lepidoptera /owl-moths and butterflies/dragonflies, papilo /antlions, golden-eyed lacewings, mantis flies/, Hymenoptera /bees, ants/, Diptera /Dolichopodidae, Nematocera/, Hemiptera /Coleoptera /beetles/.*

During the observation from the above mentioned invertebrates land *Gastropoda* were dominating as well as representatives of *Coleoptera* and land Crustaceans/woodlice were also found.

Vertebrates

The following Amphibians are found in the Project area:

1. Eurasian marsh frog (*Pelophylax ridibundus*),
2. Variable green toad (*Bufo variabilis*),
3. Savigny's tree frog (*Hyla savignyi*)

Eurasian marsh frog is more numerous and mainly found in Artashat channel. The quantity of Variable green toad and Savigny's tree frog is smaller. Total amount of the latter does not exceed approx. 10% of the total number of amphibians of the area. The other 90% is Eurasian marsh frog.

Figure 4-5 *Artashat channel that is a habitat for Pelophylax ridibundus*



Figure 4-6 *Bulrush area that is a habitat Hyla savignyi*



The following reptiles can be found in the area:

1. Schneider's skink (*Eumeces schneideri*) is registered in RoA Red Book of Animals,
2. Oriental three-streaked green lizard (*Lacerta media*),
3. Five-streaked green lizard (*Lacerta strigata*),
4. Eurasian worm snake (*Typhlops vermicularis*),
5. Western sand boa (*Eryx jakulus*),
6. Dice snake (*Natrix tessellate*),

7. Coin-marked whip snake (*Hemorrhhois numifer*),
8. Schmidt's whip snake (*Hierophis schmidti*),
9. Collared dwarf snake (*Eirenis collaris*),
10. Montpellier snake (*Malpolon monspessulanus*),
11. Levantine viper (*Macrovipera lebetina*).

From the above mentioned species Five-streaked green lizard and Dice snake are more frequently found which mainly inhabit in the area near the Artashat channel and adjacent green zones. The rest of the species are found more rarely with unique individuals. In general, the number of reptiles in Project area is small and equals to approx. 0.7 species per 1 ha.

The following birds can be found in the area:

1. Common kestrel (*Falco tinnunculus*),
2. Crake (*Porzana sp.*),
3. Northern lapwing (*Vanellus vanellus*),
4. Common snipe (*Gallinago gallinago*),
5. Rock dove (*Columba livia*),
6. Common cuckoo (*Cuculus canorus*),
7. Little owl (*Athene noctua*),
8. European bee-eater (*Merops apiaster*),
9. European roller (*Coracias garullus*),
10. Hoopoe (*Upupa epops*),
11. Bimaculated lark (*Melanocorypha bimaculata*),
12. Calandra lark (*Melanocorypha calandra*),
13. Lesser short-toed lark (*Calandrella rufescens*),
14. Greater short-toed lark (*Calandrella brachydactyla*),
15. Crested lark (*Galerida cristata*),
16. White wagtail (*Motacilla alba*),
17. Tawny pipit (*Anthus campestris*),
18. Eurasian nightjar (*Caprimulgus europaeus*),
19. Isabelline wheatear (*Oenanthe isabellina*),
20. Northern wheatear (*Oenanthe oenanthe*),
21. Woodchat shrike (*Lanius senator*),
22. Warbler (*Losutella sp.*),
23. Warbler (*Acrocephalus sp.*),
24. Warbler (*Hippolais sp.*),
25. Menetries's warbler (*Sylvia mystacea*),
26. Eurasian magpie (*Pica pica*),
27. Hooded crow (*Corvus cornix*),

28. Rook (*Corvus frugilegus*),

29. House sparrow (*Passer domesticus*).

Larks are more often found in semi-desert zone, whose lifestyle is closely intertwined with grassy parts. According to the percentage ratio of frequency of meeting different kinds of larks form about 50%, Rock dove about 7%, Wheatears, house sparrows and bee-eaters 5-10% and the rest of the birds equals to 0.1-2.7% (according to Dahl, 1954).

The quantity of birds in Project area is quite low and in summer approximately 0.82 species can be found on 1 ha. However, different quantities are observed in the reeds and waterby areas where their quantity can reach up to 15 species. Hooded crow and Eurasian magpie nests on few trees that grows in Project area and separate Passeriformes birds nest on shrubs and reeds. Birds nesting in semi-desert areas are few because of intensive grazing of large and small cattle.

Figure 4-7 Nest of Hooded crow



The following mammals can be found in the area:

1. Red fox (*Vulpes vulpes*),
2. Least weasel (*Mustela nivalis*),
3. Jungle cat (*Felis chaus*),
4. Common vole (*Microtus (Microtus) arvalis*),
5. Tristram's jird (*Meriones tristrami*),
6. Blind mole rat (*Nannospalax sp.*),
7. Small five-toed jerboa (*Allactaga elater*),
8. Lesser horseshoe bat (*Rhinolophus hipposideros*),
9. Greater horseshoe bat (*Rhinolophus ferrumequinum*),
10. Schreiber's bent-winged bat (*Miniopterus schreibersii*),
11. Botta's serotine bat (*Eptesicus bottae*),
12. Serotine bat (*Eptesicus serotinus*).

Voles, blind mole rats and red fox are more typical to the Project site. Bats do not usually inhabit in the area, but from spring to autumn their number is high enough.

According to the RoA Red Book of animals, 11 vulnerable and endangered species (eight insects, one bird and two mammals) can theoretically be met in and around Yerevan (see *Table 4.5-1*). Meanwhile, during the short-term field investigations no Red Book animal species or their traces were observed in and around the Project site.

It should be mentioned that the Project site and surroundings is subject of intensive human impacts. It is neighboured by industrial facilities and settlements, while the investigated area was previously used for grazing of large and small cattle and partly piled with construction wastes. The environmental conditions there are not favourable for inhabitation and nesting of endangered or vulnerable or near threatened fauna species (see figures below). Therefore, it can be concluded that actually it is unlikely to meet Red Book species within the boundaries of Project area.

Table 4.5-1 *List of fauna species registered in RoA Red Book of Animals that can be found in and around Yerevan)*

N	Species name	Status by RoA Red Book	Detection place /in the area or in vicinities/
1	<i>Sympecma paedisca</i>	It is a rare species which is evaluated as "Vulnerable VU B1b+B 2b" by the standards of IUCN Red list.	Among other areas it is found around Yerevan as well.
2	<i>Coenagrion vanbrinkae</i>	It is a rare species which is evaluated as "Vulnerable VU B1a+B2a" by the standards of IUCN Red list. It is registered in IUCN Red list as (ver 3.1.) "Data Deficient" DD.	Among other areas it is also found around Yerevan as well.
3	<i>Libellula pontica</i>	It is rare species with strictly restricted areal which is evaluated as " Endangered EN B B2ab (iii) " by the standards of IUCN Red list. It is registered in IUCN Red List (ver 3.1.) as "Near Threatened" NT.	It is found in Masis (Ararat region). This species inhabits in channels and rivers where reeds grow and semi desert zone.
4	<i>Poecilus festivos</i>	It is a rare species with small areal which is evaluated as "Vulnerable VU B 1b (iii) + B 2b (iii) by the standards of IUCN Red List.	Among other areas it is also found in Yerevan (near Jrvezh and Nubarashen districts). This species inhabits different kinds of semi-deserts.
5	<i>Anisoplia reitteriana</i>	It is a species with small and reducing areas of spreading and habitat. It is evaluated as " Endangered EN B 1ab (iii)+B2ab(iii) " by the standards of IUCN Red List.	Among other areas it was found in Yerevan as well. Most probably it has disappeared conditioned by the transformation of the landscape. It inhabits in different kinds of semi-deserts and sandy deserts; stipe areas.
6	<i>Craspedostethus</i>	It is a rare species with	Among other areas it was found

N	Species name	Status by RoA Red Book	Detection place /in the area or in vicinities/
	<i>permodicus</i>	restricted areal which is evaluated as "Vulnerable VU B 1b (iii) + B 2b (iii)" by the standards of IUCN Red List.	in Yerevan as well. This species inhabits in different kinds of deserts and semi-deserts.
7	<i>Adelphinus ordubadensis</i>	It is a rare species with restricted areal which is evaluated as " Endangered EN B1a " by the standards of IUCN Red List.	Among other areas it is found in Yerevan as well (without precise notes). It inhabits in different kinds of semi-deserts and dry mountain steppes.
8	<i>Laena constricta</i>	It is a rare species with restricted areal which is evaluated as " Endangered 1ab (iii)+B2ab (iii) " by the standards of IUCN Red List.	Among other areas It is found in Yerevan as well. It inhabits in semi-deserts
9	<i>Lithurge fuscipenne</i>	It is a rare species with small areal which is evaluated as "Vulnerable VU B1a+B2a" by the standards of IUCN Red List.	Among other areas It is found in Yerevan as well. It inhabits in semi-desert and steppe landscapes, riverby meadows, woodlands, meadows near rivers and yards.
10	<i>Megachile deseptoria</i>	It is a rare species with small areal which is evaluated as "Vulnerable VU B1a+B2a.	Among other areas it is found in Yerevan as well. It inhabits in different kinds of deserts, semi-deserts, crushed slopes of hills, meadows, woodlands and riverby valleys.
11	Schneider's skink <i>Eumeces schneideri</i>	The species is registered in IUCN Red List (ver. 3.1) as "Least Concern". It is evaluated as "Vulnerable VU B1ab (iii)+2ab(iii)" by the standards of IUCN Red List.	It is found in Ararat valley, Arpa River gorge, Araz River Valley, and in the southern foothills of the Republic of Armenia.
12	European roller <i>Coracias garrulous</i>	It is an oligotop species with a few number which is registered in IUCN Red List (ver. 3.1) as "Near Threatened". It is evaluated as "Vulnerable VU B1ab (iii)" by the standards of IUCN Red List.	It is found in semi-desert and mountain steppe zones.
13	Woodchat shrike, <i>Lanius senato</i>	It is an oligotop species with a few number which is registered in IUCN Red List (ver. 3.1) as "Least Concern". It is evaluated as "Vulnerable VU B1ab (iii)+2ab(iii)" by the standards of IUCN Red List.	It is found in semi-desert zones of south, south-east and north east areas of the country.
14	Schreiber's bent-winged bat, <i>Miniopterus schreibersi</i>	The species is registered in IUCN Red List (ver. 3.1) (ver. 3.1) as " Near Threatened ". It is evaluated as "Vulnerable	It is more often found in Yerevan.

N	Species name	Status by RoA Red Book	Detection place /in the area or in vicinities/
		VU B1ab (iii) + 2ab (iii)" by the standards of IUCN Red List.	
15	Small five-toed jerboa <i>Allactaga elater</i>	It is an endemic species of Ararat Valley with narrow areal which is registered in IUCN Red List (ver. 3.1) as "Least Concern". It is evaluated as " Endangered EN B1ab (ii, iii, iv)" by the standards of IUCN Red List.	Among other areas it is found around Yerevan as well.

Thus, 15 animal species registered in RoA Red Book of Animals can be found in Project area or its vicinities from which 10 species are insects, one is a reptile, two are birds and another two are mammals, and no endangered or vulnerable or near threatened species have been actually sighted that will be affected by the Project.

Figure 4-8 *General views of the area with traces of human impact*



4.5.5

Flora survey

Methodology

The flora survey was conducted based on field investigation using route method. During the field investigation the herbariums of some plant species were prepared and photos of observed flora species were taken. The identification of flora species was conducted in laboratory conditions using the following literature:

- Tsaturyan T.G., Gevorgyan M.L. Wild edible plants of Armenia, Yerevan, 2007
- Red Book of plants of the Republic of Armenia
- Malishev L.I. Modern approaches of qualitative analyze and flora comparison, 1987
- Takhtadjan A.L. Flora of Armenia, Yerevan, 1954-2009.

The vegetation of the Project area is mainly of xerophyll semi-desert type. Weed and secondary plants growing in abandoned orchards and crop lands are common there. In the abandoned areas there are remnants of wormwood compositions such as *Artemisia fragrance*. In some sections of the Project area the wetland and waterby vegetation is developed (*Figure 4-9* and *Figure 4-10*).

Figure 4-9 Artemisa semidesert



Figure 4-10 Southern cattail (*Typha domingensis*)



87 species of higher vascular plants have been found in the project area (Table 4.5-2).

Table 4.5-2 List of species higher vascular plants have found in the project area

Higher Plants	
ANGIOSPERMAE - Flowering plant	
Apiaceae - Parsley family	Fumariaceae - Poppy family
Astrodaucus orientalis (L.) Drude	Fumaria vaillantii Loisel. /Fumewort/
Daucus carota L. /Wild carrot/	Geraniaceae
Falcaria vulgaris Bernh. /Sickleweed/	Erodium cicutarium (L.) L'Her. /Pinweed/
Asteraceae - Sunflower family	Lamiaceae - Deadnettle family
Achillea millefolium L. /Yarrow/	Lycopus europaeus L. /European bugleweed/
Arctium lappa L. /Greater burdock/	Mentha longifolia (L.) Huds. /Peppermint/
Artemisia annua L. /Sweet wormwood/	Lythraceae
Artemisia fragrans Willd	Lythrum salicaria L. /Purple loosestrife/
Artemisia vulgaris L. /Mugwort or common wormwood/	Malvaceae - Mallows family

Higher Plants	
ANGIOSPERMAE - Flowering plant	
Carduus nutans L. /Musk thistle/	Abutilon theophrastii Medik. - /Velvetweed/
Carthamus glaucus Bieb.	Malva neglecta Wallr. /Common mallow/
Carthamus turkestanicus M. Pop.	Onagraceae - Willowherb family
Centaurea diffusa Lam. /Diffuse knapweed/	Epilobium hirsutum L. /Great willowherb/
Centauera iberica Trev. et Spreng.	Papaveraceae
Chondrilla juncea L. /Rush skeletonweed/	Papaver commutatum Fisch. et C.A. Mey.
Cichorium intybus L. /Common Chicory/	Plantaginaceae - Plantain family
Cirsium vulgare (Savi) Ten. /Common thistle/	Plantago lanceolata L. /Ribwort plantain/
Conyza canadensis (L.) Cronq. (ERE=Erygeron canadensis L.) /Canadian horseweed/	Plantago major L. /Broadleaf plantain/
Echinops pungens Trautv.	Poaceae - Grasses
Inula britannica L. /Meadow fleabane/	Aegilops columnaris Zhuk.
Lactuca serriola L. /Prickly lettuce/	Agropyron desertorum (Fisch. ex Link) Schult.
Taraxacum officinale Wigg. /Common dandelion/	Bothriochloa ischaemum (L.) Keng - /Yellow bluestem/
Tragopogon serotinus Sosn.	Cynodon dactylon (L.) Pers. - Scutch grass
Xanthium italicum Moretti /Cocklebur/	Dactylis glomerata L. /Orchard grass/
Brassicaceae - Crucifers	Echinochloa crusgalli (L.) P. Beauv. /Common barnyard grass/
Alyssum desertorum Stapf. /Desert madwort/	Hordeum murinum L. /Wall barley/
Lepidum latifolium L. /Broadleaved pepperweed/	Phleum pratense L. /Timothy-grass/
Thlaspi perfoliatum L.	Phragmites australis (Cav.) Trin. ex Steud. /Common reed/
Capparaceae - Caper family	Poa bulbosa L. /Bulbous bluegrass/
Capparis spinosa L. /Caper bush/	Setaria viridis (L.) P. Beauv. /Green foxtail/
Caryophyllaceae - Pink family or carnation family	Taeniatherum crinitum (Schreb.) Nevski
Cerastium arvense L. /Field chickweed/	Polygonaceae
Chenopodiaceae - Goosefoot family	Polygonum aviculare L. /Common knotgrass/
Atriplex micrantha C. A. Mey.	Polygonum hydropiper L. /Marshpepper knotweed/
Chenopodium album L. - /White Goosefoot/	Rumex crispus L. /Curly dock/

Higher Plants	
ANGIOSPERMAE - Flowering plant	
Chenopodium botrys L. - /Jerusalem oak goosefoot/	Portulacaceae /Purslane family/
Kochia prostrata (L.) Schrad.	Portulaca oleracea L. /Common Purslane/
Noaea mucronata (Forssk.) Aschers. et Schweinf.	Rosaceae - Rose family
Salsola pestifer A. Nelson	Agrimonia eupatoria L. /Common agrimony/
Convolvulaceae - Bindweed family	Rubiaceae - Bedstraw family
Calystegia sepium (L.) R. Br.	Galium aparine L. /Cleavers/
Convolvulus arvensis L. /Field bindweed/	Salicaceae - Willow family
Cuscutaceae - Dodder Family	Salix babylonica L. /Babylon willow/
Cuscuta cesattiana Bertol.	Salix excelsa S. G. Gmel.
Cyperaceae - Sedges	Salix fragilis L. /Brittle willow/
Carex melanostachya M. Bieb. ex Willd.	Solanaceae - Nightshade family
Carex supina Willd. ex Wahlenb.	Datura stramonium L. /Jimsonweed/
Dipsacaceae - Teasel family	Hyoscyamus niger L. /Henbane, black henbane/
Dipsacus laciniatus L. /Cutleaf teasel/	Typhaceae - Cattail Family
Elaeagnaceae - Oleaster family	Typha domingensis (Pers.) Poir. ex Steud. /Southern cattail/
Elaeagnus angustifolia L. /Oleaster or wild olive/	Typha latifolia L. /Broadleaf cattail/
Euphorbiaceae - Spurge family	Ulmaceae - Elm family
Euphorbia sequierana Neck.	Ulmus minor Mill. /Field elm/
Fabaceae - Crucifers	Urticaceae - Nettle family
Alhagi pseudalhagi (Bieb.) Desv.	Urtica dioica L. /Common nettle/
Glycyrrhiza glabra L. - Liquorice	Zygophyllaceae - Bean caper family
Goebelia alopecuroides Bunge	Tribulus terrestris L. /Small caltrops/
Melilotus officinalis (L.) Pall. /Ribbed melilot/	Zygophyllum fabago L. /Syrian bean-caper/
Trifolium arvense L. /Rabbitfoot clover/	

Taxonomic analysis

The determined 87 species belong to 77 genus, 32 families, 1 class, 2 division of higher vascular plants (Flowering plant / Monocots and Dicotyledones/).

Table 4.5-3 Flora taxonomic units of the Project area

Major Taxonomic Units			Number of Families	Number of Genera	Number of Species
Kingdom	Division	Class			
Plantae	Flowering plant	Dicots	30	64	73
		Monocots	2	13	14
Total			32	77	87

The arrangement of Flora families is typical to the Flora of Iran-Turan region, where in terms of species diversity the families of *Asteraceae* (Sunflower), *Poaceae* (Grasses), *Chenopodiaceae* (Goosefoot), *Fabaceae* (Bean family), *Brassicaceae*-Crucifers and other families are dominating.

The diversity in terms of genus is also distinguished in the above mentioned families. (Table 4.5-4).

Table 4.5-4 The spectrum of Families and Genus of Flora of the Project Area

N	Families	Number of Species	Number of Genera
1	Sunflower family - <i>Asteraceae</i>	20	17
2	Grasses - <i>Poaceae</i>	12	12
3	Goosefoot family - <i>Chenopodiaceae</i>	6	5
4	Bean family- <i>Fabaceae</i>	5	5
5	Parsley family - <i>Apiaceae</i>	3	3
6	Crucifers - <i>Brassicaceae</i>	3	3
7	Willow family - <i>Salicaceae</i>	3	1

Biological Spectrum of Flora

The flora species of the Project area are represented in the following ratio:

- Trees - 5 species (5.7% of Flora)
- Semishrubs - 3 species (3.5% of Flora),
- Biennial-perennial plants - 37 species (42.5% of Flora)
- Biennial plants - 9 species (10.3% of Flora)
- Annual - biennial plants - 33 species (38% of Flora).

The main life form of most of higher plants of the Project area is biennial-perennial plants compiling of 42.5% of Flora.

Data on Flora species

RoA Red Book of Plants. There are no plant species that need special protection, endangered, vulnerable, near threatened species and species registered in RoA Red Book of Plants or IUCN Red List among 87 species determined in the Project area.

Endemic and relict species. There are no endemic and relict plant species common to Armenia or of other category in the Project area. No endemic species common to Armenia or of other status have been found in the Project area.

Economic importance of the species. The Project area is rich of various useful plants most of which are being widely used by people. Wild olive (*Elaeagnus angustifolia*) (Figure 4-11), *Aegilops columnaris*, *Astrodaucus orientalis*, longleaf (*Falcaria vulgaris*), curly dock (*Rumex crispus*), common purslane (*Portulaca oleracea*), etc. belong to edible (spice plants, leguminous, vegetable) species. These are used both in raw and processed form for making salads, marinades, confectionery, soft drinks, teas, juices, etc.

Figure 4-11 *Wild olive (Elaeagnus angustifolia) edible, technical, medicinal and ornamental species in the project area*



Melliferous plants such as wild carrot (*Daucus carota*), greater burdock (*Arctium lappa*), wild olive (*Elaeagnus angustifolia*), purple loosestrife (*Lythrum salicaria*) and medicinal such as Common chicory (*Cichorium intybus*), common melilot (*Melilotus officinalis*), Peppermint (*Mentha longifolia*), common mallow (*Malva neglecta*), broadleaf plantain (*Plantago major*) are widespread in the Project site.

Some ornamental plants such as Babylon willow (*Salix babilonica*), cutleaf teasel (*Dipsacus laciniatus*), common cattail (*Typha latifolia*), southern cattail (*Typha domingensis*) (Figure 4-12), Fodder plants such as common reed (*Phragmites australis*) (Figure 4-13), cockspear (*Echinochloa crusgalli*), wall barley (*Hordeum murinum*), clustered wheat grass (*Agropyron desertorum*), bulbous bluegrass (*Poa bulbosa*), green foxtail (*Setaria viridis*), technical crops such as crack willow (*Salix fragilis*), *Salix excelsa* (Figure 4-14), common nettle (*Urtica dioica*), etc. are represented in the Project area.

Figure 4-12 *Southern cattail (Typha domingensis) waterby species in the humid parts of the area*



Figure 4-13 *Common reed (Phragmites australis) waterby species in the humid parts of the area*



Figure 4-14 *Salix excelsa technical plant in the project area*



Most of the plants growing in the area such as prickly lettuce (*Lactuca serriola*), wall barley (*Hordeum murinum*), *Aegilops columnaris*, wild carrot (*Daucus carota*) etc. are wild relatives of cultivated plants. There are no strict restrictions between the groups of the mentioned useful species. Most species can simultaneously be considered in all groups and based on that they become more valuable.

Various parasite plants such as *Cuscuta cesattiana* (Figure 4-15) and a number of weed plants such as (*Goebelia alopecuroides*), clustered wheat grass (*Agropyron desertorum*), jimsonweed (*Datura stramonium*), black henbane (*Hyoscyamus niger*), tackweed (*Tribulus terrestris*), cocklebur (*Xanthium italicum*) (Figure 4-16) etc. grow in the Project area.

Figure 4-15 *Cuscuta cesattiana* parasite type in the project area

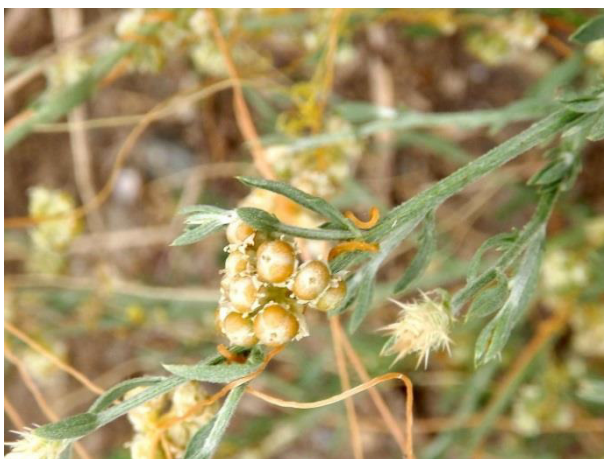


Figure 4-16 Weed species of cocklebur



SAMPLING RESULTS

To fulfil the IEE Report, Consultant has collected primary environmental data at the Project site and in adjacent areas. Primary environmental data have been gathered on November 6, 2017 by local specialist contractor according to the terms of references developed by the Consultant.

The following studies have been implemented:

- Air quality sampling;
- Noise measurements;
- Soil sampling;
- Surface water sampling.

Locations of sampling and measurement points are presented in the figure below (Figure 4-17).

Figure 4-17 Locations of sampling and measurement points



Sampling, measurements, and laboratory testing have been performed in accordance with national standards.

Based on laboratory reports, soils at the Project site are neutral or slightly-acidic, and are characterized by low content of humic matter and macronutrients (nitrogen, phosphorus, and potassium).

Presence of benzo[a]pyrene, petroleum products, and organochlorine pesticides has been revealed in several soil samples, however contents of the detected pollutants have not exceeded national and international¹ threshold levels.

¹ Dutch List Intervention Values

Some of the outdoor noise levels measured at the site were above the WHO daytime guideline values for outdoor living areas (55 dB), however the site itself is located on undeveloped land, away from the residential areas.

Results of air quality sampling and surface water sampling showed no exceedances over the national threshold values in all sampling points.

Sampling reports are provided in *Annexure C*.

Information on quality of water from the municipal water supply network have been provided by municipal water company. According to the provided documents, water quality is in line with national regulations.

Official response of the water company is presented in *Annexure D*.

4.7 SOCIAL BASELINE

4.7.1 General

The Project site is located within the administrative boundaries of Yerevan community, in Shengavit administrative district. The site is located approximately 7.5 km south of centre of Yerevan. The population of Yerevan is around 1.1 million, the total area of Yerevan community is 223 km², which represents the 0.7% of the territory of the Republic of Armenia.

As stated in the Constitution of the Republic of Armenia (Article 108) Yerevan is a community. The local self-governance of Yerevan community is regulated by the RoA Laws "On Local Self-Governance in Yerevan City" (2008) and "On local self-government" (2002). The local self-governing bodies of Yerevan are the Mayor and The City Council. The City Council consists of 65 members elected by the Yerevan population through the proportional election system. If one of political parties run up in the City Council elections gets more than 50% of City Council members' seats, number one person in the list of candidates from this party is appointed as a Mayor. If no political party gets more than 50% of City Council members' seats the Mayor is elected through secret voting.

Yerevan community is divided into 12 administrative districts: Achapnyak, Avan, Arabkir, Davtashen, Erebuni, Kentron (City Center), Malatia-Sebastia, Nor Nork, Nork-Marash, Nubarashen, *Shengavit*, and Kanaker-Zeytun.

4.7.2 Demography

Yerevan, being the capital of Armenia, has the largest share of urban population in the country. Yerevan's population had dramatically increased in the Soviet period, especially in 1950-1980. The historical maximum of Yerevan population was registered in 1990 (1,218,000 residents). In the first years of independence there was a population decline due to migration. Then in the early 2000s the population number dynamics was stabilized at the level of around 1.1 million residents. Up to date there are no big fluctuations in the population number. The historical and up to date population data is given below in *Table 4.7-1*.

Table 4.7-1 Population of Yerevan: 1990-2015

Yerevan population, thousand people	1990 (estimated)	2001 (Census results)	2011 (Census results)	2015 (estimated by the NSS)
	1,218	1,103.5	1,060.1	1,071.5

As seen from the data provided by the National Statistical Service (NSS) the population of Yerevan increased by 1% in 2011-2015, while the total population of Armenia decreased by around 9% in the same period. This discrepancy is mainly caused by the migration, when people from regions are migrating to Yerevan for education and employment purposes. Moreover de facto population of Yerevan is much higher than the "so called" permanent or de jure population. According to some studies the population of Yerevan, including residents not officially registered in the city, is around 1,200-1,250 thousand people. The distribution of Yerevan population by administrative districts is given in Table 4.7-2.

Table 4.7-2 Key characteristics of Yerevan administrative districts

Administrative district	Population, thousand residents	Total area of community, ha	Population density, residents per km ²
Ajapnyak	108.9	2,582	4,218
Avan	53.1	726	7,314
Arabkir	116.2	1,329	8,743
Davtashen	42.5	647	6,569
Erebuni	125.8	4,749	2,649
Kentron (city centre)	125.8	1,335	9,423
Malatia-Sebastia	135.2	2,516	5,374
Nor Nork	129.5	1,411	9,178
Nork-Marash	11.9	476	2,500
Nubarashen	9.8	1,724	568
Shengavit	138.6	4,060	3,414
Kanaker-Zeytun	74.2	773	9,599
Total	1071.5	22,328	-

4.7.3 Minorities and gender distribution

Yerevan is a largely mono-ethnic city, with the majority of population being Armenians (98.9%). The major ethnic minorities are Yazidis (0.3%) and Russians (0.5%). Among other ethnic minorities are Assyrians, Greeks, Ukrainians, Georgians and Iranians.

The minority people are generally well integrated with Armenian people and they are not classified into indigenous people. Basically, the minority people do not have difficulty of communication by Armenian language. The minority people have all the rights and obligations of Armenians (for example voting right, property purchase right etc.).

Religious groups are Christians of Armenian Apostolic Church (94.9%), Catholic, Orthodox, as well as Protestants, Jehovah's Witnesses, Molokans. Other religious minorities are followers of Yazdanism and Paganism.

The gender structure of Yerevan population is: women - 54%; men - 46%.

4.7.4

Socio-Economic Indicators

Yerevan is the largest economic, educational, scientific and cultural centre of Armenia. Yerevan is a major transport and transit hub. Yerevan represents 42.4% of industrial output, 53.9% of construction, 82.6% of retail trade and 85.5% of services sectors of Armenia. Around 86% of multi apartment residential buildings and around 30% of hotels are located in Yerevan.

The main trends of City's industry are food industry (including alcoholic beverages), chemical industry as well as metallurgy.

As stated in the "Program for Perspective Strategic Development of the Republic of Armenia for 2014-2025", the GDP per capita in Yerevan represents around 150% of country's average. According to the above mentioned Program the average GDP growth is assumed at the 4% per year towards 2025.

As per the 2011, population census the main sources of livelihood in Yerevan for the whole population in every age group are: employment (25.9%), retirement benefits (14.2%), self-employment (2.5%), public social allowances (1.1%), and remittances (1.1%). The rest comprise other sources of income generation (property, agriculture, financial services - 1.0%), by public and non-public institutions (1.7%), and other livelihood income sources (6.9%). Around 45% of Yerevan populations (50% of women and 39% of men) have no income source; they are under the tutelage of other family members.

The overall Gini coefficient is 0.22 in Armenia. It is much lower in urban areas (0.06) than in rural areas (0.32), indicating a more unequal distribution of wealth in the rural population than in the urban population. The lowest Gini coefficient is in Yerevan (0.02), where nearly half of the population (46%) is in the uppermost wealth quintile¹.

40.5% of women in Yerevan decide on how their earnings are used within the family, the joint (husband and wife) decision-making is 57.2% and solely husband's - 2.3%. Overall women receive less than husbands (68.5%). The decision on husbands' earnings are mostly managed jointly (79.9%). Around 46% of women in Yerevan do not own a house, the same data for men is lower - 33.2%.

As given in the "Report on social status and poverty of Armenia" published on 23 of November 2015 by the National Statistics Service of the RoA, the people are defined as poor if their monthly per capita income is less than 40,264 AMD (around 76 EUR), very poor if their monthly per capita income is less than 33,101 AMD (around 62 EUR) and extremely poor if their monthly per capita income is less than 23,384 AMD (44 EUR). This means that the criterion for extreme poverty is survival for 1.45 EUR per day.

¹ National Statistical Service of Republic of Armenia, Ministry of Health, ICF International. 2012. Armenia: Demographic and Health Survey

As per the "Social snapshot and poverty in Armenia, 2015" published by the National Statistical Service 32.6% of Yerevan population are poor, among which 25.2% are very poor and 2.0% are extremely poor.

Official unemployment rate in Yerevan is 29.1%, however the actual unemployment rate might be higher. Among population of Yerevan around 15.6% are getting retirement benefits, another 1.6% are getting social and other allowances. In 2016, the average monthly nominal salary/wage in Yerevan was 189,323 AMD; the average retirement benefit was 42,894 AMD, the average family (social) allowance was 30,350 AMD¹.

4.7.5

Socio-economic profile of the affected residential areas

The residential areas located in close proximity to the Project site are Noragavit district of Shengavit administrative district of Yerevan and Nor Kharberd rural community (Ararat Region).

Nor-Kharberd rural community of Ararat Region is the nearest settlement to the Project site outside Yerevan. The distance from the Project site to the nearest residential house is around 600 m. As of January 2016, de jure population of Nor-Kharberd was 7,046 residents (1,985 households)². The prevailing majority of Nor-Kharberd residents are Armenians. Ethnic minorities are represented by few Yazidi families. The minority people are generally well integrated with Armenian people; they do not have difficulties to communicate in Armenian language.

Agriculture is the most developed sector of the local economy. Nor-Kharberd population is engaged in orcharding, vine growing, vegetable farming and crop farming. Some of households are also engaged in cattle farming and poultry farming. There are no industrial facilities in the Community. Since the community is in close proximity to Yerevan some of residents engaged in industrial (especially for non-qualified job positions) and service sectors.

Noragavit district is mostly dwellings developed residential area located in Shengavit administrative district of Yerevan. The distance from the Project site to the nearest residential house is around 150 m. Population is around 10,000 people (2,280 households). There are four public institutions in Noragavit district (two middle schools, a child care centre, and a policlinic). There are also four small size production facilities and three public catering facilities located in Noragavit district. All the above mentioned facilities are out of Project's direct impact area. Among the population of Noragavit district, 115 households are recipients of social benefit system (around 5% of total number of households), so those households can be considered as vulnerable.

The population of Noragavit district is mainly engaged in agricultural sector. Some of residents are also engaged in industrial (especially for non-qualified job positions) and service sectors. No data about ethnic minorities is available; in the meantime it is obvious that there are no ethnic minorities compact

¹ «Marzes and Yerevan city of Armenia in figures, 2017» published by the National Statistical Service of Armenia

² The data of the National Statistical Service of Armenia

living areas in Noragavit, so ethnic minorities composition figures are close to Yerevan's average.

5.1 CATEGORISATION OF STAKEHOLDERS

The stakeholders for the purpose of stakeholder analysis have been primarily classified as Internal and External Stakeholders.

Table 5.1-1 Project Stakeholders

Stakeholder category	Stakeholder name
Internal Stakeholders	
Project Management and staff	Spayka, LLC top management
	Company's specialists and departments covering specific questions: Chief Engineer (HSE issues), HR, PR, Contractor's manager etc.
	Employee representatives and staff
Contractors and subcontractors representatives	Avagyan Construction top management
	Site Construction Management
	Workers representatives and/or workers
External Stakeholders	
Lender/Investor	Development Institutions (ADB) ¹
Provider of technology and equipment	Richel Group
The Local Community	Noragavit district of Shengavit administrative district of Yerevan
	Nor-Kharberd rural community (Ararat Region)
Regulatory Authorities	Yerevan City administration (legal department)
	Ministry of Labour and Social Affairs (labour and Employment Department)
	Armenian Ministry of Nature Protection
Civil society organizations (CSOs)/ NGOs	Relevant or active CSOs or NGOs

¹ Spayka is also a Project investor; the Company is mentioned as an Internal Stakeholder

Table 5.1-2 Stakeholder Analysis

Stakeholder category	Brief description	Expectations / key concerns / interests	Overall influence on the Project	Priority for Spayka
CATEGORIZATION OF INTERNAL STAKEHOLDERS				
Project Management				
Spayka, LLC	Armenia’s largest exporter of fruits and vegetables to Russia and other CIS countries. Company aims at diversification and improving sustainability of its business. Experience rapid growth.	<ul style="list-style-type: none"> • Completion of the project in a timely manner with continued funding from ADB; • Minimal social and environmental footprint of the project; • Proper addressing of the social and environmental issues as per ADB standards; • Acting in compliance to the host country acts, rules and regulations; • Managing the contractors and sub-contractors and ensuring compliances as per the local laws, ADB SPS standards; and • Minimising impact on the adjacent communities during the construction and operation stages 	High	High
Spayka Employees	Employees of project sponsor especially those responsible for specific Project implementation issues	<ul style="list-style-type: none"> • Concern over proper understanding and clarity over ADB requirements with respect to project implementation and delivery; • Ensuring compliance to the local laws and regulations and core labour standards during the complete project cycle including: <ul style="list-style-type: none"> • Working conditions and health and safety; • Community engagement • Managing sub-contractor to achieve regulatory as well as compliance with ADB SPS and Social Protection Strategy; • Ensuring the project completion with minimal social and environmental impact Adequate working conditions; and • Consultation, disclosure and reporting requirements 	Medium	Medium

Stakeholder category	Brief description	Expectations / key concerns / interests	Overall influence on the Project	Priority for Spayka
Contractors				
Avagyan Construction	Spayka is keen to award the contract for Project construction to Avagyan Construction as they are worked on several projects together and the contractor has successfully delivered the reconstruction and expansion of existing greenhouse in Artashat. Construction management team was trained by Richel Group on correct installation of facilities and internal equipment.	<ul style="list-style-type: none"> • Ensuring completion of the project as per the envisaged timeline; • Additional understanding of the ADB requirements on what needs to be done to abide by the standards; • Working in accordance with the local laws and regulations applicable for local contractors; • Ensuring compliance to the special requirements on social, labour, and environmental issues as per ADB guidelines; • Reporting and process requirements of Spayka technical team, community relations team and grievance redressal team (especially for the internal workers); • Provision of labour amenities including safe and hygienic water supply and sanitation, adequate labour camp facilities etc.; • Ensuring regular payment of wages including PF, medical, health care insurance, and following zero tolerance for child labour, forced labour and wage discrimination; • Liaison with government authorities for environmental, labour and other compliances; and • Maintaining of records related to labour management, payment, health and safety and regular inspections etc. • Compliance with national labour laws and with relevant ILO core labour standards 	High	High
CATEGORIZATION OF EXTERNAL STAKEHOLDERS				
Project Financiers				

Stakeholder category	Brief description	Expectations / key concerns / interests	Overall influence on the Project	Priority for Spayka
Investors and Development Agency	ADB, who are funding the Project	<ul style="list-style-type: none"> Ensure timely commitments by Spayka to delivery of the project; Ensure compliance of the project to the local applicable rules and regulations; To ensure compliance to its existing environmental and social safeguard policies; Minimum project risk in the short and long term especially from social and environmental perspective; Reporting from Spayka on various identified parameters; Identification of the E&S impacts followed by commitment and suitable actions on part of the project proponent; and Regular updates from Spayka on ESAP implementation. 	Medium	High
Local communities				
Nor Kharberd rural community (Ararat Region)	The nearest settlement to the project area outside Yerevan. The distance from the project area to the nearest residential house is around 600 m	<ul style="list-style-type: none"> Expectations of jobs priority for residents during the operation stage Concerns on potential environmental impacts associated with the Project No complaints regarding compensations provided by Yerevan Municipality for land users in 2012 	Medium	Medium
Noragavit district of Shengavit administrative district of Yerevan	Fenceline community to the Project site A private houses developed district located within Shengavit administrative district of Yerevan	<ul style="list-style-type: none"> Expectations of jobs priority for residents during the operation stage Concerns on potential environmental impacts associated with the Project No complaints regarding compensations provided by Yerevan Municipality for land users in 2012 	Medium	Medium
Regulatory Authorities And Local Administration				
Yerevan City administration	In charge for attracting investments to the site; provided compensations to previous land users; issues the	<ul style="list-style-type: none"> Project implementation in line with local regulations requirements Regular engagement on different issues of the Project implementation Minimum impacts on local communities during the 	High	Medium

Stakeholder category	Brief description	Expectations / key concerns / interests	Overall influence on the Project	Priority for Spayka
	Construction permit	<p>construction and operation stages</p> <ul style="list-style-type: none"> • Priority for employment for local community residents • Regular engagement with community representatives (in order to reduce chances of potential grievances and requests from residents to authorities) 		
Ministry of Labour and Social Affairs (labour and Employment Department)	Supervising the compliance with Armenian Labour Code	<ul style="list-style-type: none"> • Project implementation in line with national labour requirements including minimal wages, sick leave payments, minimal age of employees, investigation of incidents etc. 	Medium	Medium
Armenian Ministry of Nature Protection	<p>Responsible for permits issuance and EIA approval</p> <p>Establish guidelines for environmental protection during construction and operation activities.</p>	<ul style="list-style-type: none"> • Proper EIA and addressing of impacts identified in EIA • Timely application for environmental permits and reporting 	High	High

STAKEHOLDER ENGAGEMENT AS PART OF IEE AND SRA

Spayka has been engaging with the following key stakeholder groups with respect to the Project:

- Local authorities in Shengavit district as well as Yerevan City Administration departments – this engagement has focused on the allocation of land for the project as well as any other permits that may be required;
- Representatives of the Yerevan Thermal Power Plant (privately operated) to pursue opportunities to share resources (steam, water and electrical energy);
- Representatives of Project partners, i.e. Avagyan Construction LLC for proposed construction activities and Richel for the provision of equipment and technology.

Two public discussions/consultations on the Project environmental impact assessment with Project stakeholders were conducted. The protocols of public discussions are presented in *Annexure B*.

Public discussions/meetings and/or engagements with project stakeholders have been undertaken by Spayka's representative to disclose or disseminate information on the project in general amidst the local communities. Consultations with local residents indicated that while they were aware of a potential greenhouse project of Spayka coming up, no specific information on timelines, exact activities and/or local employment requirements had been made available till date. Some of the residents raised concerns on environmental impacts in the construction phase as well as a general expectation on jobs (please refer to *Annexure B*).

Currently Spayka does not plan to hold special stakeholder meetings, however the Company has provided its contacts on the web-site which can be used for any messages and concerns of stakeholders and community members. Also as it was evident from interviews with stakeholders of existing activities, Spayka representatives are open to the dialogs and responsive regarding requests and concerns of communities engaged in Spayka activities.

This section identifies and assesses potential changes in the environment that could be expected from different activities across the Project lifecycle. Potential impacts have been identified based on site walk through surveys, onsite primary monitoring data generated by Spayka, ERM and ATMS, secondary data and literature review pertaining to the Project site, review of international best practice guidelines, and stakeholder consultations.

Anticipated impacts have been identified and predicted based on information collected through the following:

- Initial scoping through the Environmental and Social Compliance Audit process to identify the range of environmental and social resources to be studied (technical scope), the geographical area to be covered (spatial scale of the study area and thereafter the area of influence) and the timeframe;
- Available information on the Project as described in *Annexure A*;
- Secondary and primary baseline information;
- Consultations with internal and external stakeholder groups associated with the Project; and
- Qualitative assessment techniques for Receptors/Resources.

6.1 SUMMARY OF PROJECT ACTIVITIES

As highlighted previously, development of the Project includes greenfield greenhouse within Yerevan Municipality. The Project is being planned as a new energy saving and energy efficient semi-closed greenhouse for tomatoes and bell peppers with indoor and limited outdoor vegetable production. Spayka has planned several utility components into the Project including

- Water Requirement, Supply and Storage system including irrigation and fertilization;
- Sewage Disposal System;
- Solid Waste Disposal System;
- Power Supply and Backup system;
- Storm water drainage plan;
- Fire Fighting system;
- Parking Arrangements.

Discussions with Spayka representatives responsible for the Project indicate that this will be a typical project quite similar to those which are currently operating and constructing by Spayka in Artashat.

Key activities include planning phase, construction phase, and operational phase as summarized below (*Table 5.2-1*):

Table 5.2-1 Summary of key Project activities

Planning Phase	Construction Phase	Operations Phase
<ul style="list-style-type: none"> • Land acquisition from Yerevan Municipality; • Social surveys and consultations; • Project planning phase activities: <ul style="list-style-type: none"> ○ Master plan preparation covering building layout of green houses and utilities; ○ Infrastructure planning and design (such as drinking water treatment and supply systems; wastewater conveyance, treatment and reuse systems; storm water drainage systems; rainwater harvesting and recovery systems; Waste management systems; access road; and other facilities); ○ Mechanical and electrical utilities planning and design; • Building plan approvals and other developmental proposal approvals from various line departments; • Identification of source of soils required to level the ground; • Compliance to permit conditions. 	<ul style="list-style-type: none"> • Pre-construction and mobilisation phase activities; <ul style="list-style-type: none"> • Setting up material storage yards and transport of materials; • Construction of greenhouses: <ul style="list-style-type: none"> ○ Clearing and scrubbing; ○ Site levelling works; ○ Electrical works; ○ Plumbing works; ○ Welding works; ○ Glazing works; ○ Installation of irrigation system; • Road and parking paving works; • Utilities installation; • Utilities hook-up; • Testing and commissioning 	<ul style="list-style-type: none"> • Growing and maintenance of plants: <ul style="list-style-type: none"> ○ Installation of Priva computer process system; ○ Visual observation and daily healthcare; ○ Irrigating, adding fertilizers in watering system; ○ Crops gathering; • Crops sorting, packing, loading in trucks; • Crops transportation; • Operating irrigation system including fertilization and heating; • Utilities maintenance; • Emergency systems testing and drills; • Operating canteen; • Pesticide Application and Management; • Waste management; • Maintenance of security and order

6.2 IMPACT EVALUATION

This section summarises the qualitative assessment techniques to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resources/ receptors.

Characteristics of Impacts

Predicted impacts have been described on the basis of characteristics that together determine the magnitude of the impact as provided subsequently:

Table 5.2-2 Impact Characteristic Terminology

Characteristics	Definition	Designations that are applicable to the Project
Nature of Impact	The nature of an impact is defined as the type of change from current baseline conditions	<p>Within the context of the Project, the nature of impact is as follows:</p> <ul style="list-style-type: none"> • Negative impact: when impact is considered to represent adverse change from the baseline; • Positive impact: When impact from the project is considered to represent an improvement in baseline conditions.
Type of Impact	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect)	<p>Within the context of the Project, the type of the impact can be:</p> <ul style="list-style-type: none"> • Direct impact resulting from the direct interaction between a project activity and the Resource/Receptor; • Indirect impact between the proposed activity and the environment as a result of subsequent interactions within the environment; or • Induced impact resulting from other non-project activities that happen as a consequence of the Project activities.
Extent of impact	The spatial reach or extent of the impact from Project activities (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc.) within the project's area of influence (AoI)	<p>The extent selected based on the understanding of the Project related activities and prevailing environmental baseline conditions include the following:</p> <ul style="list-style-type: none"> • Site-specific: when impact due to the proposed Project related activities is restricted within the Project site • Local: when impact due to the Project related activities is within the confines of the study area of 2 km around the Project site; and • Regional: when an impact is beyond the study area but is restricted to the adjoining wards or areas of the city of Yerevan.
Duration of impact	The time period over which a resource/ receptor is affected or exposed.	<p>The duration of an impact is determined to find out whether it would be impacted temporary, short-term, long-term or permanent based on their temporal scale and exposure of resources or receptors:</p> <p>Temporary (very short duration) impacts would last for a short duration of 6 months or less and are reversible and intermittent or occasional in nature. The resource or receptor would return to the previous state when the effect ceases or after a short</p>

Characteristics	Definition	Designations that are applicable to the Project
		<p>period of recovery (e.g. Site clearance);</p> <p>Short-term (short duration) when impact is likely to be restricted for a duration of up to 2 years;</p> <p>Long-term (medium duration) when impacts would continue for an extended period of time; this is based on the understanding that there will be recovery of the effected environmental component to its best achievable pre-project state over time;</p> <p>Permanent (long duration) when impacts would occur during the development of the Project and cause a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime.</p>
Scale- Intensity of Impact	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	<p>Low intensity, when resulting in slight changes of prevailing baseline conditions;</p> <p>Medium intensity, when resulting in changes which are within the benchmark norms or shows some signs of stress on any of the components of environment; and</p> <p>High intensity, when resulting in changes which affects larger extent or shows signs of stress on receptors in larger extent.</p>
Frequency of impact	A measure of the constancy or periodicity of the impact.	<p>The impacts as one off or varying frequency (intended to be a numerical value or a qualitative description) as per following classification:</p> <p>Remote – one off, when resulting remote or one off chance of an event due to an activity on a receptor/ resource;</p> <p>Occasional-when an impact due to an activity is occurring intermittently from time to time on a receptor/resource;</p> <p>Periodic -when an impact due to an activity is resulting on periodic basis say for a week or a month on a resource/ receptor;</p> <p>Routine or Continuous - when an impact due to an activity is continuously resulting on a resource/ receptor</p>
Likelihood of Impacts	Applicable to non-routine impacts arising as an unplanned or accidental events resulting in Project-related structure/infrastructure breakdown or catastrophic failure, or external events (e.g. fire, structural damage)	<p>The impact of non-routine events is assessed in terms of the risk by taking into account both the consequence of the event and the probability of occurrence.</p> <p>The likelihood of an impact/risk has been considered as per the following criteria:</p> <p>Unlikely - when event is unlikely but may occur at some time during normal operating conditions;</p> <p>Possible- when event is likely to occur at some time during normal operating conditions; and</p> <p>Likely - when event will occur during normal operating conditions.</p>

Determining Magnitude of Impact

Magnitude is typically a function of some combination (depending on the Resource/Receptor in question) of the following impact characteristics:

- Extent;

- Duration;
- Scale - Intensity;
- Frequency.

Additionally, for impacts resulting from unplanned events, the 'likelihood' actor has been considered together with the other impact characteristics, using qualitative scale as defined in the above table on likelihood.

Magnitude essentially describes the intensity of the change that is predicted to occur in the Resource/Receptor as a result of the impact. Magnitude designations themselves are universally consistent, but the descriptions for these designations vary on a Resource/Receptor-by-Resource/Receptor basis.

The universal magnitude designations are:

- Positive;
- Negligible;
- Small;
- Medium;
- Large.

In the case of a positive impact, no magnitude designation (aside from 'positive') has been assigned. It was considered sufficient for the purpose of the IA to indicate that the Project was expected to result in a positive impact, without characterising the exact degree of positive change likely to occur.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation was followed, but the 'likelihood' factor was considered, together with the other impact characteristics, when assigning a magnitude designation.

Definitions of magnitude for bio-physical and human environmental resources or receptors are defined as follows:

Table 5.2-3 *Magnitude definitions for physical, biological, and human Resources/Receptors*

Magnitude definitions	Biophysical and environmental Receptors	Socio-economic, cultural, and community health Receptors
Negligible	Immeasurable, undetectable or within the range of normal natural variation	Change remains within the range commonly experienced within the household or community.
Small	Slight changes in background levels well within accepted norms. Emissions/ Discharges are well within benchmark discharge limits. The effected environmental conditions are expected to be recovered within a 6 months	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of households and is of a short duration.
Medium	Temporary or localised change in physical or biological environment. The recovery of such changes returning to background levels thereafter within 1 year and / or Occasional exceedance of benchmark emission/ discharge limits	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may be regional in scale.
Large	Change over a large area or ecological conditions that lasts over the course of	Change dominates over baseline conditions. Affects the majority of the

Magnitude definitions	Biophysical and environmental Receptors	Socio-economic, cultural, and community health Receptors
	more than two years with quality likely to cause secondary impacts; and / or routine exceedance of benchmark emission/ effluent discharge limits	area or population in the Area of Influence and/or persists over many years. The impact may be experienced over a regional or national area.
Positive	In the case of positive impacts, no magnitude is assigned, unless there is ample data to support a more robust characterization. It is usually sufficient to indicate that the Project will result in a positive impact, without characterizing the exact degree of positive change likely to occur.	

Sensitivity/Vulnerability/Importance of Resource/Receptor

In addition to characterising the magnitude of impact, the other principal impact evaluation step was definition of the sensitivity/ vulnerability/ importance of the impacted Resource/Receptor. There are a range of factors that was taken into account when defining the sensitivity/ vulnerability/ importance of the Resource/Receptor, which may be physical, biological, cultural or human. The sensitivity/ vulnerability/importance designations used herein for all Resources/Receptors are:

- Low
- Medium
- High

In the social and community health context, vulnerability is the accepted term for describing the sensitivity of the social receptor that will experience the impact. A vulnerable individual (or group) is one that could experience adverse impacts more severely than others, based on his/her status (for example poverty status, access to basic goods and services). Vulnerability is a pre-existing status that is independent of the Project. A project may also exacerbate existing vulnerabilities if the status of individuals and communities and their coping mechanisms are not adequately understood or considered.

Definitions as to determine sensitivity/importance/ vulnerability of environmental resource or receptor are defined as follows:

Table 5.2-4 *Definitions of Sensitivity/Importance/Vulnerability Biophysical and Human*

Sensitivity	Biophysical and environmental Receptors	Socio-economic, cultural and community health Receptors
Low	Existing physical environment quality is good and the ecological resources that it supports are not sensitive to disturbance	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.
Medium	Existing physical environment quality shows some signs of stress and/ or supports ecological resources that could be sensitive to change in quality or physical disturbance.	Some, but few areas of vulnerability; still retaining an ability to at least in part adapt to change brought by the Project and opportunities associated with it.

Sensitivity	Biophysical and environmental Receptors	Socio-economic, cultural and community health Receptors
High	Physical environment quality is already under stress and/ or the ecological resources it supports are very sensitive to change	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project and opportunities associated with it.

6.3 DETERMINING IMPACT SIGNIFICANCE

Once the magnitude of an impact is determined based on impact characteristics and the sensitivity/ vulnerability of resource/ receptor have been ascertained, the significance was assigned for each impact. The significance of impacts is then devised from a combination of the sensitivity of the receptor and the magnitude of impact. The overall significance is evaluated through a matrix of magnitude versus sensitivity or vulnerability/ value of Resources/Receptors shown subsequently:

Table 5.2-5 Impact Significance

		Sensitivity/Vulnerability/importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all Resources/Receptors, and all impacts to these Resources/Receptors, as the Resource/Receptor-specific considerations are factored into the assignment of magnitude and sensitivity/ vulnerability/ importance designations that enter into the matrix.

Table 5.2-6 Categories of Impact Significance

Impact Category	Description of Impact Significance for Biophysical and Environmental Receptors	Description of Impact Significance for Socio-economic and Cultural Receptors	Description of Impact Significance for Community Health
Positive	Positive impacts provide resources or receptors, most often people, with positive benefits. The concepts of equity have been considered in assessing the overall positive nature of some impacts such as economic benefits, or opportunities for employment, improvement in infrastructure and overall development of region		
Negligible	An impact of negligible	Inconvenience caused,	No long-term

Impact Category	Description of Impact Significance for Biophysical and Environmental Receptors	Description of Impact Significance for Socio-economic and Cultural Receptors	Description of Impact Significance for Community Health
	significance is one where a resource/ receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be indistinguishable from natural background variations	but with no consequences to livelihoods, culture or quality of life.	consequences for the health of individuals and the community.
Minor	An impact of minor significance is one where a resource/ receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the Resource/Receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards/ guidelines	Impacts are short term and temporary and do not result in long term reductions in livelihood or quality of life.	Temporary reduction to health status of certain individuals that can be easily treated and does not result in long term consequences for community health.
Moderate	An impact of moderate significance has an impact magnitude that is within applicable standards/ Guidelines, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.	Adverse impacts that notably affect livelihood or quality of life at household and community level. Impacts can mainly be reversed but some households may suffer long-term effects.	High risk of diseases or injuries as well as exposure to Project operational risks to the local community. May result in long term but reversible community health impacts.
Major	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive Resource/Receptors.	Diverse primary and secondary impacts that will be impossible to reverse or compensate for, possibly leading to long-term impoverishment, or societal breakdown.	Exposure to and incidence of diseases not commonly seen previously in the area. Likely to have long-term consequences for community health.

6.4 MITIGATION AND ENHANCEMENT

Upon evaluation of the significance of impacts, mitigation and enhancement measures have been identified. This has followed the mitigation hierarchy in terms of:

- To avoid or reduce the magnitude of impact from the associated project activity;
- To address the resultant effect of the Resource/Receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of

the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Mitigation measures are applied to reduce impacts to 'as low as reasonably practicable' (ALARP) and as such may not be eliminated entirely.

6.5 *RESIDUAL IMPACT EVALUATION*

Following the identification of proposed mitigation measures already incorporated into the Project design and, where appropriate, any further mitigation measures that are considered feasible and justified, there are remaining impacts that are termed as residual impacts. The evaluation of the significance of residual impacts in this IEE-ESMP has taken into consideration the mitigation measures that the Project has committed to implement.

Table 5.2-7 Activity-Environmental Impact Interaction Matrix for Planning, Construction and Operational Phases

Project Phase and Activity	Environmental Resources/Receptors	Soil/Land Environment	Ambient Air Quality	Water Environment	Ambient Noise Quality and Vibrations	Ecology	Natural Disasters
Planning Phase							
All activities described in the <i>Error! Reference source not found.</i>		-	-	-	-	-	-
Construction Phase							
Pre-construction and mobilisation phase activities:							
• Setting up material storage yards and transport of materials		Minor	Negligible	-	Minor	Negligible	-
Construction of greenhouse, including:							
• Clearing and scrubbing		Minor	Negligible	Negligible	Minor	Negligible	-
• Site levelling works		Minor	Negligible	Negligible	Minor	Negligible	-
• Electrical works		-	-	-	Minor	-	-
• Plumbing works		Negligible	Negligible	-	Negligible	-	-
• Welding works		-	Minor	-	Negligible	-	-
• Glazing works		-	-	-	-	-	-
• Installation of irrigation system		-	-	-	-	-	-
Road and parking paving works		Minor	Negligible	-	Minor	Negligible	-
Utilities installation		Minor	Negligible	Negligible	Minor	Negligible	-
Utilities hook-up		-	-	-	-	-	-
Testing and commissioning		-	Negligible	-	Negligible	-	-
Operational Phase							

Project Phase and Activity	Environmental Resources/ Receptors	Soil/Land Environment	Ambient Air Quality	Water Environment	Ambient Noise Quality and Vibrations	Ecology	Natural Disasters
Growing and maintenance of plants:							
	• Installation of Priva process computer system	-	-	-	-	-	-
	• Visual observation and daily healthcare;	-	-	-	-	-	-
	• Irrigating, adding fertilizers in watering system;	-	Negligible	-	Negligible	-	-
	• Crops gathering,	-	Negligible	-	-	-	-
	Crops sorting, packing, loading in tracks	-	-	-	Negligible	-	-
	Crops transportation	-	Minor	-	Minor	-	-
	Operating irrigation system including fertilization and heating	-	Minor	-	Negligible	-	-
	Utilities maintenance	Negligible	Negligible	-	Negligible	-	-
	Pesticide Application and Management	Negligible	-	Negligible	-	Negligible	-
	Waste management	-	Minor	-	Minor	-	-
	Maintenance of security and order	-	-	-	-	-	-
	Emergency testing and drills	-	Negligible	-	Negligible	-	-

7.2 SUMMARY OF SOCIAL KEY ASPECTS

Table 7.2-1 Activity-Environmental Impact Interaction Matrix for Planning, Construction and Operational Phases

Project Phase and Activity	Land use	Sustainable resource Use	Visual/ Aesthetics	Road Traffic	Occupational Health and Safety	Demography (Influx or Displacement	Local Economy and Employment	Livelihoods	Community Health and Safety	Labour and Human Rights Issues	Social Infrastructure and Services	Culture and heritage
Planning Phase												
All activities described in the Table 6.1	Minor	-	-	-	-	-	Positive	-	-	-	-	-
Construction Phase												
Pre-construction and mobilisation phase activities												
• Setting up onsite concrete batching plant	-	-	Negligible	Negligible	Minor	-	-	-	Negligible	-	-	-
• Setting up material storage yards and transport of materials	-	-	Negligible	Medium	Minor	-	-	-	Negligible	-	-	-
Construction of greenhouse												
• Clearing and scrubbing	-	-	Negligible	-	Minor	-	-	-	Negligible	-	-	Negligible
• Site levelling works	-	-	Negligible	-	Minor	-	-	-	Negligible	-	-	-
• Electrical works	-	-	-	-	Negligible	-	-	-	-	-	-	-
• Plumbing works	-	-	-	-	Negligible	-	-	-	-	-	-	-
• Welding works	-	-	Minor	-	Minor	-	-	-	-	-	-	-
• Glazing works	-	-	Minor	-	Minor	-	-	-	-	-	-	-
• Installation of irrigation system	-	-	-	-	Minor	-	-	-	-	-	-	-
Road and parking paving works	-	-	Negligible	-	Negligible	-	-	-	-	-	-	-
Utilities installation	-	-	-	-	Minor	-	-	-	-	-	-	Negligible
Utilities hook-up	-	-	-	-	Minor	-	-	-	-	-	-	-

Project Phase and Activity	Social Resources/ Receptors											
	Land use	Sustainable resource Use	Visual/ Aesthetics	Road Traffic	Occupational Health and Safety	Demography (Influx or Displacement	Local Economy and Employment	Livelihoods	Community Health and Safety	Labour and Human Rights Issues	Social Infrastructure and Services	Culture and heritage
Testing and commissioning	-	-	-	-	Negligible	-	-	-	-	-	-	-
Operational Phase												
Growing and maintenance of plants:												
• Installation of Priva process computer system	-	-	-	-	-	-	-	-	-	-	-	-
• Visual observation and daily healthcare;	-	-	-	-	-	-	Positive	-	Negligible	-	-	-
• Irrigating, adding fertilizers in watering system;	-	-	-	-	-	-	Positive	-	Negligible	-	-	-
• Crops gathering,	-	-	-	-	-	-	Positive	-	Negligible	-	-	-
Crops sorting, packing, loading in tracks	-	-	-	-	-	-	Positive	-	Negligible	-	-	-
Crops transportation	-	-	-	Medium	Minor	-	Positive	-	Minor	-	-	-
Operating irrigation system and heating	-	Negligible	-	-	Minor	-	Positive	-	-	-	-	-
Emergency systems testing and drills	-	-	-	-	Negligible	-	Positive	-	-	-	-	-
Utilities maintenance	-	-	-	-	Negligible	-	Positive	-	-	-	-	-
Pesticide Application and Management	-	-	-	-	Negligible	-	Positive	-	-	-	-	-
Waste management	-	-	-	Minor	Negligible	-	Positive	-	-	-	Negligible	-
Maintenance of security and order	-	-	-	-	-	-	-	-	Negligible	Negligible	-	-

7.3 ASSESSMENT OF SOCIO-ECONOMIC IMPACTS

7.3.1 *Physical and Economic Displacement*

Land for the Project is barren without any active income generating anthropogenic activities. Spayka reported that the land allotment through Yerevan Municipality did not entail any involuntary resettlement (physical and/or economic). In addition, Spayka indicated that the entire project footprint/layout will be within the allotted land and no additional land acquisition is anticipated for the proposed investment.

Between 2012 and now, the land has not been used for any cultivation purposes and thus, there are no specific local communities/households that are dependent upon this land. Compensation was paid to households for the use of land based on their consent and any reported objections were amicably settled.

Thus no negative impact on land users and livelihood assets associated with land use are expected.

7.3.2 *Livelihood Impacts*

It is understood that there is a likelihood of a majority of the operations phase workforce (in particular greenhouse workers and workers engaged in sorting as well as housekeeping of facilities) to be female.

As greenhouses will be located between Yerevan and rural area workers from different location could be involved in operation. Local workers will benefit from employment opportunities to be offered during the construction and operations phase of the project. This will also result in positive impact on livelihood assets as this offers new opportunities for women to be employed within local enterprises.

7.3.3 *Influx and In-migration*

No in-migration is expected during both construction and operation of the Project.

7.3.4 *Impact on Community Facilities*

Project facilities will be connected to the local water distribution network (for water supply) through Yerevan Municipality and thermal power plant owned by private company (for heat supply). All of the connections were approved by local authorities and private company. During the period after Soviet Union significant number of enterprises were closed that is why there are large amount of free capacity within local utilities. No negative impact on local utilities is expected.

7.3.5 *Community Health and Safety*

Potential risks for community health and safety will be associated with cargo and personnel transportation during construction and operation. There are no special road safety management envisaged by the Project.

National legislation provides with general road safety requirements which are obligated for each road user. However it is recommended to develop a *Road Safety Management Plan*, which would provide additional measures to reduce the potential risk of accidents. This Plan should include but not limited to:

- Transportation routes for cargo and personnel;
- Velocity limits for driving with residential areas;
- Limits on driving during night time;
- Pre-trip checks of technical serviceability of vehicles, etc.

Implementation of suggested mitigation measures will reduce potential risk of accidents.

7.3.6 *Labour conditions*

It is expected that about 300 workers will be involved in construction and about 275 workers will be employed for operation. Spayka to develop its Human Resource Policy aligned with the Armenian labour law and ILO core labour standards.

Labour Management and Occupation Health and Safety Plan should be developed to ensure safe labour conditions for both construction and operation workers and contractor and subcontractors' compliance with national labour laws and to core labour standards. This Plan should include requirements for each type of work which will be applied during Project implementation. It is recommended to rely on ILO requirements for occupational health and safety to ensure that all of the potential risks and hazards are properly managed and reduced. Safety trainings and briefings should be provided to each worker on a regular basis.

Implementation of suggested mitigation measures will reduce potential risk associated with labour conditions.

7.3.7 *Noise and air pollution due to transportation*

Cargo and personnel transportation during construction and operation could be a source of potential noise and air pollution. It is expected that intensity of transportation will be about ten vehicles per day. Transportation routes will be will pass along public roads which currently characterised by low traffic intensity. To reduce potential impact associated with noise and air pollution it is recommended to develop *Road Safety Management Plan* (see Section 7.3.5 "*Community Health and Safety*").

7.3.8 *Grievance Redress Mechanism*

A grievance is considered to be any complaint (or also a general comment or suggestion) about the way a project is being implemented. It may take the

form of specific complaint about impacts, damages or harm caused by the Project, concerns about access to the project stakeholder engagement process or about how comments have been addressed, and concerns about project activities during construction or operation, or perceived incidents or impacts.

Spayka is yet to put in place a grievance redressal mechanism for the Project.

Spayka's Grievance Procedure for the Project shall act in accordance with adopted internal regulation of consideration of appeals of individuals and legal entities (which is assumed to be established with ESMS, as reported by Spayka).

Grievance procedure will be implemented with the following aims:

- To build and maintain trust with all stakeholders (both internal and external);
- To prevent adverse consequences of failure to adequately address grievances; and
- To identify and manage stakeholder concerns and thus support effective risk management.

Internal regulation shall establish timeline to address grievances.

The efficiency of the Grievance Procedure shall be periodically assessed by Spayka and the procedures adapted.

7.4

GRIEVANCE PROCEDURE FOR THE PROJECT

The Grievance Procedure shall be free, open and accessible to all and comments and grievances will be addressed in a fair and transparent manner. Information about the procedures, means of communication and contact person shall be publicly available. The Grievance Procedure applies to all stakeholders including community, civil society organizations, and workers; all workers (including construction contractor Avagyan Construction and subcontractors) shall be informed of the Grievance Procedures and new workers will be informed when they join the Project. Information on Contact Points (Community Liaison Officer or similar) shall be posted on staff information boards and on site information boards.

At Company level the responsibility for coordinating the external communication for the management of the stakeholder engagement process in general, including the implementation of the SEP to be developed will be one of the employees reporting directly to the General Management (a particular person will be specified by Spayka while SEP development and implementation).

Community Liaison Officer (or similar) as well as his responsibilities for performing everyday tasks on engagement will be determined during the Project implementation, and will have the following responsibilities:

- coordinate communication with local communities;
- provide Project related information on behalf of Spayka;
- receive grievances in accordance with adopted grievance mechanism;
- coordinate and follow-up on responding to comments and concerns from stakeholders;

- manage Grievance Procedure;
- report to the Coordinator on external communications on any community related matters;
- inform employees at the Project's sites on SEP.

The suggested Grievance Procedure comprises the following steps:

1. **Identification of grievance:** Stakeholders shall be able to use the following methods to submit a grievance:
 - Oral in the meeting with communities or via Project information hotline;
 - By sending an electronic appeal to Spayka; and
 - In writing via post to the address of Spayka Central office in Yerevan.

The grievance is recorded and classified in the 'Appeals Log' (written and/or electronic) by responsible employee. The Appeals Log will be held at Spayka's office.

2. **Grievance is formally acknowledged** through community meetings or letter as appropriate, within five working days of registration. If the grievance is not well understood or if additional information is required, clarification should be sought from the complainant during this step.
3. **The Community Liaison Officer (or similar) delegates the grievance** in writing to the relevant Spayka department(s)/personnel /contractor for development of an appropriate response. Head of Protocol and PR Department evaluates the subject of the grievance and determines a risk category. If required, the grievance may be sent to the senior management.
4. **A response is developed** by the delegated department and responsible PR Department employee with input from the Senior Management and others, as necessary. Should the need arise, Spayka representatives, local authorities, complainant etc. will consider it collectively.
5. **Required actions are implemented** to deal with the issue, and completion of these is recorded on the appeals log.
6. **The response is to be approved** by the Head of Protocol and PR Department. The sign-off may be a signature on the appeal's log or in correspondence, attached to the grievance.
7. **The signed by the Company's Senior Management response is communicated to the compliant.** The response to a grievance/appeal will be provided during the period which will be defined by Spayka during adoption the formal grievance procedure.
8. **The response of the complainant is recorded** to help assess whether the grievance is closed or whether further action is needed. The complainants' response should be recorded in the grievance log.
9. **The grievance is closed** with a note about results in the appeals register.

In accordance to the ADB SPS 2009 the impacts over the project lifecycle need to be adequately mitigated and managed through an Environmental and Social Management Plan (ESMP).

Accordingly, the purpose of this ESMP is as follows:

- To compile the possible mitigation measures and enhancement measures that have been summarised in *Section 7*.
- To define specific actions required and timelines of implementation;
- To identify institutional roles and responsibilities for implementation;
- To specify the standards and controls required to manage and monitor environmental and social impacts during different phase of project life cycle; and
- To identify interfaces between the controls and to estimate the costs of the measures.

The ESMP will require to be implemented in conjunction with the following framework management plans provided in *Social Audit Report (as of December 7 2017 by ERM)*.

Table 7.4-1 Environmental and Social Management Plan

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementa tion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
Overarching management measures								
1.	Management system under ISO accreditation	Formal HS management system to be developed and maintained for all different types of Spayka's activities.	Spayka EHS team; Top Management External ISO consultant	Best practices ISO requirements ADB safeguards	N/A	-	-	-
Environment and Health and Safety Impact Mitigation and Enhancement Measures - Construction								
2.	Site preparation- Site clearing, excavation and levelling	<ul style="list-style-type: none"> Water sprinkling in areas of dust emissions; Regular maintenance of machinery and equipment; Proper management of solid waste in terms of collection, stacking, disposal without disturbing the adjoining land/ areas; Disturbance to land surface contours to be kept to minimum; Construction footprint to be well defined and construction work to be carried out within the footprints only; An efficient and well planned off site storm water drainage system will be provided to cater the storm water; Adequate drains and culverts to be provided at site for proper water drainage at site 	Spayka EHS team; Construction contractor	Site Inspection Documentary evidences	On monthly basis	EHS team	Maintenance reports for construction equipment; Protocols of visual inspections	Monthly and Quarterly EHS report
3.	Utility installation	<ul style="list-style-type: none"> Water sprinkling in areas of dust emissions; Regular maintenance of machinery and 	Planning team;	Utility service maps;	On monthly basis	EHS team	Maintenance reports for construction equipment;	Report on Utility installation

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementat ion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
		<p>equipment;</p> <ul style="list-style-type: none"> • Proper management of solid waste in terms of collection, stacking, disposal without disturbing the adjoining land/ areas; • Disturbance to land surface contours to be kept to minimum; • Construction footprint to be well defined and construction work to be carried out within the footprints only; • An efficient and well planned off site storm water drainage system will be provided to cater the storm water; • Adequate drains and culverts to be provided at site for proper water drainage at site 	EHS team	<p>Site Inspection</p> <p>Documentary evidences</p>			<p>Protocols of visual inspections</p>	
4.	Transportation of Construction material and mobilization of construction machinery and vehicular movement within site	<ul style="list-style-type: none"> • Water sprinkling on approach road during dry periods; • Trucks/dumpers to be covered by tarpaulin during transportation of construction material especially, cement, sand; • Holding area to be provided within site for vehicles waiting to deliver loads at site so as to avoid queuing outside the site; • Routes for use by construction traffic within site to be planned with proper signage to minimize encountering of construction workers with vehicles; • Vehicle speed to be restricted to 10 km/h within site. 	<p>Planning team;</p> <p>EHS team</p>	<p>Visual assessment</p> <p>Site Inspection</p> <p>Documentary evidences</p>	On monthly basis	EHS team	<p>Maintenance reports for construction equipment;</p> <p>Protocols of visual inspections</p> <p>Regular checking of pollution certificate for vehicles</p>	Monthly EHS report
5.	Construction activities	<ul style="list-style-type: none"> • Provision of temporary but proper foundation supported with rubber padding 	Planning team;	<p>Visual assessment</p> <p>Copies of permits</p>	On monthly basis	EHS team	<p>Protocols of visual inspections</p>	Monthly EHS report

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementat ion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
		<p>to control vibrations;</p> <ul style="list-style-type: none"> Optimised operation of construction related machinery; Collection and disposal of construction waste generated -debris, concrete, metal cuttings wastes etc. as per the requirement; Hazardous waste will be collected and disposed off ; Construction of septic tanks and soak pits and storm water drains prior to start of construction activities; Health and Safety training to be provided to all construction workers; Fuel to be stored in storage area having impervious floor; Waste oil generated to be stored separately in drums and disposed of through authorised vendors. 	EHS team	<p>for construction activity etc.;</p> <p>Records of waste removal</p> <p>Air and noise monitoring records</p>			Monthly checking of performance of domestic utilities.	
6.	Removal of temporary construction Structures and demobilization of construction machinery	<ul style="list-style-type: none"> Remove all construction equipment from project site with due care on health, safety and environment; Remove all demobilisation waste from the construction site. 	EHS team Construction contractor Project head	<ul style="list-style-type: none"> Auditing immediately before and after the construction demobilisation 	Once, after demobilization of construction machinery	EHS team Project Head	Performance against Demobilization action checklist	Demobilization audit report
Environment and Health and Safety Impact Mitigation and Enhancement Measures - Operations								
7.	Periodical maintenance of greenhouses through its life	<ul style="list-style-type: none"> Maintenance of greenhouses will include: sweeping, cleaning and washing machinery; electrical wiring, fittings and fixtures; sanitary fittings, piping and fixtures; water supply pipelines, fittings and fixtures; and 	EHS team Operational management	Contracts/personnel for maintenance service providing	As per terms of semi-closed greenhouse technology	Project Head; Operational management	<ul style="list-style-type: none"> Availability of Maintenance manuals During defect liability period and later 	Documented greenhouses hand over report

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementat ion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
	cycle	carpentry etc.;			provision		<p>during the entire project life cycle, effective greenhouse maintenance shall be monitored using following parameters which include:</p> <ul style="list-style-type: none"> ○ Completely intact water and wastewater pipelines and sewerage system with no signs of leaks, seeps, spills, overflows; ○ Presence of all electrical fitting and fixtures in working condition. ○ No waste accumulation on non-designated grounds. ○ Neat and clean parking spaces with vehicles parked in an orderly manner. <ul style="list-style-type: none"> ● The inspection and auditing shall be done at various frequencies focussing on various issues: weekly, 	

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementat ion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
							monthly and quarterly.	
Socio-economic and Community Health Impact Mitigation and Enhancement Measures for the Project Lifecycle								
8.	Engaging Construction Workers	<ul style="list-style-type: none"> Construction phase requirements of the ESMP (especially pertaining to social issues and impacts) will require to be a part of contract agreements with Avagyan and any other sub-contractors; Stipulation of compliance with the national labour laws and to take measures to comply with the core labour standards, even for sub-contractors; and Other safeguards part of the corporate contractor management systems. 	Construction Contractors	Compliance documentation	Monthly	Spayka	ESMP, records on compliances and non- compliances	Monthly implementation reports
9.	Spayka's Compliance with National Labour Laws and Core Labour Standards in accordance with ADB's Social protection Strategy	<ul style="list-style-type: none"> Develop a Human Resources Policy (corporate level) to complement the existing Code of Conduct. This HR Policy will include, among others the following specific requirements and will also be applicable to the Yerevan greenhouse and its contractors and subcontractors: <ul style="list-style-type: none"> - Non-tolerance of child labour and forced labour - non-discrimination; -freedom of association; -commitments on provision of minimum wage, equal opportunity and nontolerance to engagement of young workers in the supply chain; - Standardized employment contracts as 	Spayka	HR Policy document to be submitted to ADB; and monitoring of its implementation through the annual E&S Progress Report (AESPR)	Quarterly	Spayka	AESPR	Quarterly

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementat ion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
		<p>per the provisions of the</p> <p>-Employment Contract under the Labour Code, 2004 for all workers;</p> <ul style="list-style-type: none"> • Overtime recording and payment policy for all activities; 						
10.	Health & Safety provisions	<ul style="list-style-type: none"> • Develop a standard operating procedure on Emergency Response with a provision of mitigation and mechanisms to contain onsite and offsite emergencies (limited to their activities). • Develop and implement HS management system to ensure all routines include health and safety precautions on a regular basis. System shall be introduced to all dimensions of Spayka's activities, including the Greenhouse Project in Yerevan. • Develop an onsite and offsite community health and safety management and monitoring plan based on sanitary and hygiene parameters identified under the Law on assurance of the sanitary epidemiological welfare of population of the Republic of Armenia", 1992 for implementation during the construction and operations phase 	EHS team	Plans Compliance documentation Engineering design	Quarterly	EHS team Chief Engineer Project Head	Relevant onsite documentation Trainings as per provided in plans and legal requirements	Up to date plans and trainings records

N	Aspect/ Potential Impact/ Issue	Mitigation /Safeguard Measures	Responsible Parties (Implementat ion)	Means of verification	Monitoring Frequency	Responsible Parties (Supervision of monitoring)	Monitoring Indicators and Training	Reporting Requirements
11.	Labour conditions	<i>Labour Management and Occupation Health and Safety Plan</i> should be developed to ensure safe labour conditions for both construction and operation workers. This Plan should include requirements for each type of work which will be applied during Project implementation. Contractors and subcontractors to comply with the national labour laws and the ILO CLS. It is recommended to rely on ILO requirements for occupational health and safety to ensure that all of the potential risks and hazards are properly managed and reduced. Safety trainings and briefings should be provided to each worker on a regular basis	EHS team	Plans Compliance documentation Engineering design	Quarterly	EHS team Chief Engineer Project Head	Relevant onsite documentation Trainings as per provided in plans and legal requirements	Up to date plans and trainings records
12.	Road Safety provisions	Road Safety Management Plan which will provide additional measures to reduce the potential risk of accidents. This Plan should include but not limited to: <ul style="list-style-type: none"> • Transportation routes for cargo and personnel • Velocity limits for driving with residential areas, • Limits on driving during night time, • Pre-trip checks of technical serviceability of vehicles, etc. 	EHS team Fleet management team	Plans Compliance documentation Engineering design	Quarterly	EHS team Chief Fleet Manager	Relevant documentation Trainings as per provided in plans and legal requirements	Up to date plans and trainings records

The environmental, health and safety and social impacts of the proposed Spayka tomato and bell pepper greenhouse Project have been assessed in the Initial Environment Examination reported in this document, conducted in accordance to ADB SPS: SR 1 on Environmental Assessment. The proposed greenhouse will be developed on a land plot of 47.76 ha that has been allotted to Spayka by the Yerevan Municipal Authorities in July 2017. ADB's financing is limited to the greenhouse activities (30 ha) and other associated infrastructure and administrative buildings that will be developed within the land plot.

Environmental and Social Management Plan describes implementation mechanism for recommended mitigation measures together with management system elements to ensure overall project performance.

The key mitigation measures implemented at the Project site include the following:

- Water sprinkling in areas of dust emissions;
- Regular maintenance of machinery and equipment;
- Proper management of solid waste in terms of collection, stacking, disposal without disturbing the adjoining land/ areas;
- Disturbance to land surface contours to be kept to minimum;
- Construction footprint to be well defined and construction work to be carried out within the footprints only;
- An efficient and well planned off site storm water drainage system will be provided to cater the storm water;
- Adequate drains and culverts to be provided at site for proper water drainage at site;
- Trucks/dumpers to be covered by tarpaulin during transportation of construction material especially, cement, sand;
- Holding area to be provided within site for vehicles waiting to deliver loads at site so as to avoid queuing outside the site;
- Routes for use by construction traffic within site to be planned with proper signage to minimize encountering of construction workers with vehicles;
- Vehicle speed to be restricted to 10 km/h within the site
- Provision of temporary but proper foundation supported with rubber padding to control vibrations;
- Optimised operation of construction related machinery.

Environmental and socio-economic impacts, community health and safety implications, and local economic impacts anticipated during construction and operational phase were also assessed and have been included within the ESMP, included in this report.

The ESMP will require to be implemented in conjunction with the following framework management plans provided in *Social Audit Report (as of December 7 2017 by ERM)*

Provided that the mitigation and enhancement measures are implemented in full, there are anticipated to be no significant environmental, social and health and safety residual impacts as a result of the location, design, construction or operation of the Project.

It is anticipated, in fact, that there are likely to be benefits and overall upliftment of the socio-economic when greenhouses are in operation.

CONTENTS

GLOSSARY AND ABBREVIATIONS	2
EXECUTIVE SUMMARY	4
WHO IS THE PROJECT PROPONENT?	4
WHAT IS THE PROJECT?	4
WHAT IS THE LOCATION OF THE PROJECT SITE?	5
WHAT ARE THE PROJECT'S ECONOMY AND TIMELINE?	5
HOW IS THE PROJECT CATEGORISED ACCORDING TO ADB REQUIREMENTS?	6
WHAT DELIVERABLES HAVE BEEN DEVELOPED FOR THE PROJECT?	6
WHAT STAKEHOLDER ENGAGEMENT ACTIVITIES HAVE BEEN MADE TO THE DATE?	6
WHAT ARE THE BASELINE CONDITIONS OF THE PROJECT SITE?	6
WHAT ARE THE KEY ENVIRONMENTAL RISKS AND IMPACTS OF THE PROJECT?	7
WHAT ARE THE KEY SOCIO-ECONOMIC RISKS AND IMPACTS OF THE PROJECT?	7
HOW IS THE PROJECT GOING TO MANAGE ITS RISKS AND IMPACTS?	7
1 INTRODUCTION	8
1.1 PREAMBLE	8
1.2 PURPOSE OF THE STUDY	8
1.3 APPLICABLE REFERENCE FRAMEWORK	9
1.4 OBJECTIVES AND SCOPE OF THE STUDY	9
1.5 ERM'S APPROACH AND METHODOLOGY	9
1.6 LIMITATIONS	13
1.7 LAYOUT OF THE REPORT	14
2 PROJECT DESCRIPTION	15
2.1 INTRODUCTION	15
2.2 SITE SETTING	17
2.3 PROJECT UTILITIES AND RESOURCES	18
2.4 PROJECT UTILITIES AND RESOURCES	18
2.5 ASSESSMENT OF PROJECT ALTERNATIVES	21
3 APPLICABLE LEGAL AND REGULATORY FRAMEWORK	24
3.1 NATIONAL LEGAL REQUIREMENTS	24
3.2 RELEVANT INTERNATIONAL CONVENTIONS	28
3.3 NATIONAL ADMINISTRATIVE FRAMEWORK	30

3.4	<i>INTERNATIONAL STANDARDS</i>	33
4	<i>ENVIRONMENT AND SOCIAL BASELINE</i>	39
4.1	<i>GEOTECTONIC ZONATION, GEOLOGY AND HYDROGEOLOGY</i>	39
4.2	<i>SEISMICITY AND GEOLOGICAL HAZARDS</i>	40
4.3	<i>SURFACE WATER AND GROUNDWATER RESOURCES</i>	41
4.4	<i>CLIMATE AND METEOROLOGY</i>	42
4.5	<i>TERRESTRIAL ECOLOGY SURVEY</i>	47
4.6	<i>SAMPLING RESULTS</i>	63
4.7	<i>SOCIAL BASELINE</i>	64
5	<i>PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT</i>	69
5.1	<i>CATEGORISATION OF STAKEHOLDERS</i>	69
5.2	<i>STAKEHOLDER ENGAGEMENT AS PART OF IEE AND SRA</i>	74
6	<i>IMPACT ASSESSMENT</i>	75
6.1	<i>SUMMARY OF PROJECT ACTIVITIES</i>	75
6.2	<i>IMPACT EVALUATION</i>	77
6.3	<i>DETERMINING IMPACT SIGNIFICANCE</i>	81
6.4	<i>MITIGATION AND ENHANCEMENT</i>	82
6.5	<i>RESIDUAL IMPACT EVALUATION</i>	83
7	<i>KEY FINDINGS OF INITIAL EXAMINATION</i>	84
7.1	<i>SUMMARY OF ENVIRONMENTAL KEY ASPECTS</i>	84
7.2	<i>SUMMARY OF SOCIAL KEY ASPECTS</i>	86
7.3	<i>ASSESSMENT OF SOCIO-ECONOMIC IMPACTS</i>	88
7.4	<i>GRIEVANCE PROCEDURE FOR THE PROJECT</i>	90
8	<i>ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN</i>	92
9	<i>CONCLUSIONS AND WAY FORWARD</i>	100
	<i>CONTENTS</i>	102
	<i>ANNEXURE A - INFORMATION REVIEWED AND DATA GAPS</i>	
	<i>ANNEXURE B - SAMPLE MEETING MINUTES</i>	
	<i>ANNEXURE C - ENVIRONMENTAL SAMPLING RESULTS</i>	
	<i>ANNEXURE D - OFFICIAL RESPONSE FROM WATER DISTRIBUTION COMPANY</i>	

Annexure A

Information Reviewed and Data Gaps

- 30-20 general plot plan scheme for the new greenhouse (the Project);
- ARM Spayka Gender Action Plan Draft for Discussion;
- Spayka Environment and Social Review;
- Number of Spayka Employees per Department (October 2017);
- Summary of Spayka Payroll Record (tabulated) for April 2016; August 2016; October 2016; and February 2016;
- Organisation Structure of Spayka dated 1st June 2017;
- Construction permits №№12-13 issued for the construction of greenhouses near the Shahumyan community;
- Contract dated 29.01.2016 with medical institution for workers' periodical medical examination;
- Spayka's Code of Conduct;
- Working contract №1220 between Spayka and driver (direct employment);
- Spayka's Truck driver incentive order;
- Working contract № 1707 between Spayka and External Market Sales and Marketing Officer (Administrative staff);
- Working contract № 1618 between Spayka and Artashat greenhouse gardener;
- Working contract № 1750 between Spayka and harvesting worker (seasonal) worker in Shenik Orchards;
- Payroll for Shenik orchards harvesting workers, June 2017;
- Protocols for management meetings in Volvo Service Centre (31.07.2017, 04.09.2017);
- Protocols for management meetings in Artashat greenhouse (15.07.2017, 11.09.2017);
- Water permission №000161 for greenhouses near Shahumyan community;
- Contract №03401031 with "Shenik" water users association for irrigation water supply for the orchard near Bagramyan community;
- Records of training drills conducted together with rescue service under the Ministry of Emergency Situations;
- Land property certificate, Spayka LLC issued for greenhouse area (FMO-funded section, 24.44 ha);
- Land property certificate, Spayka LLC issued for greenhouse area (ADB-funded section, 47.76 ha);
- Land donation contract dated 18.07.2017 between Yerevan Municipality and Spayka;
- Air, noise, soil, and surface water test reports for the Project site, NAREK scientific research CJSC, 20.11.2017;

- 'Technical Conditions' document N 930 of for tie-in to water supply network, VEOLIA DJUR CJSC, 31.08.2017.

The following information is pending as of 8th February 2018:

Avagyan Construction Data

- Contract agreement with Avagyan for ongoing construction activities including act of responsibility of the constructor;
- Sample payroll records for construction workers in July 2017;
- Sample contract with permanent workers on construction site;
- Sample contract with temporary workers on construction site;
- Contractor licenses that have been already obtained for the Project's construction;
- Organisation structure for the construction site.

Spayka Data

- Any safeguards considered for: women, vulnerable social groups, religious minorities etc.;
- Key Spayka organisation involved in land purchase and their roles;
- Examples of any benefits provided to land owners and/or communities where land was purchased, if any (e.g. employment guarantee, funds for infrastructure etc.).
- Sample purchase agreement with individual farmers (at least three examples – one for different region);
- Sample purchase agreement with farmers union (at least three examples – one for different region);
- List of agriculture extension and training and awareness activities conducted with farmers (including number of beneficiaries);

Fleet Management

- Accident report for the vehicle overturned incident in Georgia in 2016;
- Overall list of traffic incidents for 2015, 2016 and 2017 which includes: Date, place, location, damages, details of any fatalities or injuries;
- Training calendar and records for drivers in 2016 and August 2017.

Additional Information Request to address ADB Comments to Ver.1 of the Report

The table below summarises additional requests that ADB made while reviewing draft version of the IEE Report, and response to them.

ADB comment	Party	Action required	Response
Please clarify if the whole 30 ha will be levelled off as part of site preparation activities. What is the required volume of backfill materials needed to do the designed site levelling? How far is the material or quarry source from the project site?	ERM, Spayka	To confirm with Spayka	All 30 ha will be levelled, as per general plan of construction, including the preparation of the roads. Backfill material will be taken from the same 30 ha land plot, no additional material needed.
Insertion: Sludge generation from waste water	Spayka	To confirm if any sludge generation from wastewater is envisaged	No sludge will be generated.
We expect that the estimated water requirement will be provided by Spayka's Technical Staff and incorporated in the final IEE Report.	Spayka	To provide data on water requirements during construction stage and operation stage.	Will be provided accordingly during construction phase and operational phase. Water analysis results have been provided.
We expect that the estimated water requirement will be provided by Spayka's technical staff during operation and incorporated in the final IEE Report.	Spayka		
We expect that the estimated quantity/volume generated of sewage will be provided by the Technical Staff and incorporated in the final IEE Report.	Spayka	To provide data on estimated quantity/quality of sewage.	Daily volume is 1/3 of total consumption volume, which in the pick of the season is 3,600 m ³ /daily
Please mention here estimated volume of "crop residue" during operation and how this will be disposed of by Spayka? Do they have plan to establish in-house compost pit for the crop residues?	Spayka	To provide data on estimated volume of "crop residue" and the ways of disposal. Confirm installation of in-house compost pit for the crop residues.	The crop residue will be composted on traditional way and sold to the interested third parties. In house composting system is on design stage.
ERM to gather data from Spayka about all the consultation meetings that they have conducted with the project stakeholders (local communities, fence communities, government officials, etc.) and incorporate it in the final IEE Report. And in case Spayka has plans	Spayka/ATMS	Spayka to provide information on further meetings with stakeholders	No additional meetings were proceeded.

ADB comment	Party	Action required	Response
for future meetings then it should also be included in the discussion			
For the construction of greenhouses –does Spayka need to set up onsite concrete batching plant? Please check this statement.	Spayka	To clarify if the concrete batching plant will be installed on site.	Concrete will be purchased by supplier. No own production foreseen.
Insertion: “Pesticide Application and Management”	Spayka	To clarify if pesticides will be used and what is the procedure of its management.	General risks and impacts related to pesticides application have been addressed in the IEE Report. ERM comment 07.02.2017: Detailed information was not provided
Please insert additional section/chapter to discuss the analysis of alternatives, in terms of project location, technology, design and operation including the “no project alternative”.	Spayka	Provide any information on alternatives considered during the Project planning, e.g. type of vegetables to grow, construction technology, location, size etc.	Alternative technology is based on glass greenhouses, which requires 1.5 times more CAPEX and bears additional risks in Armenia due to high seismicity.
ERM to check and review this Priva process computer system which Spayka that will be used during greenhouses operation. (Note: Kindly check if other existing or operational Spayka’s greenhouses are also using the Priva process computer and what are their experience of this Priva process computer.	Spayka	Provide list of parameters controlled by PRIVA	ERM comment 07.02.2017: Information was not provided
ERM to review the specifications of semi-closed greenhouse manufactured by Richel Group (a leading manufacturer from France). Also review the role of Priva process computer in terms of air quality, water quality/quantity, pesticide and fertilizer management.	Spayka	To provide the specifications of semi-closed greenhouse manufactured by Richel Group	All specifications are listed in the Annex 1 of the supply contract with Richel Group. ERM comment 07.02.2017: Annex 1 was not provided

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Annexure B

Sample Meeting Minutes

Basic details	
Location: Spayka head office	Village: Yerevan City
District: Yerevan City	Date: 05.10.2017
Purpose of the visit: Discussions on working conditions and labour issues	

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Key points Discussed :
<ul style="list-style-type: none"> • Number of years of engagement at Spayka: The attended employees have been working in Spayka for around 6-7 years; • Recruitment process: The employees learned about vacancy in Spayka through the announcement and passed interview with the management. Then they passed probation period before being employed; • Comparison of Spayka with other employers in the area (in terms of work conditions, salaries, benefits etc.): Spayka provides better working conditions compared with the other employers, namely better working environment, better working discipline, a bit higher salary which is paid in time (SG. timely payments of salary is an issue in Armenia); • Contract structures and its terms: They don't pay attention to their contract provisions, the only issue they know is that the salary fixed in the contract complies with the de facto paid salary; • Contract renewal process post annual appraisal: There is no annual appraisal of the contracts; contracts are made on permanent basis; • Communication to the workers about the wage raises and other benefits (e.g. bonus): In Ararat Fruit there is strong distribution of wages per positions. Among the interviewed people there were 3 sorters with the salary of 95,000 AMD, one senior sorter with the salary of 110,000 AMD and 3 workmen with the salary of 110,000 AMD. The salaries are the same for all the employees for the same position. There is no fixed/ documented bonus system, as far as I understood bonuses are paid on voluntaristic basis, decision is made on the top management level. Generally bonuses are linked with the performance, so they are paid mainly in harvesting period, when Ararat Fruit Workload is higher; • Workers' feedback on leaves policy and conditions of leaves to be availed: The employees are allowed to take leaves once a year 24 working days (SG. As requested by the legislation). The time for leave is arranged with the management; usually it is winter season, when the workload is relatively low. • The work schedule is 8 hours per day with one hour break from 9:00 to 18:00 (SG. as stipulated by the legislation). For the overtime work in Saturdays they get some additional compensation; • Drinking water and sanitation in their work areas: Drinking water is available at the processing facilities, bathrooms, change rooms are also available. Overall sanitation conditions are suitable; • Social security benefits provided by Spayka: The interviewed people are benefited from all the social security benefits envisaged by the legislation, namely compensations for maternity leaves, paid sick slips etc. No additional social security benefits are applied; • Specific conditions for female workers (if any): No specific conditions for female workers, except for restriction of female workers to undertake rough labour; • Health and Safety: Coverage during recruitment and joining. The workers passed induction training on health and safety during probation period; Annual medical check-up process: They pass induction and periodical medical check-up process; • Refresher trainings – type and content. Type- safety induction for personnel, Content-basics of health and safety, the content varies for different positions; • Type of incidents, first aid cases and accidents that have occurred: No major incidents so far, for the minor incidents they have first aid kits, the senior sorters and facility managers

are aware of first aid skills;

- Awareness of fire evacuation and emergency response: The interviewed people demonstrated awareness of fire evacuation and emergency response plans;
- Grievance Mechanisms and processes: The process is verbal, no documented grievance procedure. Grievances are raised in accordance with Spayka hierarchy, i.e. from sorters to senior sorters then to facility managers, then if suitable to Company's top management;
- Response time taken by Spayka for grievance redressal: No fixed time;
- Workers' participate in the town hall meeting with the Spayka Director: Yes, for example the senior sorter attended the discussion has participated such a meetings for couple of times;
- Worker concerns: General concerns, availability of work in the future (linked with the Company's business perspectives, increase of wages etc.);
- Suggestions for improvement: No specific suggestions are to be mentioned.

Meeting Attended By :

- Mr. Suren Gyurjinyan- ATMS Solutions- Social Expert;
- A heterogeneous group of 3 male workers (Ararat Fruit workmen) and 4 female (Ararat Fruit sorters) engaged in the Yerevan site for food processing and refrigeration.

Basic details	
Location: Shahumyan	Village: Shahumyan
District: Shahumyan	Date: 04.10.2017
Purpose of the visit: Community Perceptions about the operational warehouse	

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Key points Discussed :
<ul style="list-style-type: none"> • Frequency of inspection of the greenhouse premises and the elements covered in it: The municipal authorities have no legal power to inspect business facilities (SG. That is true, municipal authorities have enforcement power only for activities, which are linked with the municipal services (waste collection, street cleaning and sanitary, municipal transport etc.). He visits the greenhouse area from time to time just to provide support or advice; • Spayka's overall performance: Extremely positive, He said that Spayka constructed the greenhouse complex on the lands which had not been suitable even for pasture, Spayka is the biggest employer for the Community population (around 70 people), and moreover Spayka pays around 3,500,000 AMD annual local taxes to Community budget, which is around 10% of Community's total budget incomes. • Any issues with respect to noise, dust, air emissions, ground water requirements etc.: Spayka complex is far from Community's residential area, so no complains; • Any issues with respect to permits that Spayka needs and its compliance and feedback from authorities on Spayka: Local authorities are in charge only for construction permits, which have been applied by Spayka and issues by the rural municipality in due course; • Process and mechanisms of grievance redressal: There have not been grievances so far, if grievance raised the head of community is ready to be a mediator between the Community's population and Spayka.
Meeting Attended By :
<ul style="list-style-type: none"> • Mr. Suren Gyurjinyan- ATMS Solutions- Social Expert; • Mr. Serjik Babayan - the head of Shahumyan rural community

DISCUSSION WITH FEMALE WORKERS AT OPERATIONAL GREENHOUSE

<i>Basic details</i>	
Location: Operational Greenhouse near Shahumyan	Village: Shahumyan
District: Shahumyan	Date: 21 st September 2017
Purpose of the visit: Discussion on labour conditions	

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<i>Key points Discussed :</i>
<ul style="list-style-type: none"> • There are about 64 sorting facilities. Details as follows: <ul style="list-style-type: none"> ○ 8 USD/day for 8 hours per day, ○ 10 USD/day for 8 hours per day, • Each greenhouse produces about 40kg in every sq. m. of area, • The entire workforce was recently appointed; • Payment of wages, entitlements and overtime: There are some examples of Overtime being paid over and above the ordinary wages; however not at a premium rate but as per the same ordinary wage rate that is paid per hour. Overtime reportedly does not exceed 1 hour a month. The male workers in the greenhouses are engaged in loading and unloading work. Bonus is paid only to those workers engaged at the greenhouse and not to those engaged at the sorting units; • There is flexibility to choose the type of work; • The team was not aware of any instance when they were rejected; • Grievance mechanisms: There is no formal grievance redressal system in place. Generally the workers report their concerns to their team leaders who then reports to the agronomist or the shift leader. The usual cases of grievances are related to leaving early for home and taking leaves due to sickness; • Leave structure: The workers were aware of the maternity leave benefit. However, they were not informed about this provision by the management; • The new joiners undergo induction training that also includes the basic requirements of health and safety at work e.g. operating a lift, boilers etc. There were no cases of first-aid reported. The workers were not aware of the procedure to be followed during an incident of fire or any other emergency; • The overall working environment was good with a responsive management; • The key area of improvement is regarding the salaries.
<i>Meeting Attended By :</i>
<ul style="list-style-type: none"> • Mr. Suren Gyurjinyan - ATMS Solutions- Social Expert; • Ms. Rutuja Tendolkar and Ms. Alexandra Leman, ERM; • 10 Female and male workers at the greenhouse and sorting facilities.

Basic details	
Location: Spayka Orchard	Village: Alapars
District: Alapars Municipality	Date: 20 th September 2017
Purpose of the visit: Discussions on labour conditions	

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Key points Discussed :
<ul style="list-style-type: none"> • Use of Personal Protective Equipment (PPE) such as hats and gloves; • The working hours are between 9 a.m. and 6 p.m. with an hour of break in between. There is a provision of weekly offs; • There are special vehicles arranged for transportation of these workers; • The average monthly wages are 4,000 AMD per day for 8 hours of work. The overtime is paid at fixed value of 200 AMD for 2 hours of extra work. There is no practice of providing bonuses; • The workers were reportedly aware about the presence of snakes and insects in the area and the safety hazards posed by them; however were not aware of any other type of health or safety hazard at workplace. They reported cases of minor incidents such as cuts on fingers and no major accidents were reported; • The workers were not communicated about the provision of maternity leave. They were not aware that if pregnant they can be shifted to other department for work. As reported expecting women are not allowed to work during their pregnancy period in any department. Moreover, they are required to re-sign their contract with the employer after returning after maternity leave; • The workers are aware of Spayka's other rules and regulations; except for the grievance redressal mechanism. Furthermore the workers are not aware of whom to approach in case of any concern to be reported; • Rest rooms and lunch rooms: There is no provision for lunch rooms and the workers have their lunch in the open fields inside the site premises. Currently there is only 1 toilet at the site and there has been a request for a separate toilet near the fields; • The workers are not aware of company's leave policy. Currently the permission to avail a leave differs from case to case. There is a practice of taking seasonal breaks of 6-7 months during winter season every year; • Workers had requested the manager for facilities that are currently not offered to them. The manager has assured to respond to them after discussing the same with the management. The workers are satisfied with the work and optimistic about facilities being made available to them soon.
Meeting Attended By :
<ul style="list-style-type: none"> • A group of 6 female workers • Mr. Suren Gyurjinyan- ATMS Solutions - Social Expert; • Ms. Rutuja Tendolkar and Ms. Alexandra Leman, ERM

DISCUSSION WITH FARMERS ENGAGED IN ARARAT FRUIT PROCUREMENT (NUMBER 2)

<i>Basic details</i>	
Location: Municipality townhouse	Village: Narck Khasrashah
District: Narck Khasrashah	Date: 20 th September 2017
Purpose of the visit: Understanding Spayka's fruit and vegetable procurement procedures.	

Important Notice: This document, intended for internal use, provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval.

<i>Key points Discussed :</i>
<ul style="list-style-type: none"> • Spayka has leased a temporary storage facility where famers come to sell their produce; • Managers supply fruits from 600-700 households, • Spayka provides labour for harvesting and transporting the produce to warehouse at the municipal corporation, • The contract period of May to November indicates that some workers from Spayka are engaged on temporary basis; • Spring agronomies - Agents renew farms and open invitations for trainings in order to identify more problems related to the lack of plot; • Fertilisers only in case of need; • Prices of the products remain the same; • The key criteria to accept the products are their size and surface. However, products of other qualities are also accepted which is then sold to other companies; • There is no specific discrimination or favouritism between - ? • The average area is 8,000 m². For small (95%) the area ranges from 7,000 to 10,000 m². whereas for large (5%) it ranges between 2 ha and 4 ha. They were not able to provide for the cost, income, and margins; • 10,000 USD income and 5,000 USD profit in 7,000 m² of area of farming apricot, peaches, cherries, and plumes for which plots are divided due to the diversity in yields; • 10% of this is engaged in animal farming; • Supplying to Spayka since 2007; • No specific trends in cropping pattern were observed. Earlier majority of the land was used for cultivating vegetables that were sold in the local market. Present conditions are more suitable to grow fruit trees therefore a shift from wheat to fruits was observed. Fruits are now purchased at the local market or at subsistence level. Local village traders also purchase fruits; • Role of Municipal Corporation includes: Coordination, Proper information to farmers, provide a warehouse/space, and provide workshops. They don't play any role in payment of farmers; • The process of payment includes the following: <ul style="list-style-type: none"> ○ cash payments to farmers, ○ payment is made after the product is accepted, and ○ there are no famers' unions. • There are no formal grievance redressal mechanisms from Spayka and they approach the municipal authorities or brigadiers in case of any concerns.
<i>Meeting Attended By :</i>
<ul style="list-style-type: none"> • Municipal authorities • Groups of local farmers; • Mr. Suren Gyurjinyan- ATMS Solutions- Social Expert; • Ms. Rutuja Tendolkar and Ms. Alexandra Leman, ERM

Basic details	
Location: Near new greenhouse	Village: Nor-Kharberd
District: Yerevan	Date: 2 nd November 2017
Purpose of the visit: Overview of the socio-economic profile, dependence on Yerevan municipality land and perceptions about the Project.	

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Key points Discussed :
<p>Nor-Kharberd rural community of Ararat Region is the nearest settlement to the Project site outside Yerevan. The distance from the Project site to the nearest residential house is around 600 m. As of January 2016 de jure population of Nor-Kharberd was 7,046 residents (1,985 households). The prevailing majority of Nor-Kharberd residents are Armenians. Ethnic minorities are represented by few Yazidi families. The minority people are generally well integrated with Armenian people; they do not have difficulties to communicate in Armenian language. The minority people have all the rights and obligations of Armenians (for example voting right, property purchase right, etc.). Therefore ethnic minorities of Nor-Kharberd rural community are not classified into indigenous people.</p> <p>Agriculture is the most developed sector of the local economy. Nor-Kharberd population is engaged in orcharding, vine growing, vegetable farming and crop farming. Some of households are also engaged in cattle farming and poultry farming. There are no industrial facilities in the Community. Since the community is in close proximity to Yerevan some of residents engaged in the industrial (especially for non-qualified job positions) and service sectors.</p> <p>Mr. Kakosyan has already noticed some developments in the Project site; in the meantime he has not had information about the implemented project specifics. Mr. Sargsyan briefed about the implemented greenhouse complex and blue cheese construction projects. Then Mrs Principe asked whether within the Project site have ever been used by the Community residents. Mr. Kakoyan mentioned that since the Project site is located within Yerevan administrative boundaries, the Project site land was used exclusively by residents of Noragavit district of Yerevan. In the last couple of years the Project site land has been unused and has become a dump site. Mr. Kakosyan supported the Project implementation in terms of visual amenity of the area (no waste is disposed anymore) as well as in terms of development of the local economy (employment opportunities, development of the local service sector etc.). He committed to support the Project implementation. He also agreed to organize public discussions in the Community administration office if requested by Spayka/ADB.</p>
Meeting Attended By :
<ol style="list-style-type: none"> 1. Mr. Kamo Kakosyan, Head of Nor-Kharberd Rural Community, 2. Mrs Marife B. Principe - ADB Social Safeguards Officer, 3. Mr. Suren Gyurjinyan - ATMS Solutions- Social Expert, 4. Mr. Aram Sargsyan - Spayka, Technical Director

<i>Basic details</i>	
Location: Main settlement	Village: Nor-Kharberd
District: Yerevan	Date: 2 nd November 2017
Purpose of the visit: General interviews	

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<i>Key points Discussed :</i>	
<p>Mrs Mkrtchyan's family lives in a private house, located in close proximity to the Project site (around 650 m). Her family consists of 5 members, a wedded couple and 3 children. Her husband is disabled and is dealing with crop farming at the household plot. One of daughters is student, another one works in the small grocery in Yerevan. Her son left Armenia for temporary work in the Russian Federation.</p> <p>She was aware that the Project owner is Spayka, but was not aware about the Project specifics. Mr. Sargsyan briefed about the implemented greenhouse complex and blue cheese construction projects. She supported the Project implementation mainly in terms of employment opportunities; she particularly would like her son to come back and to work in Spayka facilities.</p> <p>She also concerned about the potential environmental hazards coming from implementation of the Project. She was informed by Mr. Sargsyan that the potential environmental impacts are under the consideration of Spayka, no significant environmental hazards/risks are expected.</p>	
<i>Meeting Attended By :</i>	
1.	Mrs Ruzanna Mkrtchyan, Resident
2.	Mrs Marife B. Principe - ADB Social Safeguards Officer,
3.	Mr. Suren Gyurjinyan - ATMS Solutions- Social Expert,
4.	Mr. Aram Sargsyan - Spayka, Technical Director

<i>Basic details</i>	
Location: Main settlement	Village: Noragavit
District: Yerevan	Date: 2 nd November 2017
Purpose of the visit: General discussions on socio-economic profile and perceptions towards the Project.	

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<i>Key points Discussed :</i>	
Noragavit is a private houses developed district located within Shengavit administrative district of Yerevan. Population is around 10,000 residents ¹	
Interview with Noragavit resident Mrs Karine Mkrtchyan	
Mrs Mkrychyan family owns a small flower shop near to Noragavit cemetery along the access road to the Project site. She told that there were many households cultivating land in the Project site, but they stopped cultivation in 2012, because Yerevan municipality acquired the land for some business development purposes. According to her, people had long term leasing agreement with Yerevan municipality, and when the date of leasing agreement was expired the municipality did not extend it, proposing cash compensations instead. Her family had also cultivated a small land plot in the area, but since their land plot was out of the acquisition zone no compensation was paid to them. As far as understood by the interviewers their land plot was alienated in 2015 within the ADB financed Sustainable Urban Development Investment Program (Artashat highway construction section).	
Group discussions with Noragavit residents	
Interviewers talked with the group of Noragavit residents, who are living in close proximity to the Project site along Artashat highway. There was also a family, which had an orchard in the Project site. According to the family head after leasing agreements of people cultivating lands in the Project site were expired, the municipality did not extend it, proposing cash compensations instead. All the land users got compensations calculated per square meter of used lands as follows: orchards - 1,600 AMD/m ² , croplands 800 AMD/m ² . Interviewed people complained about the land acquisition, but in the meantime stressed that they had agreed to stop cultivation and get compensations instead. That time Noragavit residents were informed by Yerevan municipality that the land alienation zone should be used for greenhouses construction and they were promised for employment priority in the constructed greenhouses. They in a sense expect this promise to be fulfilled by Spayka as greenhouse complex project owner ² .	
<i>Meeting Attended By :</i>	
1.	Mrs Marife B. Principe - ADB Social Safeguards Officer,
2.	Mr. Suren Gyurjinyan - ATMS Solutions- Social Expert,
3.	Mr. Aram Sargsyan - Spayka, Technical Director

¹ More data about Noragavit district will be gathered after meeting with Shengavit administrative district officials.

² Expectations of Noragavit residents were discussed with Spayka HR manager, who assured that dissemination of employment opportunities information in surrounding communities and giving employment priority to surrounding community residents is a part of Spayka recruitment policy.

<i>Basic details</i>	
Location: Yerevan City	Village: Yerevan City
District: Yerevan City	Date: 3 rd November 2017
Purpose of the visit: General discussions on socio-economic profile and perceptions towards the Project.	

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<i>Key points Discussed :</i>	
<p>Mr. Gyurjinyan thanked Yerevan city administration officers for meeting and presented the scope of meeting, which is to learn the background of municipality owned land plots donation to Spayka. As per Mr. Araqelyan Before collapse of the Soviet Union the land allocated for Spayka Greenhouse complex construction was used for agricultural purposes. It belonged to a communal farm (so called kolkhoz). After collapse of the Soviet Union communal farming activities in Armenia were stopped and the land became a property of Shengavit community of Yerevan (before 2009 Yerevan has a status of region divided to communities). Starting from early 90-th the land in the area was cultivated by Noragavit district residents, based on the so called land use "permissions" issued by Shengavit community. As noted by Mr. Araqelyan those "permissions" were not legally binding documents, therefore no leasing charge was envisaged for land users. Mr. Sargsyan stressed that initially there were around 250 households cultivating the land then the number of land users was dramatically reduced to around 4 households. After Yerevan city governance legal reforms in 2009, the land use permissions issued by Shengavit community were terminated.</p> <p>In 2012 the Government through its decision No 633-N dated by 03.05.2012 approved the proposal of Yerevan Mayor for land alienation through direct sale of Yerevan community owned lands for the purposes of greenhouses construction . To that end Yerevan municipality initiated process for payment of compensations to de facto users of land plots. As per the head of Shengavit administrative district compensations were provided to all the households, which had ever cultivated in the alienated area. The compensations were 1600 AMD/m² for orchards and 800 AMD/m² for crops. Even for households not cultivated at the compensation cut-off date compensations for crop were paid. All cultivating households agreed with the amount of compensations and signed sort of compensations receipt bill. As per Mr. Araqelyan the greenhouse construction investment project had not been implemented, so the land had become unused. In the beginning of 2017 Spayka applied to the Mayor of Yerevan to provide the land plot in the above mentioned area for greenhouse complex as well as blue cheese factory construction purposes. The Mayor of Yerevan submitted the relevant proposal to the Government. In June 2017 the Government through its Decision gave consent for donation of the Project site lands to Spayka LLC for greenhouse construction purposes. Then the Mayor of Yerevan adopted the relevant land donation decree and donation contract was signed between Yerevan municipality and Spayka LLC. As per Mr. Araqelyan the Project site land was donated specially for greenhouse construction investment project and Yerevan municipality is to monitor developments on the donated land plot to be in line with the investment program presented by Spayka. Mr. Araqelyan valued the Project implementation in terms of sustainable development of the Project surrounding area, especially Noragavit district of Yerevan. He noticed that the investment project to be implemented by Spayka might be considered as follow-up of ADB financed Sustainable Urban Development Investment Program, particularly construction of Artashat highway. Mr. Sargsyan committed to organize project public hearings for Noragavit residents, as well as to provide other support if requested.</p>	
<i>Meeting Attended By :</i>	
1.	Mr. Zaven Araqelyan - the head of legal department
2.	Mr. Aram Sargsyan - the head of Shengavit administrative district
3.	Mrs Marife B. Principe - ADB Social Safeguards Officer,
4.	Mr. Suren Gyurjinyan - ATMS Solutions- Social Expert,

<i>Basic details</i>	
Location: Yerevan City	Village: Yerevan City
District: Yerevan City	Date: 3 rd November 2017
Purpose of the visit: General discussions on socio-economic profile and perceptions towards the Project.	

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<i>Key points Discussed :</i>
<p>During the meeting Mr. Sargyan was requested to provide clarifications on some provisions of the applicable national labour legislation.</p> <p>How the minimal wages are regulated? What are the legal proceedings to change the minimum wage?</p> <p>The minimum wage is regulated by the Law «On minimal monthly wage» adopted in 17.12.2003. The minimal monthly wages are changed through the amendments of the given Law. The last amendment was adopted in 01.12.2014, which set the minimal monthly wage as per 55,000 AMD.</p> <p>Which public authorities are in charge for enforcement of labour legislation?</p> <p>Enforcement of labour legislation in terms of correct and timely payments of wages and social benefits is done by the Tax service. Control of compliance of employees working conditions with the requirements of the national labour legislation is done by the Health inspection under the Ministry of Health.</p> <p>Is the work of underage people prohibited in Armenia?</p> <p>Employment of the children under 14 is prohibited. Employment of children of 14-16 is allowed only in the event of consent of one of the parents, adopter or guardian³. There are some special provisions for the work time for underage employees⁴. As per the article 257 of the Labour Code the Government should adopt the types of work prohibited for underagers, pregnant and lactating women. This list is set by the Government Decision No 2308 dated by 29.12.2006. Underagers are subject for medical check-up before signing of labour contracts. Employees under 18 years of age must undergo a medical examination upon employment and with the defined regularity until they reach 18 years of age⁵.</p> <p>What are legal regulations for sick leaves?</p> <p>Sick leave benefits are not paid for the first working day, for the coming three working days sick leave benefits are paid by employer (which is not compensated), for the remaining sick leave period benefits are paid from the state budget. The maximum duration of paid sick leave is 3 months⁶.</p> <p>What are the legal regulations for investigations of accidents? Are there any regulations for compensations of employees?</p> <p>Occupational diseases and accidents are subject to mandatory registration by the employer (Article 261 of the Labour Code). The procedure for the registration of occupational diseases</p>

³ Article 4 of the Labour Code

⁴ Those limitations are: 24 hours per week for persons aged 14-16 and 36 hours per week for persons aged 16-18 (Article 140 of the Labour code)

⁵ Article 249 of the Labour Code

⁶ The Law «On temporary work inability benefits», Article 8

and official investigation is defined by the Decision of Government N 158-N dated by 23.03.2006.

As per the Article 234 of the Labour Code Employee's occupational diseases, injures or death at the workplace are subject of employer's legal liability.

Meeting Attended By :

- | | |
|----|--|
| 1. | Mr. Jora Sargsyan - the head of Labour and Employment Department |
| 2. | Mrs Marife B. Principe - ADB Social Safeguards Officer, |
| 3. | Mr. Suren Gyurjinyan - ATMS Solutions- Social Expert |

Annexure C

Environmental Sampling Results



ISO/IEC 17025:2005



N 0027-02

NAREK scientific-research closed joint stock com

Testing laboratory for physical-chemical and microbiological
0023, bld 4, str Getari, Yerevan, RA, phone +37410526527, e-mail: info@certification.am

Approved by Director
S. Davtyan
20.11.2017

TEST REPORT № ---

Name of the product

SAMPLES OF SOIL

- sample I-22(SAMPLES OF SOIL)
- sample II- 5(SAMPLES OF NOISE)
- sample III -4 (Air quality)
- sample IV-4 (Surface water).

Organization who presented samples

Date of samples presentation

06.11.2017

Parameter s, units	Test methods norm	SAMPLES OF SOIL																			
		Value of the index result																			
sample I-22 (SAMPLES OF SOIL)		N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13	N14	N15	N16	N17	N18	N19	N20
1	pH(KCl) GOST 26483-85	5.5-8.5	5.8	5.7	5.9	6.5	6.4	7.0	7.4	7.7	7.5	7.8	7.9	8.0	8.0	7.9	6.9	7.0	8.1	8.3	8.0
2	pH(H ₂ O) GOST 26483-85	3.5-6.5	4.4	4.8	5.2	4.1	3.9	4.0	4.3	4.9	5.2	5.4	5.5	5.4	5.7	4.9	5.6	5.8	6.0	6.0	6.2
3	Humic matter, g/l GOST R 54249-2010	10-30	7.0	6.5	5.5	5.5	7.0	8.2	8.1	7.0	6.5	5.4	6.6	4.4	3.4	2.4	7.7	8.5	9.5	10.0	8.0
4	(mineral forms), % GOST 26715-85	0.6	0.2	0.3	0.3	0.4	0.3	0.22	0.5	0.4	0.2	0.3	0.3	0.5	0.4	0.3	0.22	0.25	0.4	0.3	0.4
5	P(fluent), mg/kg GOST 26261-84	0.4	0.1	0.1	0.2	0.2	0.3	0.1	0.2	0.3	0.11	0.2	0.18	0.21	0.4	0.3	0.22	0.33	0.31	0.28	0.18
6	K(fluent), (KCl) GOST 26427-85	360	120	110	140	50	40	60	130	160	170	160	200	210	200	180	160	170	180	190	220

Report NO

Page 1 of 2

No.	mg/kg	Benzopyrene, mg/kg	MUK 4.1.1274-03	0.02	not detected	not detected	not detected	0.01	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected																						
																									Oil products, %	GOST R 54039-2010	10	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
																									Organochlorine pesticides, mg/kg	GOST R53217-2008	0.1	0.01	0.01	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
sample II- 5(NOISE)																																														
SAMPLES OF NOISE																																														
Value of the index																																														
result																																														
norm																																														
N1 N2 N3 N4																																														
N1 N2 N3 N4																																														
50.0 60.0 49.0 52.0																																														
sample III- 4 (Air quality)																																														
Parameters																																														
Air quality																																														
Value of the index																																														
result																																														
norm																																														
N1 N2 N3 N4																																														
N1 N2 N3 N4																																														
0.5 0.4 0.3 0.4																																														
2.5 1.8 2.3 2.4																																														
0.2 0.3 0.4 0.25																																														
10.0 8.0 12.0 0.40																																														
0.018 0.017 0.015 0.016																																														
0.032 0.025 0.030 0.028																																														

sample IV-4 (Surface water).		Surface water					
IV	Parameters, units	Test methods	Value of the index				
			norm	N1	N2	N3	N4
1	Biochemical oxygen demand, mgO ₂ /dm ³	RD 52.24.420-2006	2.0	1.5	1.4	1.6	1.8
2	Chemical oxygen demand, mgO ₂ /dm ³ , no more	GOST 31859-2015	15.0	11.0	10.0	12.0	13.0

Analysts signature _____
 S.Sargsyan
 L. Samvelyan
 Ts. Bilyan



Annexure D

Official Response from
Water Distribution
Company



Զուր

«Սպայկա» ՍՊԸ տնօրեն
պարոն Դ. Ղազարյանին
ՀՀ, ք.Երևան, 007, Արշակունյաց 252

Ելից/ԳԳ/ 10932 26.09.17

Երևան, 26 սեպտեմբեր, 2017թ.

Հարգելի պարոն Ղազարյան,

Ի պատասխան Ձեր 14. 09. 2017թ. թիվ 17/0571 գրության տեղեկացնում ենք, որ տարվա տարբեր ժամանակահատվածներում խմելու ջրի մատակարարումս իրականացվում է մի քանի տարբեր ջրաղբյուրներից: Մատակարարվող խմելու ջուրը համապատասխանում է ՀՀ-ում գործող խմելու ջրի որակին ներկայացվող սանիտարական նորմերի և կանոնների պահանջներին:

Գրությանը կից ներկայացվում է մատակարարվող խմելու ջրի քիմիկոմանդաբանական բաղադրությունը՝ ըստ ջրաղբյուրների և մատակարարվող խմելու ջրի քանակներն՝ ըստ ամիսների և ջրաղբյուրների:

Հարգանքով՝

Գլխավոր գործառնական տնօրեն
Գոռ Գրիգորյան

Պատասխանատու՝
Տեխնիկական տնօրեն
Վ. Բասոյան

Գտնարող՝ Մ. Քելլոյան
Հեռ. 055557876



Բայաստանի Բանրապետություն
ք. Երևան, 375025
Արուկյան փ. 66
Բեռ./Ֆաքս (+374 10) 56-93-57

66a St. Abovyan
375025 Yerevan
Republic of Armenia
Tel./fax (+374 10) 56-93-57

Ցուցանիշներ

№	Սկզբնաղբյուրներ	Հտուղ բավ	Համը բավ	Գույնը աստիճ.	Պղտոր. մգ/լմՅ	pH	Չոր մն. մգ/լմՅ	Ընդ. կաշտ. մմոլ/լմՅ	Օքսիդացում մգՕ/լմՅ	Ca մգ/լմՅ	Mg մգ/լմՅ	NH4 մգ/լմՅ
1	Արարատյան 3-րդ					7.2	631	7.3	0.72	3.92	3.38	չի*
2	Արարատյան 4-րդ					7.2	776	9	0.72	4.8	4.2	չի
3	Գառնի կապտած					6.8	96	0.9	0.64	0.5	0.4	չի
4	Ապարանի կապտ.					6.8	125	1.5	0.64	1	0.5	չի
5	Շոր-Շորի կապտ.					7	258	3.1	0.72	1.7	1.4	չի
6	Արզնի 1-ին կապտ.					7	277	3.1	0.56	1.9	1.2	չի
7	Արզնի 2-րդ կապտ.					7	288	3.3	0.56	2	1.2	չի
8	Արզակյան կապտ.					6.8	234	2.5	0.56	1.6	0.9	չի

*-ի նպատակով

Մասնատարբեր խմելու ջրի ֆանկտորանները ըստ ցուցանիշների և աճի մեթոդի

№	Ցուցանիշներ	Խառնուրդ	Ֆոսֆոր	Ազոտ	Սնուց	Կալիում	Մագնիզիում	Կալցիում	Սոդիում	Կարբոնատներ	Կլորիդներ	Սուլֆատներ	Կոբալտներ
1	Գառնի	80%	51%	39%	44%	48%	66%	25%	21%	32%	34%	21%	
2	Արզնի	3%	10%	13%	13%	10%	5%	6%	6%	13%	13%	13%	
3	Շոր-Շոր	2%	5%	5%	5%	5%	5%	10%	10%	3%			
4	Ապարան	15%	34%	43%	38%	37%	24%	44%	18%	47%	5%	8%	
5	Արզակյան												
6	Արարատյան	100%	100%	100%	100%	100%	105%	100%	100%	100%	100%	100%	
Կամենը													

Յուշակ

Մասնակցությունը ինժեներական ծախսերի վճարումը համապատասխանում է գնումային պայմանագրերին:

NO2 մգ/մ³	NO3 մգ/մ³	Cl մգ/մ³	SO4 մգ/մ³	Fe մգ/մ³	Cu մգ/մ³	Mo մգ/մ³	As մգ/մ³	Pb մգ/մ³	Zn մգ/մ³	F մգ/մ³	Mn մգ/մ³	Al մգ/մ³	Ba մգ/մ³	Ni մգ/մ³	Hg մգ/մ³	Cr մգ/մ³
	13.3	75	206.2	0.01	չի	չի	չի	չի	չի	0.38	չի	չի	չի	չի	չի	չի
	14.6	90	220.4	0.02	չի	չի	չի	չի	չի	0.44	չի	չի	չի	չի	չի	չի
	5.3	7	5.3	0.05	չի	չի	չի	չի	չի	0.22	չի	չի	չի	չի	չի	չի
	9.07	7	9.3	0.05	չի	չի	չի	չի	չի	0.28	չի	չի	չի	չի	չի	չի
	8.08	25	17.5	0.05	չի	չի	չի	չի	չի	0.42	չի	չի	չի	չի	չի	չի
	13	30	15	0.01	չի	չի	չի	չի	չի	0.35	չի	չի	չի	չի	չի	չի
	13.8	31	16.2	0.02	չի	չի	չի	չի	չի	0.36	չի	չի	չի	չի	չի	չի
	9.2	25	13.2	0.05	չի	չի	չի	չի	չի	0.42	չի	չի	չի	չի	չի	չի

Վաճառք
54%
13%
5%
28%
100%

Translated from Armenian into English

“Spayka” LLC
To Mr. Kh. Atayan
/address: Yerevan, Artashat highway 37/2/

/N 930/ 31.08.17
August 31

Yerevan 2017,

Subject: Provision of technical conditions

Dear Mr. Atayan

In response to your application dated 22.08.2017, attached you can find the technical condition /KO660/ for water connection and waste water design provided by “Veolia Djur” company. Based on this, it is necessary to order the preparation of design cost estimate documents in a company having a relevant license and submit to “Veolia Djur” company for the purpose of coordination and technical supervision.

At the same time it should be mentioned that the construction of the new system and gratuitous transfer of its ownership right to the Republic of Armenia is performed in the manner prescribed by RA Legislation.

Attached 1 page.

Sincerely:

/signature exists/

Executive Director
Gor Grigoryan

Responsible person:
M. Mirzoyan
Tel.: 011 59 03 86

RA YEREVAN “VEOLIA DJUR” CJSC
N 9350
31.08.2017

66a St. Abovyan
375025 Yerevan
Republic of Armenia
Tel./Fax (+374 10) 56-93-57

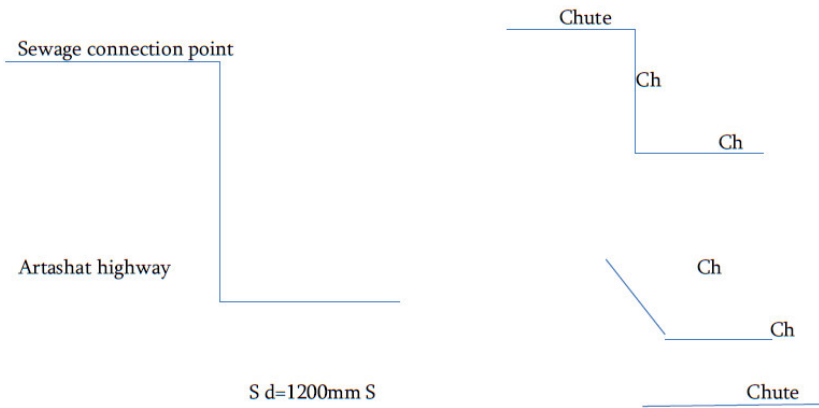
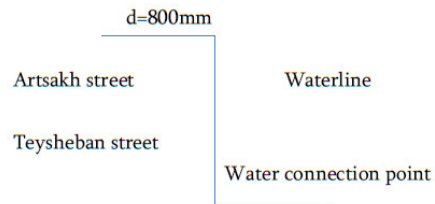
Approved by:
"Arevelq" IT Director
/signature and stamp exist/ K. Ohanyan
31.08.2017

Technical condition N KO-660
(for water connection and/or/ waste water design)

Yerevan, Artashat highway 37/2
/territory address/

"Spayka" LLC
(subscriber's name, surname)

077 07 79 18
(tel. number)



Connection type Description	Waterline	Sewage line
Location	Artsakh – Teysheban crossroad	Passing adjacent to Artashat highway
Diameter, pressure, type	D=800mm, P=3.0atm. steel	D=1200mm
Connection point	Artsakh – Teysheban crossroad	Adjacent to Artashat highway
Connection diameter	In accordance with the design	
Diameter, class and type of water meter		
Other requirements	An inspection pit should be constructed for the water metering junction	An inspection pit should be constructed in the sewage connection point
Water supply schedule	Day and night	

For the performance of the construction works, the preparation of the design cost estimate documents should be ordered in a company having the relevant license and coordinate them with “Veolia Djur” CJSC.

Technical supervision of the construction works is performed by “Veolia Djur” CJSC at the discretion of the applicant or by an organization included in the list published on its official website at the expense of the applicant. Connection of the new constructed system to the water supply and waste water systems is performed by “Veolia Djur” CJSC at the expense of the applicant.

Water supply and waste water services shall be performed after signing a Contract for the provision of water supply and waste water services by “Veolia Djur” CJSC.

These technical conditions are valid for 1 (one) year from the day of signing otherwise they are subject to revision.

When performing earth works during the construction works, it is necessary to acquire permits/consents of the head of the community, other legal and/or interested bodies or people.

“Arevelq” IT Deputy Director	/signature exists/	<u>G. Meliksetyan</u>
“Shengavit” site Chief Engineer	/signature exists/	<u>V. Mkrtchyan</u>
Chief Specialist	/signature exists/	<u>V. Mkrtchyan</u>

31.08.2017

Translated by Knarik Hakobyan