



Armenia: GrCF2 W2 - Yerevan Bus Project (Phase I)

ENVIRONMENTAL AND SOCIAL DUE DILIGENCE REPORT

Rev02

**Consultancy Contract №
C44610/12951/87449**

November 2020



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Prepared for:

European Bank for Reconstruction and Development

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In cooperation with



Ecoline
International

November 2020

Document Preparation and Issue:

Version	Description of status	Prepared by	Reviewed by	Issue Date
Rev01	First draft of Environmental and Social Due Diligence Report	Dr. Artak Ter-Torosyan Dr. Suren Gyurjinyan	Dr. Maia Gachechiladze-Bozhesku	14.11.2020
Rev02	Draft of Environmental and Social Due Diligence Report with description of sanitary protective zones for bus depot	Dr. Artak Ter-Torosyan Dr. Suren Gyurjinyan	Dr. Maia Gachechiladze-Bozhesku	30.11.2020

List of Abbreviations

ACM	- Asbestos Containing Material
ADB	- Asian Development Bank
AMD	- Armenian Dram
BOD	- Biochemical Oxygen Demand
CJSC	- Close Joint Stock Company
CNG	- Compressed Natural Gas
DD	- Due Diligence
DIO	- Dangerous Industrial Object
EBRD	- European Bank for Reconstruction and Development
EEA	- European Economic Area
EHS	- Environmental, Health and Safety
EIA	- Environmental Impact Assessment
EMEP	- European Monitoring and Evaluation Programme
E&S	- Environmental and Social
ESAP	- Environmental and Social Action Plan
ESDD	- Environmental and Social Due Diligence
ESHS	- Environmental, Social and Health Safety
ESIA	- Environmental and Social Impact Assessment
ESP	- Environmental and Social Policy
EU	- European Union
FS	- Feasibility Study
GET	- Green Economy Transition
GHG	- Greenhouse Gases
GDP	- Gross Domestic Product
HN	- Hygienic Norms
HPF	- Hazardous Production Facility
HR	- Human Resources
ILO	- International Labour Organisation
MASL	- Meter Above Sea Level
ME	- Ministry of Environment
MPC	- Maximum Permissible Concentrations
MSDS	- Material Safety Data Sheet
NCTS	- National Center of Technical Security
NSS	- National Statistical Service
NTS	- Non-Technical Summary
OHS	- Occupational Health and Safety
PM	- Particulate Matter
PPE	- Personal Protective Equipment
PR	- Performance Requirements
RFID	- Radio Frequency Identification

RA	- Republic of Armenia
RACN	- Republic of Armenia Construction Norms
SEP	- Stakeholder Engagement Plan
SN	- Sanitary Norms
SPZ	- Sanitary Protective Zone
SR&N	- Sanitary Rules and Norms
SNCO	- State Non-Commercial Organization
ToR	- Terms of Reference
TLV	- Threshold Limit Value

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0. Introduction

0.1 Background

The European Bank for Reconstruction and Development (the "EBRD" or the "Bank") is considering provision of a sovereign loan of up to EUR 25 million to Armenia to be on lent for the benefit of "Yerevan Bus" Close Joint Stock Company ("CJSC"), which will operate bus network (the "Company" or the "Client"). The Bank will finance immediate purchase of up to 100 Compressed Natural Gas ("CNG") low-floor buses (standard 12 m). The construction of a new bus depot, the upgrade of the currently operated Nor Nork (Jrvej) bus depot, and CNG refuelling station is envisioned by the "New Bus Network and Integrated Tariff and Ticketing System" Project ("Project") and will be co-funded by Asian Development Bank ("ADB"). These activities are incorporated into Phase 1 of the Project.

Yerevan Municipality has invited technical consultant to deliver the detailed design for the brand-new bus depot at Arshakunyats Avenue together with the major upgrade of the Nor Nork (Jrvej) bus depot currently operated by "Yerevan Bus" CJSC. The design works for both locations shall start in September 2020 and will need 6 months to deliver the drawings and supply requirements for the tender on construction works. The entire investment package is co-funded by ADB. For details see section 2.4.2.

Currently the urban transport system of Yerevan City consists of buses, trolleybuses, minibuses and metropolitan.

In total, there are 39 bus lines in the city, where 400 diesel/CNG, 7.5-8.5 m buses operate on a daily basis. The operating companies are 17; out of which one is the municipal owned company "Yerevan Bus" CJSC and the 16 are private operators. As per the 2018 data, the buses carried 82.9 million passengers, which is 42.5% of the total passenger traffic for that year. There are 66 minibus routes in the city, where the total fleet is equal to 1,150 units, mainly running on diesel and CNG fuel. 35 private companies provide minibus transportation services in the city; over 2018, the passenger flow of minibuses was 88.8 million, which is 45.4% of the total passenger traffic for that year.

It is envisaged that Phase 2 of the Project will be implemented later on. It will include: the purchase of up to 250 electric buses, trolleybus (including battery trolleybus, in motion charging, street charging and/or hybrid CNG, comprising articulated 18 m, standard 12 m and/or midi 9 m buses), with the related bus depots' construction/ renewal¹ and integrated ticketing system, relevant details of which (project components, including fleet composition) to be defined in this study. The pre-Feasibility Study for Phase 2 will be launched soon.

The Bank has engaged ATMS Solutions Ltd. (Armenia) (the "E&S² Consultant" or "Consultant") to carry out an Environmental and Social Due Diligence (the "ESDD") of the Client's existing operations and environmental and social assessment of Phase 1 of the Project (the "Assignment").

¹ADB is planning to finance depot reconstruction of four main bus/trolleybus depots, the scope of which shall be determined during this study, and with which the scope of the EBRD supported project shall be fully integrated.

²Environmental and Social

0.2 Objectives

The main objectives of the Assignment are to:

- Identify and assess the potentially significant existing and future adverse E&S impacts (including gender) associated with the Company's current operations and the proposed Project, assess compliance with applicable legislation and the EBRD Environmental and Social Policy ("ESP") (2019) and the Performance Requirements ("PRs").
During the E&S audit, the Company's current operations in terms of compliance with national legislation and permitting requirements, the relevant provisions of the EBRD ESP, PRs, and pertinent EU environmental standards must be evaluated. The E&S audit also should pay attention to possible E&S historical issues, such as potential contamination of soil and/or groundwater or land acquisitions disputes.
- Determine the measures needed to prevent or minimise and mitigate the potential adverse impacts.
- Identify potential E&S opportunities, including those that would improve the E&S sustainability of the Project and/or the associated current operations.
- Determine whether further E&S studies are required, focusing on specific risks and impacts, such as climate change, human rights, disability, gender equality and / or vulnerable groups.

0.3 Scope

The Project is classified as belonging to Category "B" according to the ESP (2019). To this end, the Consultant is required to undertake the following tasks:

- Review the Company's environmental, health, safety, road safety, human resources and public interaction policies, management systems and procedures and assess their compliance with the EBRD's PRs.
- Conduct the E&S audit of the existing operations and facilities, review the environmental, health and safety (EHS) management performance and procedures.
- Identify any material EHS risks and liabilities associated with assets that need to be resolved prior to the Bank committing itself to financing.
- Identify and assess the existing and the Project-related E&S impacts and risks.
- Identify a green economy transition ("GET") potential of the Project.
- Describe and characterize the relevant E&S baseline commensurate with the risks posed by the Company's activities and the Project.
- Prepare a high-level Gender Impact Assessment to focus on gender and inclusion impacts and risks and the economic inclusion potential of the Project (with a focus on women, people with disabilities, and youth).
- Develop an ESDD report, including Compliance table, Stakeholder Engagement Plan (SEP), Environmental and Social Action Plan (ESAP), and Non-Technical Summary (NTS).

As part of the ESDD study, the Consultant has completed a media search about the Project, Client, sector, country, etc. to determine the extent to which there has been relevant news coverage and, if so, whether any of the issues require additional verification during the study.

0.4 Source of Information

The information/data sources that have been used to prepare this ESDD report are set out below:

- Project ToR,
- Documents/data submitted by the Client in reply to the Consultant's request for information, dated 30.04.2020,
- Information/documents available on the web-site of Yerevan municipality associated with the existing and future bus network,
- New Bus Network and Integrated Tariff and Ticketing System, Tariff and Ticketing Proposals, 2019,
- Draft (Technical) Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020,
- Reforms of Yerevan Transport System in the Context of Low-carbon Development Policy, Vazgen Harutyunyan, Yerevan 2020,
- Available maps, layouts, reports, etc. related to the Company and Project components,
- Feedbacks from Project stakeholders.

1. Methodology and Limitations

1.1 Methodology

To successfully perform the comprehensive ESDD, the following tasks have been undertaken:

- The Project kick-off call and correspondence involving the representatives of the EBRD, Yerevan municipality and E&S Consultant in April-May 2020,
- Submission of the EBRD E&S Due Diligence questionnaire to Yerevan municipality on 21 April 2020 (in English),
- Preparation and submission of a pre-audit Request for Information to the "Yerevan Bus" CJSC on 21 April 2020 and to Yerevan municipality on 08 May 2020 (in Russian),
- Site visits to "Yerevan Bus" CJSC Nor Nork (Jrvej) depot on 29.04.2019 and 19.06.2020 as well as to Charbakh bus depot on 10.06.2020, field audits and face-to-face individual interviews with the on-site staff (for the list of the interviewees refer to **Annex 1**),
- Review of surveys, calculations, assessments and other documents relevant to the Project and current bus routes (for the list of reviewed documents refer to **Annex 2**),
- Review of Technical Due Diligence Report and other associated documents prepared by Technical consultant,
- Review of documentation provided by Yerevan municipality and "Yerevan Bus" CJSC as well as collected by the E&S Consultant during the site visits/audits,
- Assessment of compliance with the EBRD's PRs and relevant Sub-sectoral E&S Guidelines using a checklist approach and expert judgment method. As part of the review, consideration has been given to whether the current activities and operations, as well as the Project, complies with the requirements of the applicable national and EU legislation.

This ESDD report summarizes the review of applicable local and international E&S requirements, findings of the site visits and interviews, overview of the Project components and "Yerevan Bus" CJSC activities and operations, E&S audit results, and PR compliance assessment.

1.2 Limitations and Assumptions

The E&S Consultant's conclusions rely on the information and documents provided by Yerevan municipality and "Yerevan Bus" CJSC.

Due to the COVID-19 restrictions and limitations, only few interviews have been performed with the representatives of Yerevan municipality and "Yerevan Bus" CJSC. Therefore, the E&S Consultant had to rely on the information provided by the top management of "Yerevan Bus" CJSC during the site visits.

As during this E&S study the elaboration of the Project Phase 1 detailed design documentation was still in process, only a preliminary E&S assessment of the Project components (mainly the construction of new Arshakunyats depot and the update of Nor Nork (Jrvej) bus depot) was conducted. The impacts and opportunities that will appear in the course of new 100 buses (to be purchased within the Project Phase 1) operation were considered and discussed.

2. Project Description

2.1 Current public transport system of Yerevan³

2.1.1 Public transport network of Yerevan

Transportation services are provided to the population of Yerevan by buses, trolleybuses, minibuses and the underground ("Metropolitan" or "Metro"). Taking into account the recent tendency of growing number of vehicles in the capital, the City authorities adopted the policy of increasing the volume of big capacity rolling stocks (buses and trolleybuses) and ceasing operation of minibuses. The public transportation services in Yerevan are provided by the following companies that are coordinated by the Department of Transport of Yerevan Municipality ("Municipality"):

- "Yerevan Metro after Karen Demirchyan" CJSC,
- "Electric Transport of Yerevan" CJSC,
- "Yerevan Bus" CJSC, and
- "Yerevantrans" CJSC.

The fare for a single journey on all modes of transport is currently 100 AMD, with the exception of trolleybuses, where the fare is 50 AMD. These fares relate to services within the city. There are some transportation services provided by the Municipality for the surrounding villages at different fares. There are also a large number of inter-urban bus services organised and supported by the Republic of Armenia ("the RA") government, where the fare varies. These services, however, theoretically do not offer a service within the City and are only for passengers boarding or alighting outside the municipal boundary. There is also a new service to the "Zvartnots" International Airport organised by the RA government, with a fare of 300 AMD.

2.1.2 Bus transportation

Currently, there are 562 buses actually operated on 39 routes in Yerevan. About 400 buses come out on route daily. The bus routes are maintained by "Yerevan Bus" CJSC and 16 private companies. To increase the bus stock in 2012-2017, 434 buses of different makes were imported to the capital (the last consignment was in 2017 and included three "Hyundai" buses). In 2019, the number of buses increased on the intercity itineraries and the total number of transported passengers was 84.3% which is by 1.6% more than the previous year's figure. So, the volume of bus transportation in total transportation volumes is 43.2%. However this number is still lower than desirable: the efficiency of bus itinerary operation remains low. To ensure regular transportation services to the population, it is necessary to continue increasing the number of buses and exclude the minibuses.

2.1.3 Minibus transportation

64 minibus routes operate in Yerevan. The routes are served by 1,120 minibuses of different types. The mentioned routes are served on a contractual basis by 36 private organizations. The volumes of minibuses have decreased recently. In 2019, 85.3 million passengers were transported by minibuses, which is less than in 2018 by 3.5 million or 3.9%. However, the volumes of transportation by minibuses are still high - 43.8% of total passenger traffic. The replacement of

³<https://www.yerevan.am/en/transport-department/>

minibuses with buses is vital. Thus, this process is to be implemented within the frames of the installation of the new itinerary network.

2.1.4 Overground electric transport

There are 51 trolleybuses on the balance of the "Electric Transport of Yerevan" CJSC, including 5 "Renault", 12 "Skoda" and 34 "LIAZ" models. The company operates five trolleybus routes, 40-42 units run on routes daily. In 2019, the number of passengers transported by trolleybuses decreased. In 2019, 5,216.1 thousand passengers were transported by trolleybuses, which is 6.8 thousand or 0.1% passengers less than in the previous year. The share of trolleybus transportation is small, i.e., about 2.7%. Considering the importance of electric transport in intercity transportation, particularly from the environmental point of view, some renovations related to cable systems, the rolling stock stations, modernization of the stocks and stations have been undertaken.

2.1.5 Underground (Metropolitan)

The Yerevan metropolitan has 10 stations, the length of the line is 12.1 km, the rolling stock includes 45 wagons. 26 wagons are operated on weekdays (13 rolling stocks), and at weekends the number is less - 24 wagons (12 rolling stocks). A significant growth in the number of passengers using the Metro has been noticed recently, largely due to improved quality of transportation. In 2019, the number of people transported by the Metro was 19,993.2 thousand, which is 1,520.3 thousand more or 8.2% more compared to 2018. The share of the Metro traffic have also increased in the total volumes of transportation. The growth makes 10.3%. Further sustainable growth of the Metro passenger traffic is possible only if new stations are constructed and operated.

2.1.6 Public transport stops

856 public transport stops are operated in Yerevan, and bus-stop cabins and signs are installed at 352 of them. 504 stops are equipped only with signs. The arrangement of the new itinerary network provides for both, the renovation of old bus-stops and construction of new ones. In 2019, four bus-stops were furnished with modern, wrought iron cabins.

2.1.7 Transportation service for people with disabilities

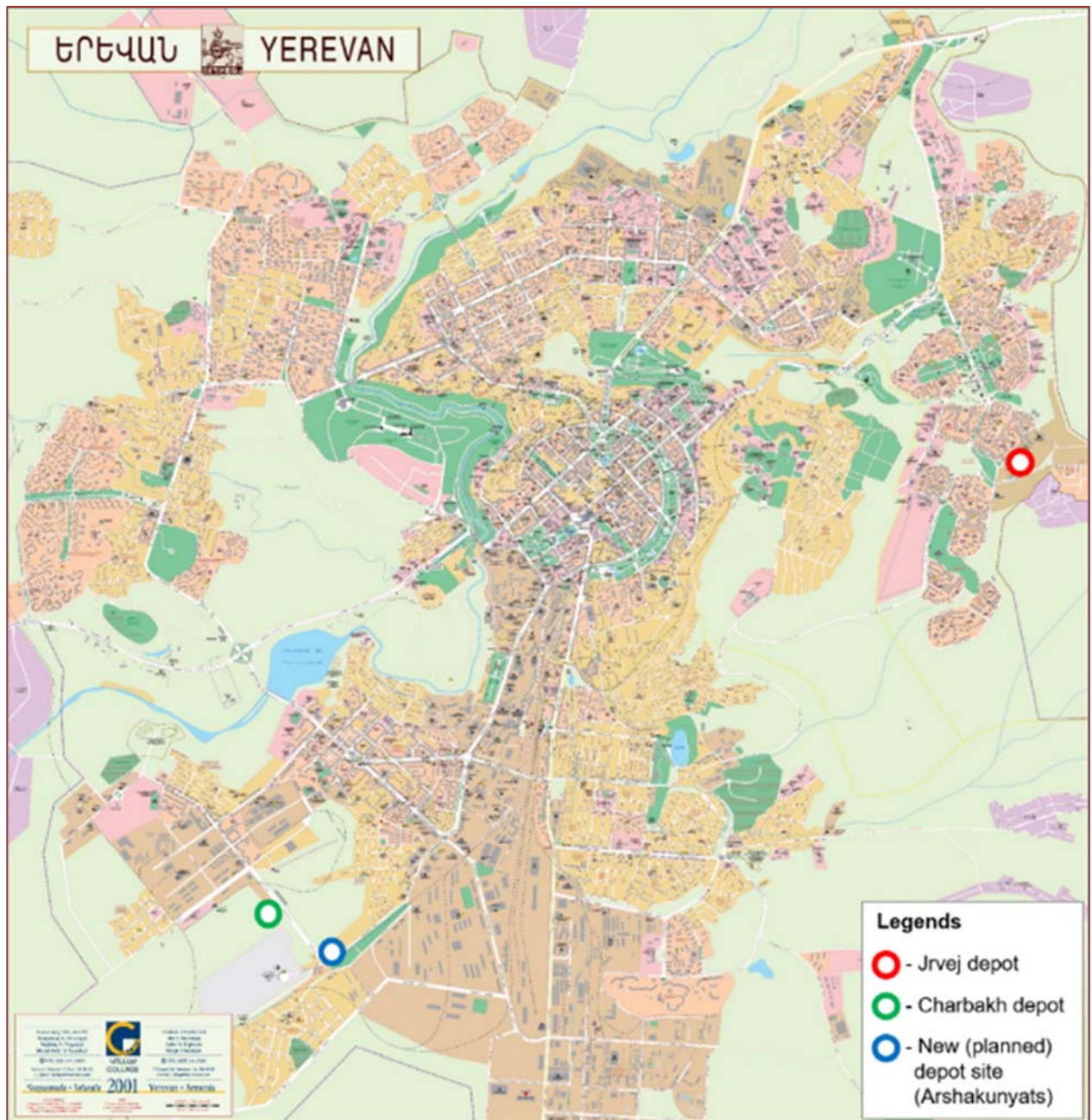
To ensure the access of people with locomotor disabilities to city buses, 25 "Higer" buses equipped with special wheel-chair elevators (**Figure 2-1**) were imported from China in 2014-2017. The buses are owned by "Yerevan Bus" CJSC and are operated on 4 routes (№№ 14, 20, 22, and 28). There are special signs on the front and side parts of the buses with the phone numbers (011 674428, 011 674460) by which one can get informed about the time when the buses will approach the bus-stop. Within the framework of the programme providing availability of parking areas for people using wheelchairs, special areas were separated for them in 101 paid parking areas. In accordance with Decision №182-N of the Municipality's Council of Elders, dated December 25, 2019, the process of providing free tickets for parking spaces to the people with wheelchairs started and 102 tickets were given out for 2020.

Figure 2-1. Buses equipped with special wheel-chair elevators



2.2 Location of the Project facilities

The Project area and facilities are confined to the area of Yerevan city and Zvartnots airport, which is geographically located in Armavir region, however administratively is within the boundaries of Yerevan. The map of the Project area and facilities is presented below in **Figure 2-2**.

Figure 2-2. Map of Yerevan and location of the Project facilities (existing and planned)

2.3 New bus network and Integrated tariff and ticketing system

Within the scope of public transport system reformation in Yerevan and considering the vital need of forming a new and efficient itinerary transport network, the municipality of Yerevan has initiated the "New Bus Network and Integrated Tariff and Ticketing System" Project and commissioned "WYG International" consulting company to undertake the assignment⁴ made of two main tasks:

- (i) Design a new public transport network for the City, and
- (ii) Develop a new integrated tariff and ticketing system.

⁴financed by Asian Development Bank

After these two tasks are implemented, the final outcome will be a new public transport system for the City. The final report was submitted to the Municipality in January 2019.

The proposed new transport network of Yerevan comprises 47 routes (hereafter referred as "New Network"):

- **11 core routes** - typically served by articulated buses with peak frequency 5-10 minutes,
- **30 feeder routes** - targeted for current midibuses with peak frequency 4-10 minutes,
- **5 trolleybus routes** - preserving the current routing and vehicle sizes, but frequency increased, and
- **Airport Shuttle** - with flat frequency of one bus per hour during the day.

The New Network concept represents roughly a 2/3 reduction in the current number of routes in operation. This reduction meets the outlined objective of simplifying the network to make it easier for users to understand.

To satisfy the demand of the New Network routes, 820 units would be needed in the peak operation:

- 488 midibuses (8 m long),
- 29 buses (12 m long),
- 216 articulated buses (18 m long), and
- 87 trolleybuses (12 m long).

It is obvious that there is not so much space left for the standard size buses (12 m). However, the core routes with a 10-minutes peak frequency can be easily converted to the standard buses with positive impact on the passenger waiting times. Simply said, such route would see the peak frequency of 6-7 minutes with equal capacity offered by articulated buses, which is still in line with the industry standards for the core routes. It should be noted that the Phase 1 routing plan has been inspired by the New Network principles and recommendations to the extent possible, however the operational parameters were adjusted to reflect the overlap with the current network.

2.4 Overview of Phase 1 (subject of this Assignment)⁵

2.4.1 Proposed and terminated bus routes within Phase 1

The 100 CNG low-floor buses to be purchased within Phase 1 of the Project are recommended⁶ to be introduced into the five bus routes, from which three routes have been selected from the New Network (№№ 3, 5 and 7) and the rest two are current routes №28 and №33 (**Table 2-1**). The daily peak vehicle requirement equals to 87 vehicles, with 13 spare buses left in the depot.

Table 2-1. Bus routes overview

Name	Route description	Route length, km	Duration, min	Speed, km/h
Route 3	South West Block B2 - Nor-Nork Block 9	43.1	144	18
Route 5	South West Block A1 - Zeytun	37.8	133	17

⁵Description of Phase 1 and Phase 2 is presented in Chapter 0

⁶Draft Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020

Name	Route description	Route length, km	Duration, min	Speed, km/h
Route 7	Raffi str. × Babajanyan str. junction - Jrvej	39.4	118	20
Route 28	Huysi Block - Nor-Nork Block 8	40.7	136	18
Route 33	Davitashen 4th Block - Kharberd village	48.6	146	20

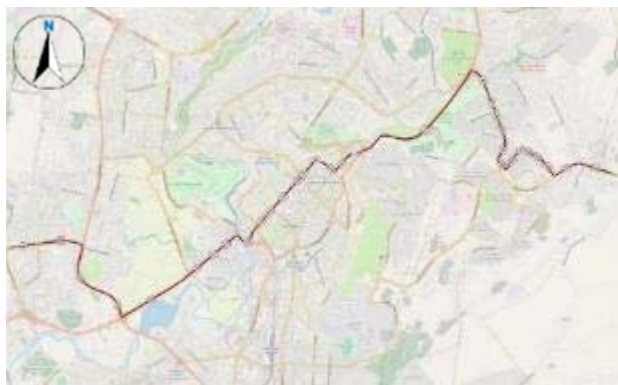
Figure 2-3. Schematic view of bus routes selected for Phase 1



Route 3 (South West Block B2 - Nor-Nork Block 9)



Route 5 (South West Block A1 - Zeytun)



Route 7 (Raffi str. × Babajanyan str. junction - Jrvej)



Route 28 (Huysi Block - Nor-Nork Block 8)



Route 33 (Davitashen 4th Block - Kharberd village)

The indicators of vehicle kilometres (**Table 2-3**) have been calculated for the selected five bus routes on the basis of route length for the individual round trip and the number of trips per day (**Table 2-2**) linked to the route frequency and average speed proposed.

Table 2-2. Summary of round trips per day (numbers)

Route	Weekday	Saturday	Sunday
Route 3	144	87	81
Route 5	110	84	78
Route 7	110	84	78
Route 28	80	56	53
Route 33	80	56	53
Total	524	367	343

Table 2-3. Summary of vehicle kilometres per day (km)

Route	Weekday	Saturday	Sunday
Route 3	6,200	3,735	3,477
Route 5	4,156	3,173	2,947
Route 7	4,339	3,313	3,077
Route 28	3,258	2,281	2,159
Route 33	3,888	2,721	2,576
Total	21,841	15,223	14,236

During the calculations of annual vehicle kilometres, the seasonal variations should be taken into account. The selected five routes of Phase 1 perform around 6.1 million vehicle kilometres, as summarised below in **Table 2-4**.

Table 2-4. Seasonal variations for annual vehicle kilometres

Month	Seasonal ratio ⁷	Vehicle kilometres
January	0.655	387,239
February	0.717	423,893
March	0.813	480,649
April	0.822	485,970
May	0.875	517,304
June	0.834	493,064
July	0.788	465,869
August	0.768	454,045
September	0.966	571,103
October	1.093	646,186
November	0.984	581,745
December	1.000	591,204
Total		6,098,271

There are 87 buses needed for weekday operation, while the weekend need drops to 61 units out of 100 buses in the fleet (**Table 2-5**). The margin provides reasonable space for the vehicle maintenance and repairs.

⁷Source of seasonal ratio: New Bus Network and Integrated Tariff and Ticketing System, WYG, 2019

Table 2-5. Summary of peak vehicle requirement per day (bus)

Route	Weekday	Saturday	Sunday
Route 3	24	15	15
Route 5	18	14	14
Route 7	16	12	12
Route 28	14	10	10
Route 33	15	10	10
Total	87	61	61

The implementation of Phase 1 requires reducing the parallel and overlapping services together with the introduction of the new Project routes. This approach ensures that the Project routes will satisfy the passenger demand in line with the proposed frequency and capacity.

In total, there were 17 bus and minibus routes identified to have a significant overlap with the proposed Project routes. However, this figure also includes the current bus routes 3, 5, 28 and 33, operated by "Yerevan Bus" CJSC and planned to be replaced by the Project routes with almost identical routing. If these four routes are omitted, the list of routes to be terminated includes 1 bus and 12 minibus routes.

Table 2-6 provides the overview of routes to be terminated, including the number of round trips per weekday that has been observed in the latest survey (*these figures need to be checked with the up-to-date records of Yerevan Trans as soon as the sample data is provided and analyzed (currently in process)*)⁸.

Table 2-6. Overview of terminated routes

Route category	Route number	Route length, km	Weekday vehicle, km	Comments
Bus	3	42.3	2,456	100% of this route overlaps with Route 3
Bus	5	27.7	1,831	88% of this route overlaps with Route 7
Bus	28	40.7	2,444	100% of this route overlaps with Route 28
Bus	33	48.6	2,430	100% of this route overlaps with Route 33
Bus	55	18.4	184	73% of this route overlaps with Route 33
Minibus	3	16.3	2,208	69% of this route overlaps with Route 28
Minibus	6	38.9	3,060	92% of this route overlaps with Route 3
Minibus	12	21.2	2,772	87% of this route overlaps with Route 28
Minibus	16		1,860	66% of this route overlaps with Route 3
Minibus	34	31.7	3,373	80% of this route overlaps with Route 3
Minibus	43	20.3	3,394	80% of this route overlaps with Route 5
Minibus	55	13.9	1,503	77% of this route overlaps with Route 7
Minibus	58	26.6	4,691	85% of this route overlaps with Route 28 81% of this route overlaps with Route 3
Minibus	63	36.0	3,634	71% of this route overlaps with Route 3
Minibus	66	27.2	3,078	98% of this route overlaps with Route 3
Minibus	70	24.7	2,765	74% of this route overlaps with Route 5
Minibus	71	25.0	3,829	79% of this route overlaps with Route 3

⁸Draft Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020

2.4.2 Supporting facilities and assets

2.4.2.1 Arshakunyats bus depot

The brand-new bus depot will be located on the currently unused plot of land at the intersection of Arshakunyats Avenue and Shirak Street in the southwestern part of the city. It is expected that the capacity of the depot will be between 350 and 400 buses in the long-term perspective. Based on field surveys and investigations and design review of the sketch design prepared previously, the main output of the detailed design will be the layout and sizing of the depot facilities, layout and sizing of parking area, circulation plan, locations for entrances and exits (with respect to traffic flow), accessibility for persons with disabilities or other special needs, environmental safeguards, equipment and also design for the bus stop adjacent to the depot. The layout of new Arshakunyats depot is given in **Figure 2-4** (Master-plan of new Arshakunyats depot is presented in **Annex 5**).

The depot design will elaborate in detail:

- 1) Entry/exit area (with an entry gate with a check post including an Radio Frequency Identification ("RFID") connection for buses, a single entry/exit gate separate from the buses for staff and visitors) and perimeter fencing,
- 2) Refuelling station (separate area for conventional vehicle fueling and for CNG refuelling with enough quantity of refuelling dispensers),
- 3) Vehicle washing area (mechanized washing in enclosed washing area with number of needed wash bays),
- 4) Bus parking area (at-grade, designated bays for each bus, include time-fill CNG dispensers for night-time refuelling) and inspection area (app. 2 pits),
- 5) Maintenance area (app. 9 pits) and supervisor offices (in close proximity to the maintenance area for supervisory staff, enclosed with protection from noise, but with visual sight-lines of the maintenance area),
- 6) Workshops (separate workshops for various components and activities - engines, gears, painting, upholstery, tire resolving, electrical equipment etc.),
- 7) Parts storage room (separate sections, one storage area for CNG vehicles and one for diesel vehicles),
- 8) Tools storage room (systematically organize, store, and secure work tools),
- 9) Administrative offices,
- 10) Control room and fare management room,
- 11) Driver and conductor facilities (the number of lockers for at least two full shifts of drivers and conductors, assuming a depot fleet size of 400 buses; quality male and female water closets, cafeteria and kitchen, rest and recreational facilities, laundry room etc.),
- 12) Drainage and sub-drainage systems,
- 13) Sewage and sanitation system,
- 14) Electrical supply facilities (electrical connections, transformers, and electric infrastructure for lighting, equipment, etc.; universal power supply),
- 15) Telecommunication lines and existing utilities,
- 16) Landscaping and signage.

Figure 2-4. Layout of Arshakunyats depot at conceptual design stage⁹

The design of the depot will be also sustainable and environmental-friendly in terms of choice of construction materials. The whole complex will be barrier-free and accessible to all, including persons with disabilities.

A circulation plan will be developed with a focus on main pathway for buses:

- Secure gate entrance,
- RFID connection log,
- Visual check at the inspection area,
- Maintenance area or refueling,
- Washing and parking area,
- Light maintenance area for routine maintenance or heavy maintenance area in case of serious issue,
- Exit through separate gate.

2.4.2.2 Nor Nork (Jrvej) bus depot

The detailed design of depot investment programme also includes the design of the refuelling facility for the CNG buses at the existing "Yerevan Bus" CJSC Nor Nork (Jrvej) depot located in the eastern part of the city. Nor Nork (Jrvej) bus depot will house the new fleet of 100 CNG buses in the initial period when the Arshakunyats depot will be under construction. This will allow the new buses to begin operation when they arrive in Yerevan, until the Arshakunyats site is completed and the fleet can then be moved there. The design of CNG filling stations will cover on the portion of the depot to include CNG filling dispensers as well as on a new entrance for the

⁹Draft Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020

buses to access and egress from the facility. The design of updated Nor Nork (Jrvej) depot is presented in **Figure 2-5**.

Figure 2-5. Layout of Nor Nork (Jrvej) depot conceptual design¹⁰



Both conventional and mobile filling stations should be considered and costed in the design stage. For conventional stations, compressor units will need to be installed and connected into the pipeline, which is available at the depot. For this depot site, only fast-fill dispensers shall be utilized, given the limited spatial arrangements.

2.4.3 Key findings of Phase 1

- The 100 CNG low-floor buses to be purchased within Phase 1 of the Project will be introduced into the five bus routes, from which three routes have been selected from the New Network (№№ 3, 5, and 7) and the remaining two are current routes №28 and №33. The daily peak vehicle requirement equals to 87 vehicles, with 13 spare buses left in the depot.
- The annual vehicle kilometres of the new fleet are 6,098,271 km for the bus routes №№ 3, 5, 7, 28 and 33, while the annual vehicle kilometres of the existing routes that will be replaced by the new routes equal to 20,267,858 km, of which 5,625,541 km refer to buses (28%) and 14,642,317 km refer to minibuses (72%).
- 17 routes are to be terminated (12 of them are minibus) to support the operational plan for Phase 1.
- The terminated routes are served by 50 buses and 139 minibuses. The withdrawn 50 buses will be reused on other minibus routes to replace the obsolete minibus fleet.

¹⁰Draft Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020

- The Arshakunyats bus depot will be constructed in the southwestern part of Yerevan with the expected capacity of 350-400 buses.
- Nor Nork (Jrvej) bus depot will be upgraded to house the new fleet of 100 CNG buses in the initial period when the Arshakunyats depot will be under construction. This will allow the new buses to begin operation when they arrive in Yerevan, until the Arshakunyats site is completed and the fleet can then be moved there.
- Both bus depots will be equipped with CNG gas refueling stations.

2.5 Project alternatives

The zero or "do nothing" option is not considered a potential alternative to the Project as the latter was initiated by Yerevan municipality in 2016 in order to renew the public transport system in the City, including new bus network and Integrated tariff and ticketing components. Therefore, the main alternative options to the Project discussed during the Feasibility Study are based on:

- 1) Improvement/optimization of the bus routes, including adjustment of overlapping routes and termination of duplicating routes,
- 2) Variations (in number) among the midibuses (8m long), buses (12m long), articulated buses (18m long) and trolleybuses (12m long) within the City public transport system,
- 3) Feasibility of routes to be operated by minibuses,
- 4) Locations, equipment and capacities of bus depots (rehabilitation of operating "Charbakh" bus depot instead of construction of new Arshakunyats one).

The mentioned alternative options and their economic, environmental and technical feasibility are detailed by the Technical consultant within the Feasibility Study. The final option for public transport system was presented by the Technical consultant (WYG International Limited) and approved by Yerevan municipality in 2019. Phase 1 of the Project, i.e. purchasing of 100 CNG low-floor buses, construction of new Arshakunyats and update of operating Nor Nork (Jrvej) bus depots, is a part of Yerevan new public transport network system and is not considered as a separate component that can have alternatives.

3. Legal and Regulatory Framework

This section determines E&S legal and regulatory framework applicable for the current activities and operations of the Client and the Project, including relevant RA laws and regulations, ratified international conventions/treaties, EU Directives, EBRD Performance Requirements (PRs), pertinent sub-sectoral guidelines, etc.

3.1 Applicable national legislation

The list of E&S legislative acts, which could be applied during the E&S audit and assessment process, alongside their descriptions are summarized in **Table 3-1**.

Table 3-1. List of applicable E&S legislation

Laws	Description
Water Code (2002)	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

Laws	Description
	<p>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>The quality of surface water in Armenia is monitored in accordance with the principles of EU water framework directive. This system is defined by the RA Government Decree №75-N (dated 27.01.2011) and applied since January 2013.</p>
Land Code (2001)	<p>The Land Code defines the main directives for use of the lands in the RA. The land fund of Armenia is classified in according with their designated purposes (categories) as follows: (1) agricultural land, (2) settlement land, (3) industrial, mining and other production designation land, (4) land for energy, transport, communication, utility infrastructure facilities, (5) land for specially protected areas, (6) special designation land, (7) forest land, (8) water land, and (9) reserve land.</p> <p>The procedure for providing land that are under the State ownership or community is defined by the RA Government.</p>
Code on Underground Resources (2011)	<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 environmental impact assessment and expert examination (2014)	<p>According to the Law there are two types of documents, which are subject of environmental impact assessment (EIA) and expert examination. These documents are: (i) Framework Document - project document (policy, strategy, concept, scheme of utilization of natural resources, program, master plan, urban development document), which are likely to affect the environment; (ii) Design Document - technical report, feasibility study and construction-engineering design of intended activity.</p> <p>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 A, B and C categories depending on their impact on the environment.</p> <p>According to the Law, the urban development activities with construction area of 1,500 m² and more are classified as "C" category projects and are subject of one (preliminary) stage EIA and expert examination.</p> <p>The procedure for public notification and discussions is given in the RA Government Decree №1325-N dated 19.11.2014.</p>
Law on waste (2004)	<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>

Laws	Description
	<ul style="list-style-type: none"> - RA Government Decree №47-N on defining of procedure for waste passportization (19.01.2006), - RA Government Decree №2291-N on approval of procedure for waste generation norms and their disposal limits (09.12.2005), - RA Order №342-N of Minister of nature protection on approval of list of industrial and consumption wastes generated in the territory of the Republic of Armenia (26.10.2006).
Law on atmospheric air protection (1994)	<p>The purpose of Law on Atmospheric Air Protection is to define main principles of the RA 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> <ul style="list-style-type: none"> - RA Government decree №160-N dated 02.02.2006 defines maximum permissible concentrations of air pollutants in atmosphere of residential areas.
Law on flora (1999) and Law on fauna (2000)	<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> <p>The RA Government decrees №71-N and №72-N on approval of RA Red Book of animals and RA Red Book of plants correspondingly define the biology of threatened (rare, threatened, endangered, vulnerable) species of fauna and flora as well as their quantity, habitats and variety.</p>
Law on special protected areas of nature (2006)	<p>The Law on special protected areas of nature regulates the special protected areas of the RA 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 (1998)	<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 (1992)	<p>This Law defines the legal, economic and organizational basis for provision of sanitary and epidemiological security of the RA 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>

Laws	Description
Law on State regulation of technical safety (2005)	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 RA, as well as the system of technical safety provision and regulates the relationship connected with technical safety. The Law also defines main types of dangerous industrial objects, which should be registered and controlled by the National Technical Safety Center ("NTSC").
Labour Code (2004)	The Labour Code 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.
Law on fire safety (2001)	The Law on fire safety regulates relations of the State bodies and local self-governing bodies of the Republic of Armenia, organizations/companies and citizens in fire safety-ensuring sphere and presents definition of the basic ways of the State policy working out and implementation, the regulation principles and mechanisms of their implementation in fire security ensuring sphere as well as provision of RA populations with qualitative and reliable fire protection system. The requirements of the Law are supplemented by the Fire safety rules (approved by the Order №595-N of the RA Minister of territorial administration and emergency situations (2015)).
Economic damage calculation procedures	<p>The calculation of the damages on atmospheric air, land and water resources caused as a result of economic activities is carried out using the following regulations:</p> <ul style="list-style-type: none"> - Procedure for evaluation of damage on atmospheric air caused as a result of economic activities (approved by the RA Government decree №91-N), - Procedure for evaluation of damage on land caused as a result of economic activities (approved by the RA Government decree №92-N), - Procedure for evaluation of damage on water resources caused as a result of economic activities (approved by the RA Government decree №1110-N).
Tax code (2016)	The Tax Code regulates relations regarding the taxes applied in the Republic of Armenia and fees provided for by the Code, including rates/tariffs, calculation and reporting on environmental taxes and nature resources utilization payments.
Law on road safety provision (2005)	The Law regulates relations regarding the road safety, establishes the principles and the directions of State policy in the field of traffic safety and the legal basis for traffic safety provision as well as defines the power and responsibilities of State bodies, local self-governments and other participants of traffic.

Laws	Description
Sanitary and Hygienic Norms and Rules	<ul style="list-style-type: none"> - SN №2-III-11.3. Noise in workplace, residential and public buildings and in the residential construction areas, - SN №2.2.4-001-05. Microclimate of the production facilities, - HN №2.2.4-006-06. The hygienic norms of the electromagnetic industrial frequency field in the workplace, - HN №2.2.4-009-06. The hygienic norms of the vibration in the workplace, residential and public buildings, - HN (without number). The hygienic norms of the air and ambient air in workplace, - SR&N (without number). Work hygienic classification by the harmful and hazardous aspects of working environment and by the parameters of workload and work intensity, - RACN 22-03-2017. Artificial and natural lighting.

3.2 Relevant international conventions

The RA 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 **Table 3-2** is not exhaustive, but is limited to the E&S conventions and agreements signed by the country that are relevant to the Project

Table 3-2. Selected international conventions and agreements on environmental and social issues

International Convention or Protocol	Description
The Convention on Biological Diversity (1992)	<p>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.</p> <p>Signed by Armenia in 1993.</p>
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 2002.</p>
Paris Agreement under the United Nations Framework Convention on Climate Change	<p>The aim of the agreement is to decrease global warming through:</p> <p>(a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;</p> <p>(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;</p>

International Convention or Protocol	Description
Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998)	<p>(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.</p> <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>
ILO Conventions	<p>The RA has ratified 29 ILO conventions including the following fundamental conventions:</p> <ul style="list-style-type: none"> • Forced Labour Convention, 1930 (Ratified 17.12.2004), • Freedom of Association and Protection of the Right to Organise Convention, 1948 (Ratified 02.01.2006), • Right to Organise and Collective Bargaining Convention, 1949 (Ratified 12.11.2003), • Equal Remuneration Convention, 1951 (Ratified 29.07.1994), • Abolition of Forced Labour Convention, 1957 (Ratified 17.12.2004), • Discrimination (Employment and Occupation) Convention, 1958 (Ratified 29 Jul 1994), • Minimum Age Convention, 1973 (Ratified 27 Jan 2006), • Worst Forms of Child Labour Convention, 1999 (Ratified 02.01.2006).

3.3 The EBRD requirements

The main requirements to EBRD clients are described in EBRD ESP (2019)¹¹ and its PRs. Based on the review of the available data/ information, the following EBRD PRs are outlined as applicable to the Project:

- PR1: Assessment and Management of Environmental and Social Risks and Impacts,
- PR2: Labor and Working Conditions,
- PR3: Resource Efficiency and Pollution Prevention and Control,
- PR4: Health, Safety and Security,
- PR5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement,
- PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources,
- PR7: Indigenous People (*Note: This PR is not applicable, as no indigenous peoples have been identified in the Project area*),
- PR8: Cultural Heritage (*Note: This PR can be applicable only for the land-plot envisioned for the new Arshakunyats bus depot construction, however, it hardly will occur as the area is under the multi-year manmade impact*),
- PR9: Financial Intermediaries will not apply to the Project; and
- PR10: Information Disclosure and Stakeholder Engagement.

¹¹<https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html>

The provisions of EBRD's Access to Information Policy (2019)¹² are also considered when preparing this ESDD report.

3.4 Good international practice

A useful reference has been the EBRD's Sub-sectoral Environmental and Social Guidelines: Building and Construction Activities (2010)¹³ that contains typical E&S risks related to construction, operation, maintenance and decommissioning of facilities/buildings. In addition, EBRD has developed a number of guidance notes /guidelines to support its clients in implementing the EBRD E&S Policy (2019); these relate to employment; resettlement; forced labour; gender issues, non-discrimination and equal opportunity; workers' accommodation: processes, standards and others.

The International Finance Corporation's General EHS Guidelines (2007) have been used as a source of specific requirements in terms of resource use, waste and pollution, and OHS hazards/risks, as well as of reasonable measures that are deemed achievable in new facilities.

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) is used to some extent as a reference source.

¹²<https://www.ebrd.com/what-we-do/strategies-and-policies/access-to-information-policy.html>

¹³<https://www.ebrd.com/who-we-are/our-values/environmental-and-social-policy/tools-for-financial-intermediaries/construction.html>

4. Environmental and Social Audit of "Yerevan Bus" CJSC Facilities and Operations

4.1 Introduction

The ESDD has been performed by the E&S Consultant on two sites managed by "Yerevan Bus" CJSC: Nor Nork (Jrvej) and Charbakh bus depots (**Figure 2.2**). The management unit of the Company is located in the administrative building of Nor Nork (Jrvej) bus depot. The data/documents about the activities and operations of "Yerevan Bus" CJSC have been provided by the Company's managers. Some additional information regarding the EHSS activities, processes and performance were obtained during the walk-over and visual observation of the sites/facilities. The relevant snapshots took during the site visits are either used in this report to support the ESDD statements or stored as evidence.

4.2 Facilities, assets and infrastructure

The Company's buses are maintained on two sites/facilities: (i) Nor Nork (Jrvej) and (ii) Charbakh bus depots (see **Figure 2-2**). The depots are located in the north-east and south-west of Yerevan, respectively. The direct distance between the depots is 12 km, while the shortest road route is 16 km (**Figure 4-1**). Layouts and general views of both depots are presented in **Figure 4-2**.

Figure 4-1. Location of Nor Nork (Jrvej) and Charbakh bus depots and a distance between them

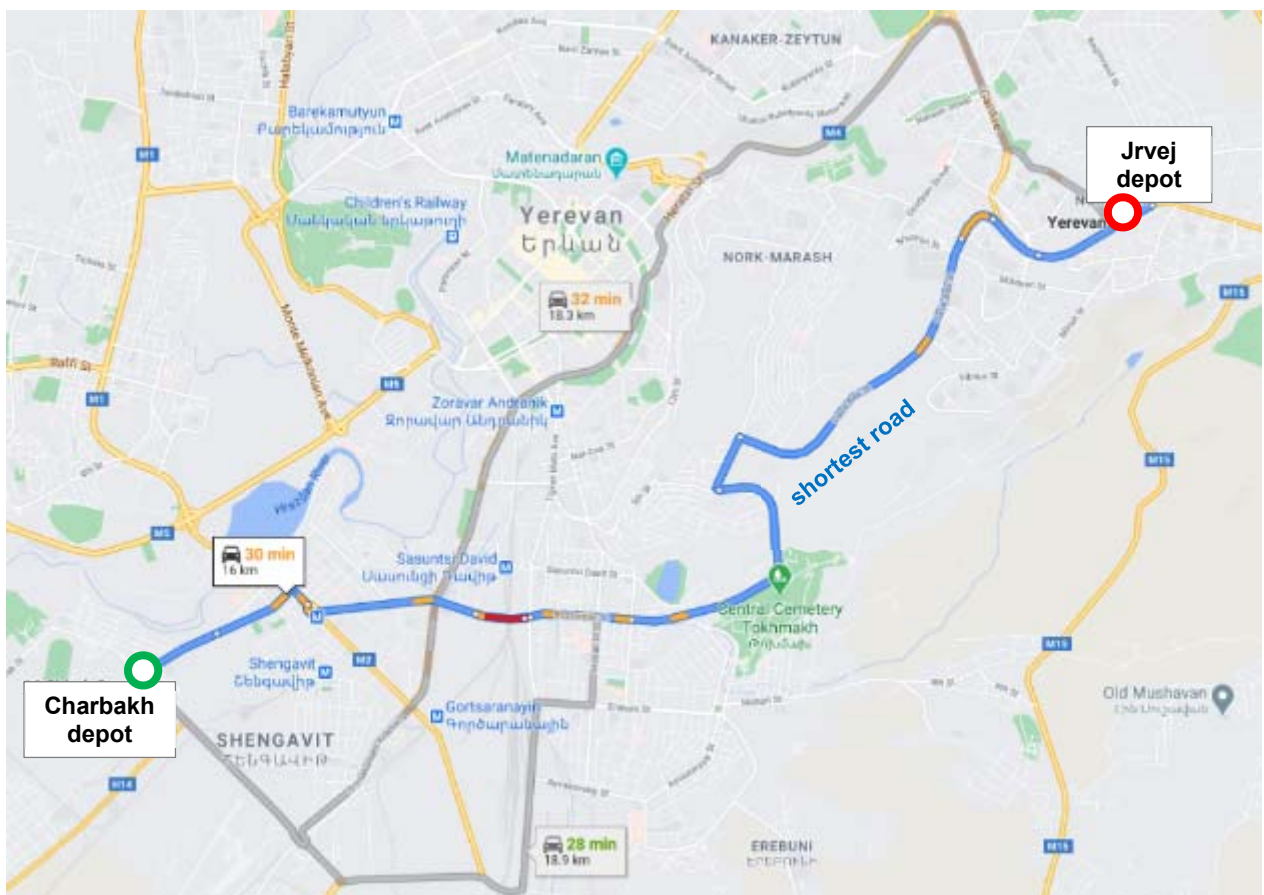


Figure 4-2. Layouts and views of Nor Nork (Jrvej) and Charbakh bus depots*Layout and general view of Charbakh bus depot**Layout and general view of Nor Nork bus depot*

The territory of Charbakh bus depot is the property of "Yerevan Bus" CJSC. The territory of Nor Nork (Jrvej) bus depot, including industrial and administrative buildings (1.42 ha) and land-plots (4.54 ha), is the property of "Yerevantrans" CJSC, but was rented by "Yerevan Bus" CJSC according to the real estate renting contract dated 13.02.2012 for 10 years (till 13.02.2022). It should be noted that there are some infrastructure facilities located in the rented area, the operation of which requires relevant permits/registrations from the authorized state bodies (see **Sections 4.6.4** and **4.7.5**).

4.3 Organizational structure, capacity and commitment

The bus transport services in Yerevan city are provided by 17 companies, of which one is the municipality-owned company "Yerevan Bus" CJSC and 16 are private operators, selected based on tenders organized and conducted in accordance with the RA Government Decree №762 dated 16.08.2001 "On Approval of Procedure for the Selection of Companies Conducting Regular Passenger Transportation Services in the Republic of Armenia".

About 400 buses come out on the route daily. 20 bus routes with approx. 200 buses are serviced by "Yerevan Bus" CJSC and the other 18 routes - by 16 private companies. From 562 buses operating in the City, 372 ("Higer", "Hyundai", "Bogdan" and "PAZ") belong to "Yerevan Bus" CJSC. 83 buses (79 "Bogdan" and 4 "PAZ") are technically out of operation and could not be repaired. The average age of used buses is 9.2 year.

The overall supervision over the activities of "Yerevan Bus" CJSC is the responsibility of Transport Department of Yerevan municipality, while the ongoing management of the Company is performed by its director.

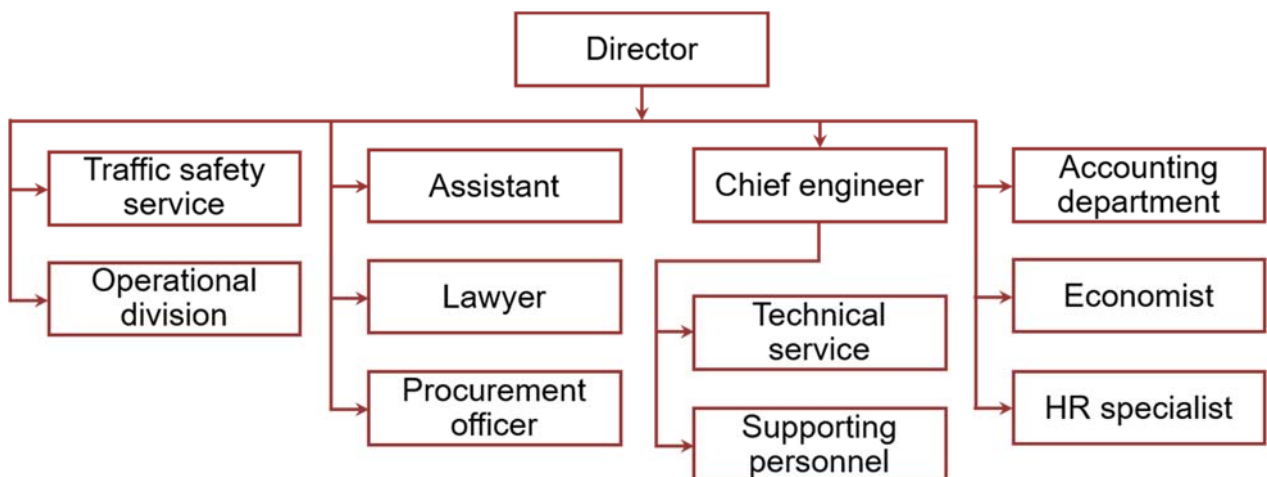
According to the staff schedule, 117 employees (without bus drivers) work at "Yerevan Bus" CJSC, including:

- Management unit (director, chief engineer, referent, HR specialist, lawyer, economist and procurement officer) - 7 employees,
- Accounting department - 8 employees,
- Operational division (flagmen, route supervisors, etc.) - 26 employees,
- Traffic safety service - 5 employees,
- Technical service (technicians, welders, electricians, vulcanizers, motorists, washmen, oilmen, refuellers, storekeeper, etc.) - 50 employees, and
- Supporting personnel (turners, electrician, janitors, watchmen, etc.) - 21 employees.

The buses of "Yerevan Bus" CJSC are operated by 232 drivers.

The latest revision of the organizational structure of "Yerevan Bus" CJSC, as approved by the Company's director on 28.12.2017, is presented in **Figure 4-3**.

Figure 4-3. Organizational structure of "Yerevan Bus" CJSC



According to Article 244 of the RA Labour Code, an employer should secure a proper working environment for workers, in particular, safe and harmless conditions (heating, lighting, ventilation, noise, vibration, electromagnetic radiation and other factors). According to Article 243 of the RA Labour Code, an employer is obliged to ensure the protection of OHS of workers. The same article also declares that based on level of hazard of a site, the employer can engage a qualified health and safety unit or fulfill the OHS functions itself. This requirement was partly implemented by Order №13-L of the Company dated 19.09.2016, according to which the overall responsibility for the provision of employees' OHS conditions was laid on Chief Engineer.

There are no assigned persons to be responsible for day-to-day management of environmental, social and health safety ("ESHS") issues at "Yerevan Bus" CJSC. Some health and safety requirements are implemented by Traffic Safety Service engineers as part of their duties. Daily medical check-ups of bus drivers are performed by the medical personnel (3 nurses) working within the Traffic Safety Service.

Some environmental functions, such as reporting to the relevant state bodies, are delegated to other units of "Yerevan Bus" CJSC. As an example, the quarterly environmental taxes and nature

resources utilization payments are calculated and submitted to the Tax Service by the Accounting Department of the Company.

The human resources within the Company are managed by HR specialist, whose obligations and responsibilities are defined in a Job Description (approved on 18.05.2020).

Recommendations for sections 4.2-4.3

- 1) Appoint a person to be responsible for "Yerevan Bus" CJSC environmental, social and health safety ("ESHS") performance. The appointed person (ESHS specialist) should work under the overall supervision of the Company's Director and in close cooperation with Chief Engineer.
- 2) Conduct specific training on environmental, social and OHS management and best practices for the ESHS specialist in specialized institutions.
- 3) Provide awareness raising to the Company's managers and specialists regarding the ESHS requirements to be followed when performing their professional duties.

4.4 EHSS policies and management

There are no internationally recognized environmental, social or OHS management systems implemented in "Yerevan Bus" CJSC. The Company has no ESHS policy documents defining the objectives, commitments and responsibility of top management in the relevant domains. As a result, no programs/plans to ensure the performance of ESHS management systems are developed and implemented within the Company.

Although the certification of environmental and OHS management systems in accordance with the ISO 14001 and ISO 45001 standards, respectively, is not a formal EBRD's requirement, the EHS activities and practices of "Yerevan Bus" CJSC should at least commensurate with the level of its environmental and OHS risks/issues. The key elements of ISO management systems standards, such as planning, support, operation, evaluation and improvement shall be implemented.

Recommendations for section 4.4

- 1) Develop and implement the key elements of environmental and OHS management systems in "Yerevan Bus" CJSC. As a reference, rely on the requirements of ISO 14001 and ISO 45001.
- 2) As the first step it is recommended to: (i) define the EHS objectives as well as main commitments and responsibilities of the Company and document them in environmental and OHS policies, (ii) elaborate and perform the EHS plan/program targeted at the implementation of environmental and OHS objectives and commitments
- 3) Provide training and awareness raising to the Company's personnel in relation to the requirements of environmental and OHS management systems standards.

4.5 Organizational capacity and commitment

Despite the fact that the Company's Chief Engineer bears the overall responsibility for OHS issues, as explained above, there are no specifically-trained specialists with a due background to manage day-to-day OHS activities, as well as environmental and social issues. Some environmental functions/roles are delegated to other units of "Yerevan Bus" CJSC. Yet, it can be stated that

currently, the Company does not have sufficient capacities, including trained personnel, to effectively manage the ESHS activities.

Generally, no sufficient capacities to identify and implement the applicable E&S requirements of national legislation are observable within "Yerevan Bus" CJSC.

The roles and responsibilities of the Company's personnel are defined in the relevant Job Descriptions. These Job Descriptions were elaborated in 2020 for most of the professions that exist in the Company. The Consultant was informed that the Company's workers get familiarized with their duties, obligations and responsibilities.

Recommendations for section 4.5

- 1) Identify and evaluate the environmental aspects/impacts that relate to the activities and operations of Yerevan Bus" CJSC (this is also required by ISO 14001:2015 standard, clause 6.1.2).
- 2) Identify and document the environmental obligations and requirements related to the environmental aspects of Yerevan Bus" CJSC (this is also required by ISO 14001:2015 standard, clause 6.1.3).
- 3) Define methodologies and procedures on how to implement the requirements of the applicable obligation stemming from the national and EBRD's E&S requirements.

4.6 Environmental performance and management

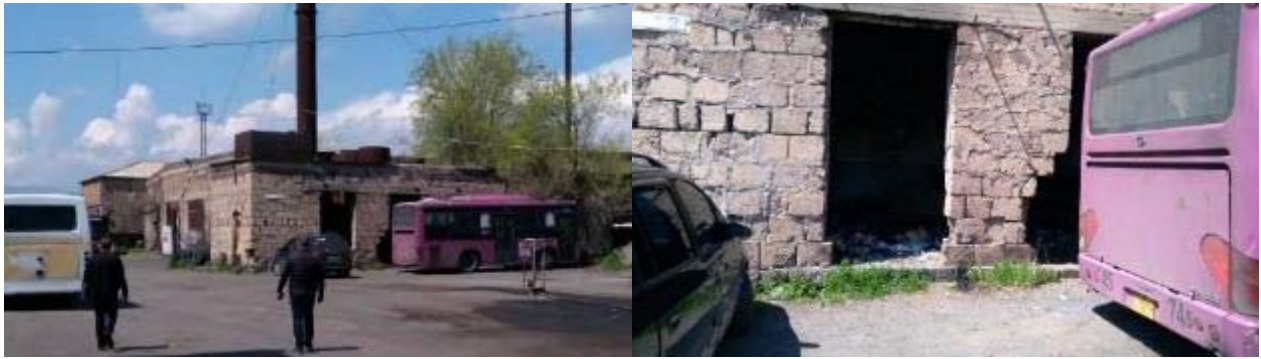
4.6.1 Environmental impact assessment and historical liabilities

The results of site visits / field audits and interviews with the managers of "Yerevan Bus" CJSC have not revealed any activities that could be a subject of EIA and/or state environmental examination. Both bus depots were constructed during the former Soviet Union time and no significant investments (besides the purchase of bus fleet) have been observed there by the Consultant.

The seismic stability of some buildings/structures within the both bus depots is a critical issue. They are old and unsafe (**Figures 4-4** and **4-5**). The representatives of the Company informed the Consultant that one of the buildings in Charbakh depot was largely demolished in the past. This building was previously used as a warestore (see **Figure 4-4**), but due to stability issues had to be demolished.

Figure 4-4. Damaged and largely demolished building in Charbakh depot



Figure 4-5. Unstable buildings in Nor Nork (Jrvej) depot

According to Article 14 of the RA Law on Environmental Impact Assessment and Expert Examination №-HO-110-N, the construction, rehabilitation, extension and closure/dismounting of buildings with 1,500m² and more area is considered as an intended activity of "C" category and is subject to EIA and State expert examination. It is prohibited to start the mentioned activities without positive conclusion of environmental impact expert examination to be issued by the Ministry of Environment. So, if the sites would like to demolish the building(s), they need to undergo these procedures.

Recommendations for section 4.6.1

- 1) Acquire a positive conclusion/permit from the Ministry of Environment before starting any construction/rehabilitation or dismantling of buildings with 1,500m² and more surface. Identify any applicable requirements of the RA Law on EIA and Expert Examination shall be identified and follow them if/when new activities/projects are initiated.
- 2) Engage a specialized organization in order to check/test the seismic stability of the buildings used in Charbakh and Nor Nork (Jrvej) bus depots. Identify and isolate the buildings that do not comply with the minimum criteria of seismic stability. If possible, dismantle the buildings with low seismic characteristics.

4.6.2 Air emissions, greenhouse gases (GHGs) and permits

According to the RA Law on Atmospheric Air Protection, the organizations that have significant stationary air pollution sources should have permits for air emissions issued by the relevant State Authority (Ministry of Environment). Operation of mobile sources does not require an air emission permit.

There are no significant stationary air pollution sources operating within the both depots of "Yerevan Bus" CJSC. The process of CNG burning in bus engines is the main source of Company's air pollution emissions (particulate matter ("PM"), nitrogen oxide (NOx)) and greenhouse gases emissions (carbon dioxide (CO₂) and methane (CH₄))¹⁴.

The annual amount of air emissions has been calculated based on the annual total quantity of mileage, fuel consumption and emission factors of buses operated by "Yerevan Bus" CJSC. The data required for calculation of annual mileage of bus routes were extracted from the "Yerevan intercity regular passenger transportation network" document, approved by the decision of Yerevan Mayor №665-A dated 11.03.2015. Emission factors as well as weekday trip numbers of

¹⁴The generation of sulphur dioxide (SO₂) and nitrogen dioxide (N₂O) can be neglected as only a few diesel buses are used

bus routes operated by the Company were obtained from the Draft Due Diligence Report, Yerevan Bus Renewal Project (August 2020).

The results of air emission calculations are summarized below in **Tables 4-1** through to **4-3**. According to the Consultant's estimations, the annual mileage of the Company's current operational bus routes is equal to 11.6 mln. km per year. The buses currently used by "Yerevan Bus" CJSC comply with the EURO III CNG bus standard.

Table 4-1. Summary of GHG emissions

No	Parameters	Unit	EURO III CNG bus
1	Emission factor	g CO ₂ eq per g of CNG	2.822
2	Fuel consumption	g CNG per km	283.1
3	Annual mileage	km	11,600,000
	Total annual emissions	tonne CO₂eq	9,267

Table 4-2. Summary of PM emissions

No	Parameters	Unit	EURO III CNG bus
1	Emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000022
2	Fuel consumption	g CNG per km	283.1
3	Annual mileage	km	11,600,000
	Total annual emissions	tonne PM_{2.5=10=tsp}	0.072

Table 4-3. Summary of Nitrogen oxides emission

No	Parameters	Unit	EURO III CNG bus
1	Emission factor	g NO _x per g of CNG	0.022
2	Fuel consumption	g CNG per km	283.1
3	Annual mileage	km	11,600,000
	Total annual emissions	tonne PM_{2.5=10=tsp}	72.24

4.6.3 Waste generation and permits

The main types of wastes generated as a result of the Company's operations are listed in **Table 4-4**.

Table 4-4. Types of wastes generated in "Yerevan Bus" CJSC and their classes of hazard

No	Name of waste	Class of hazard
1	Used mercury lamps	1
2	Used lead accumulators	2
3	Used engine oil	3
4	Used oil filters, oiled clothes	4
5	Metal scrap	4
6	Construction waste	4
7	Used tyres	4

No	Name of waste	Class of hazard
8	Empty containers from chemicals and lubricants	4
9	Unusable bus spare parts	4
10	Household waste	4

The principles of waste management and good housekeeping are not applied by the Company. The territories of both Charbakh and Nor Nork (Jrvej) bus depots are piled with hazardous wastes, and it is only household waste that is periodically removed from the sites by Yerevan Communal Waste Collection Company. The Consultant was informed that during the last years all the generated wastes of different classes of hazard were stored in the buildings/sites of the bus depots (see **Figures 4-6** and **4.7**) and were not removed to the landfills or passed to the licensed companies for utilization or treatment.

Figure 4-6. Improper waste storage practices at Charbakh depot

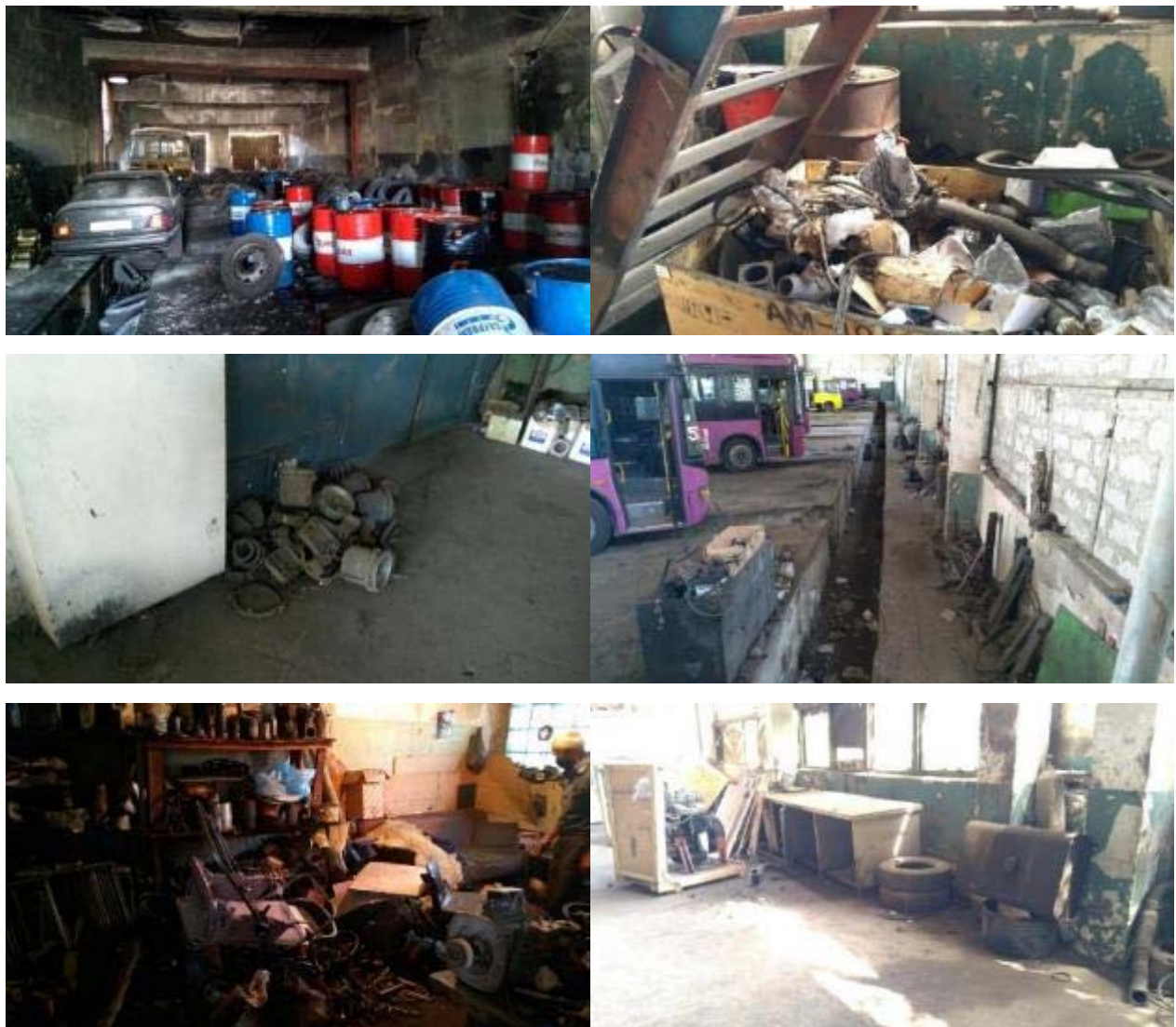
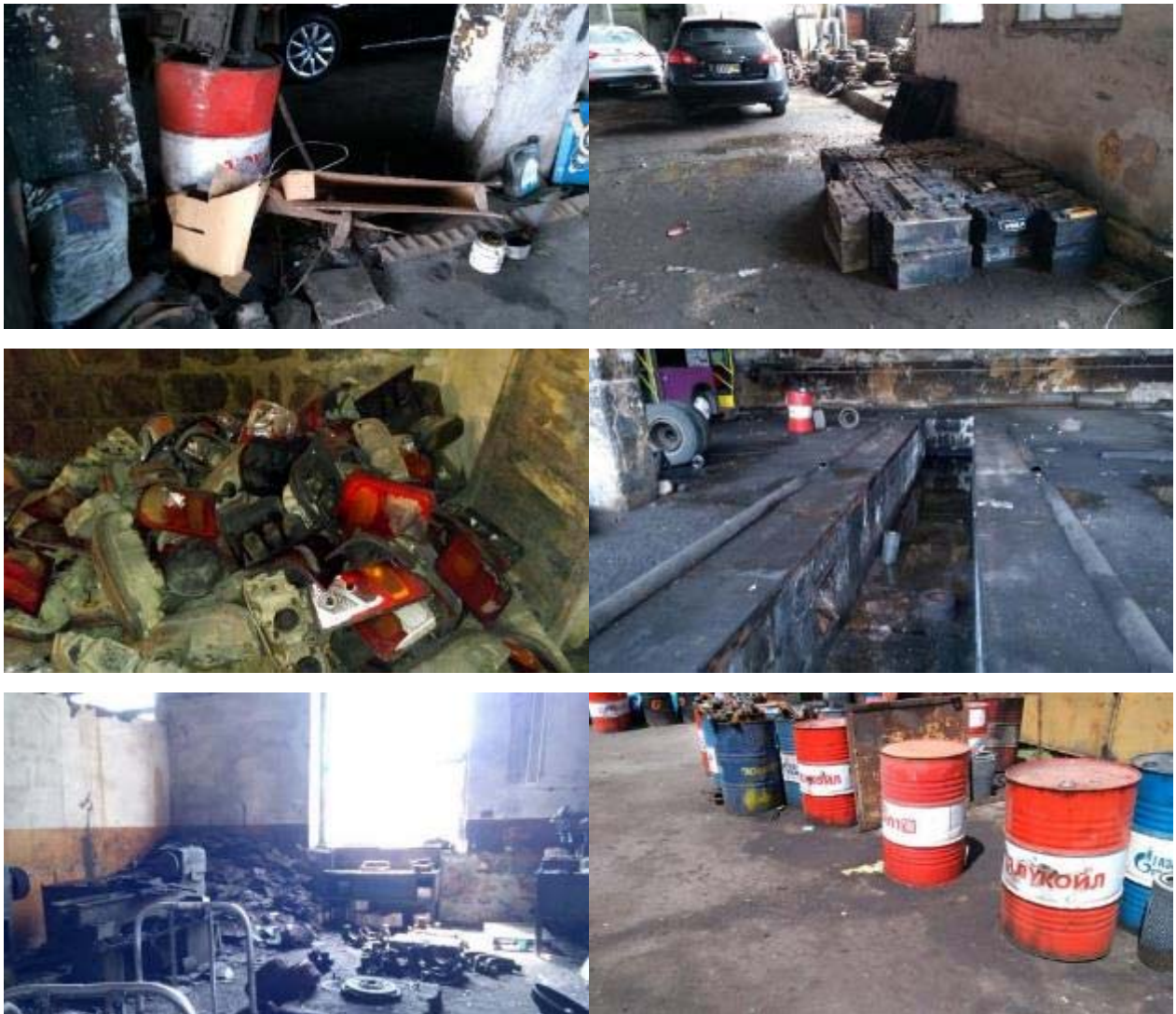




Figure 4-6. Improper waste storage practices at Nor Nork (Jrvej) depot





The Company does not have proper waste storage facilities/areas and waste storage containers. Wastes of different classes of hazard are mixed and stored together. The used oil storage areas are not equipped with the secondary containments and oil spill-kits. The used mercury lamps are collected together with household waste and then disposed of to a communal landfill. It shall be mentioned that improper storage of hazardous waste, especially used oils and waste containing oil also leads to the potential leakages (see **Section 4.6.5**) and further to soil and water contamination.

The RA Law "On Waste" sets out the requirements for waste generation, registration, collection, storage, transportation, disposal, etc. and most of these requirements are not followed by the Company. There are no procedures for safe waste handling. The passports for hazardous wastes (according to the RA Government Decree №47-N) and waste generation norms and disposal limits (according to the RA Government Decree №2291-N) have not been elaborated. The report on registration of waste generation facilities has not been submitted to the Ministry of Environment (according to the RA Government Decree №500-N).

It should be noted that at least the metallic scrap, used oil, tyres and lead accumulators can be sold to the licensed companies that will form additional income to be used for implementing waste handling measures, i.e. for purchasing waste storage containers, secondary containment and trays, etc.

Recommendations for section 4.6.3

- 1) Ensure compliance with the requirements of the RA waste management legislation, including:
 - a) Register the wastes generated by "Yerevan Trans" CJSC in waste registration log-books as required by the RA Government Decree №1343-N,
 - b) Elaborate the hazardous waste passports and submit them to the Ministry of Environment for approval as required by the RA Government Decree №47-N,

- c) Prepare the report on registration of waste generation facilities and submit it to the Ministry of Environment for approval as required by the RA Government Decree №500-N,
 - d) Elaborate waste generation norms and their disposal limits document and submit it to the Ministry of Environment for approval as required by the RA Government Decree №2291-N.
- 2) Ensure separate collection of generated wastes in special containers and equip relevant facilities/sites for safe waste storage.
 - 3) Sign contracts with the specialized waste management companies to periodically hand the generated wastes over to them for utilization, treatment or disposal purposes.

4.6.4 Water, wastewater and permits

Water to Charbakh and Nor Nork (Jrvej) bus depots of "Yerevan Trans" CJSC is supplied from the Yerevan city water supply network by "Veolia Jur" CJSC¹⁵ based on the potable water supply and discharge (wastewater treatment) service provision contracts (registration numbers 3-7-39 and 7-7-10) signed on 19.12.2019.

Wastewater generated in both bus depots is discharged into the city sewage system according to the above-mentioned contracts. These contracts also include the wastewater treatment services. Water in bus depots are mainly used for sanitary hygienic purposes and at bus washing stations. According to the RA Water Code, no water permit is required when water is supplied from secondary water sources¹⁶.

It should be noted that both bus depots have wastewater treatment units that have not been maintained for many years and currently are not properly operated (**Figure 4-7**).

Figure 4-7. Wastewater treatment units used for discharging water from bus washing stations



a) Charbakh depot

b) Nor Nork (Jrvej) depot

During the field audit of Nor Nork (Jrvej) depot the underground water borehole was noticed (**Figure 4-8**). The Consultant was informed that the bore hole was drilled by the "Yerevantrans" CJSC (land-plot owner) and did not have a water permit¹⁷. Meanwhile, the Company sometimes use the water from the borehole, mainly for irrigation purposes. If "Yerevan Bus" CJSC intends to use the water from borehole, a water permit should be obtained from the Ministry of Environment.

¹⁵National water supply operator.

¹⁶Only water intake from primary sources is regulated by the water permit issued by the Authorized State body.

¹⁷This land-plot is rented by "Yerevan Bus" CJSC from "Yerevantrans" CJSC (see section 4.2)

Figure 4-8. Water borehole in the territory of Nor Nork (Jrvej) depot

Inefficient use of water resources in Nor Nork (Jrvej) depot bus washing station was noted to be practiced. Even when no bus washing was ongoing, the water tap was not closed (**Figure 4-9**).

Figure 4-9. Inefficient water use at the bus washing station of Nor Nork depot

Recommendations for section 4.6.4

- 1) Obtain a permit for the underground water extraction from the Ministry of Environment according to the requirements of the RA Water Code and Government Decree №218-N.
- 2) Consider the possibility to rehabilitate the wastewater treatment station at Nor Nork (Jrvej) bus depot.
- 3) Consider the possibility to rehabilitate the wastewater treatment station at Charbakh bus depot, if the latter will not be conserved/closed as a result of the Project implementation.
- 4) Elaborate resource (including water) efficiency and saving management plan.

4.6.5 Hazardous materials and leakages

Main types of hazardous materials used in both depots are engine oil, lead accumulators, other chemicals, bus spare parts (**Figures 4-10** and **4-11**) and diesel in fueling stations. As mentioned in **Section 4.6.3**, requirements pertaining to proper storage and handling of hazardous wastes and materials are not implemented in Nor Nork and Charbakh depots. The warehouses and storage facilities/sites are not equipped with secondary containments, trays and spill-kits or any other safeguarding tools. During the field audit, a lot of leakages were noticed by the Consultant

in oil storage facilities/sites and/or near the oil drums, bus parking areas and diesel fueling stations (Figure 4-12) within the Company's bus depots.

Figure 4-10. Hazardous materials storage area in Nor Nork bus depot



Figure 4-11. Hazardous materials storage area in Charbakh bus depot



Figure 4-12. Fueling stations and oil spills in Nor Nork (Jrvej) and Charbakh bus depots



a) Nor Nork (Jrvej) depot

b) Charbakh depot

The leakages of oil or other chemicals can potentially lead to their evaporation and air pollutions. Moreover, the leakages are mixed with the rainwater and can contaminate soil and water resources.

Technical examination and integrity testing of fuel storage tanks/reservoirs in both depots have not been held for a long time. It is unknown whether they have enough thickness and are safe for future operation. Therefore, it is urgent to check the integrity/validity of diesel tanks/facilities, otherwise emergency situations can take place in future.

Recommendations for section 4.6.5

- 1) Secure the areas, where fuel/oil/chemicals leakages potentially can take place, with fuel / oil spill-kits and secondary containments and trays.
- 2) Perform technical examination and testing of fuel storage tanks/reservoirs in both depots and assess their integrity and validity.
- 3) Elaborate a spill prevention and respond procedure and conduct practical drills with workers engaged in fuel filling operations on the risks of oil/chemicals leakages and on how to respond to them.

4.6.6 Noise, vibration and traffic

The main sources of physical impact factors, such as noise and vibration, at the Company are movement of buses along the City roads and operation of bus maintenance workshops and washing stations. The noise emitted from buses cannot be separately assessed as it is interfered with the traffic noise and forms the ambient noise level. Anyway, the share of noise from the Company's buses in ambient noise value is very low (almost negligible) and is unlikely to be an issue of population disturbance taking into account that bus routes do not operate at night time.

The regular technical maintenance of "Yerevan Bus" CJSC buses will ensure a lower noise emission level. The purchase of new buses that comply with EURO V or higher standards (envisioned by the Project) will also result in reduction of noise emission level.

The buses on their own are not considered as a significant source of vibration. It is unlikely that vibration can be a significant issue considering the type and nature of operations performed in both bus depots.

Recommendations for section 4.6.6

- 1) Ensure regular technical maintenance of "Yerevan Bus" CJSC buses in accordance with the relevant technical regulation and technical maintenance time-frames.
- 2) Purchase new buses complying with EURO V or higher standards.

4.6.7 Environmental inspections and audits

No environmental inspections have been conducted by the relevant state authority (RA Inspectorate for Nature Protection and Mineral Resources) during 2017-2019. Therefore, no fines/penalties have been imposed so far.

Internal environmental audits are not practised by the Company.

No third party (external) audits are conducted in "Yerevan Bus" CJSC.

4.6.8 Environmental emergencies

During the audit no evidences of any environmental incidences and breakdowns that can lead to significant risks and liabilities for "Yerevan Bus" CJSC personnel, property, population, the environment, and the state, except of fuel/oil and chemicals leakages, were noticed. Besides, during the field audit, the Consultant was informed that several years ago a building used as warehouse was demolished due to seismic instability reasons.

Recommendations to avoid and/or mitigate the leakages are given in **Section 4.6.5**.

4.6.9 Environmental reports

According to the RA Tax Code, the Accounting Department of "Yerevan Trans" CJSC prepares quarterly reports on environmental taxes and nature utilization fares and submits them to the State Tax Service. These reports include calculations of environmental taxes for wastewater discharge and disposal of household waste only. However, the mentioned report should include at least the calculated taxes for hazardous waste storage in the facilities/sites of "Yerevan Trans" CJSC. In order to do this, the recommendations in **Section 4.6.3** (registration of waste generated by "Yerevan Trans" CJSC in dedicated log-books) should be implemented.

As a number of hazardous waste types are generated in the course of the Company's operations, it is obvious that the annual statistical reports on waste generation, utilization and disposal (template N1-waste) shall be prepared and submitted to the authorized state body (i.e., the State Statistical Agency), which is not carried out. At the same time, the Company does submit to the State Statistical Agency another statistical report covering power products, utilization and reserves. Data on power and fuel consumption for the last three years obtained from the mentioned statistical reports are summarized below in **Table 4-5**.

Table 4-5. Summary of power and fuel consumption for 2017-2019

No	Item	Unit	2017	2018	2019
1	Power	ths. kWt-h	529.1	358.6	317.9
2	CNG	ths. m3	1616.7	1724.6	1386.8
3	Petrol	ths. liter	13.02	13.0	13.0
4	Diesel	ths. liter	1879.8	1635.5	1876.7

Recommendations for section 4.6.9

- 1) Fill data on generation and storage of hazardous waste in quarterly reports on environmental taxes and nature utilization fares.
- 2) Prepare annual statistical reports on waste generation, utilization and disposal (template N1-waste) according to Order №112-N of the RA Minister of Environment and submit them to the State Statistical Agency.

4.6.10 Asbestos-containing materials

Asbestos-containing material (ACM) roofs are partly used in the Company's both bus depots (**Figure 4-13**). It is proposed to implement piecemeal replacement of asbestos roofs.

Figure 4-13. Roof elements containing ACM in Nor Nork (Jrvej) and Charbakh bus depots**Recommendation for section 4.6.10:**

- 1) Prepare a program of phased ACMs roofs replacement for Charbakh and Nor Nork (Jrvej) bus depots.

4.6.11 Ozone depleting substances

"Yerevan Bus" CJSC does not use or intend to use any equipment that contains ozone depleting materials e.g. as refrigerants.

4.7 Occupational health and safety performance and management**4.7.1 OHS procedures and records**

In total, ten OHS procedures were elaborated in Nor Nork (Jrvej) and Charbakh bus depots in 2016. These include the OHS procedures for different works and professions like drivers, welders, technicians, electricians, repair workers, etc. All OHS procedures are approved by the Company's Director.

According to Order №13-L dated 19.09.2016 on Regulation of Workers Health and Safety System within "Yerevan Bus" CJSC, the overall coordination of workers' OHS issues is performed by the Company's Chief Engineer. The mentioned Order has assigned persons responsible for initial, periodical and unscheduled OHS trainings at each division.

During the field audit, the Consultant was informed that no procedures for implementation of dangerous works (fire-works, works at height, etc.) were in place. Hazardous works were not identified and documented. No evidence of documented permissions for dangerous works implementation, including the preventive OHS and fire safety measures to be performed before the start of dangerous works, were available.

The provision of personal protective equipment (PPE) to the working personnel is not properly planned and carried out. The types and norms of PPE to be given to the workers depending on their professions and harmful/hazardous factors of working environment are not defined and documented.

Recommendations for section 4.7.1

- 1) When a competent OHS specialist is appointed and trained (see recommendations in **Sections 4.2-4.3**), redistribute OHS roles and responsibilities among the Company's

personnel and update the relevant provisions of Order №13-L dated 19.09.2016 (on Regulation of Workers Health and Safety System within "Yerevan Bus" CJSC).

- 2) Prepare a list of procedures required for effective functioning of the Company's OHS management system. This list shall at least include:
 - a) Procedure for safe implementation of dangerous works (fire-works, works at height, etc.),
 - b) Procedure defining the PPE types, norms, wearing periods and rules,
 - c) Procedure for OHS and fire safety audit and control,
 - d) OHS and fire safety induction guide/leaflet, etc.
- 3) Ensure the availability of the records required by the OHS and fire safety legal acts as well as internal procedures and regulations.

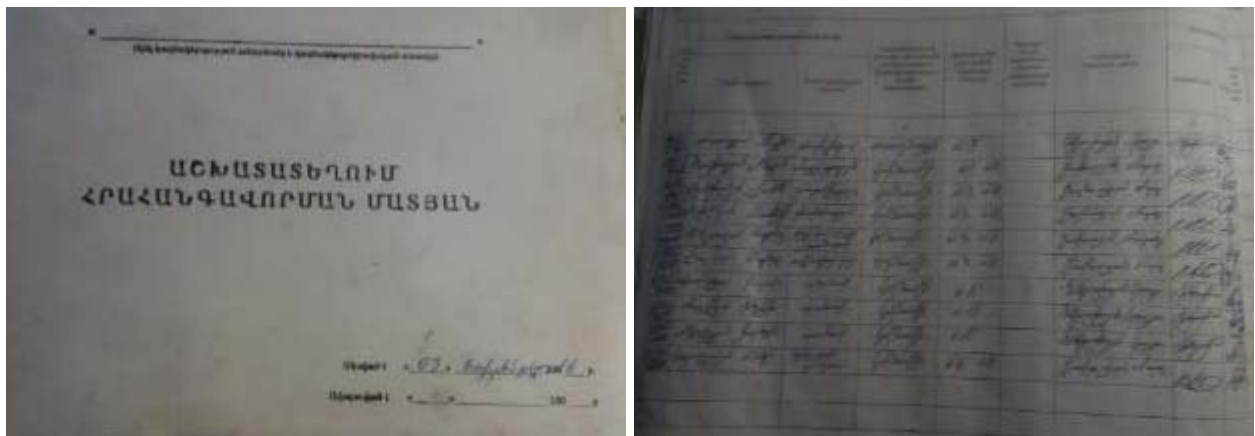
4.7.2 OHS training and knowledge examination

OHS training practices in the RA envisage an induction, training at workplaces, and periodical, specific and unscheduled training, as well as annual OHS trainings and knowledge examination.

As stated in **Section 4.7.1**, the persons responsible for OHS induction and periodical trainings were assigned at each division of the Company according to Order №13-L dated 19.09.2016. The OHS inductions are conducted for new employees and visitors. It is a good practice to use the relevant OHS and fire safety manual/leaflet when conducting the OHS induction. Besides, the OHS induction for new employees and visitors will be usually conducted not by the representatives of the different Company's divisions (as set by Order №13-L), but by the competent OHS specialists.

The results of OHS training with employees are registered in the OHS training registration log-books. The extraction from the Charbakh bus depot log-book is presented in **Figure 4-14**. The last periodical OHS training record was made on 02.06.2020 by the Shift Foreman of Charbakh depot.

Figure 4-14. Extraction from OHS training registration log-book of Charbakh bus depot



The workers engaged into the implementation of dangerous works did not pass the tailored safety training (specific training) before start of work. During the field audit, no evidences/records on personnel OHS and fire safety trainings as well as knowledge and competency examination were identified.

Nor Nork (Jrvej) and Charbakh bus depots were not equipped with OHS and fire safety posters, prohibition and warning signs and training rooms.

Recommendations for section 4.7.2

- 1) Elaborate OHS and fire safety induction guide/leaflet (same as recommendation in **Section 4.7.1, d)**) and assign the Company’s competent OHS specialist to deliver OHS inductions.
- 2) Conduct specific OHS training with the personnel engaged in implementation of dangerous works according to the provisions of Procedure for Safe Implementation of Dangerous Works (can be done when the recommendation for **Section 4.7.1, 2-a)** is implemented).
- 3) Establish a personnel qualification commission to be responsible for carrying out knowledge and competency examination. Prepare an OHS and fire safety annual training program for the Company’s personnel, conduct a knowledge and competency examination of the personnel, and document its results.
- 4) Equip the OHS specialist’s office with necessary OHS and fire safety training posters or envisage separate training room. Retrofit the industrial facilities and territory of both bus stations with safety (prohibition, warning, fire safety and evacuation) signs.

4.7.3 Medical examination and daily check-ups

According to Article 249 of the RA Labour Code and Government Decree №347-N, bus drivers shall undergo initial (before the start of employment) and periodical (annual) mandatory medical examinations in licensed medical institutions. During the audit, the Consultant was informed that all bus drivers working in "Yerevan Bus" CJSC underwent periodical medical examinations and the relevant records were made in their personal sanitary (medical) books. The last medical examination of Company’s workers were conducted by "Polyclinic №12" CJSC according to the contract E/A-05 dated 19.02.2020. As an example, the sanitary (medical) book of a bus driver was provided (**Figure 4-15**).

Figure 4-15. Title page and last filled page of driver’s personal sanitary (medical) book



Daily medical check-ups of drivers are conducted by the Company’s nurse. The blood pressure, temperature, alcohol, etc. are checked and the results are registered in drivers’ trip tickets. In case of any counter-indication, the driver is substituted.

The industrial facilities, administrative buildings and buses are not equipped with first aid kits.

Recommendation for section 4.7.3:

- 1) Equip the industrial facilities, administrative buildings and buses with first aid kits.

4.7.4 Working environment and harmful conditions/works

The working environment and conditions in bus parking, maintenance and washing facilities (industrial facilities) do not comply with the applicable sanitary and hygienic norms/standards. The poor conditions of industrial facilities and lack of heating and air conditioning systems (**Figures 4-16** and **4-17**) could not ensure the allowable values of harmful and hazardous aspects of the working environment, such as microclimate, lighting, etc. as well as ergonomic parameters at workplaces.

Figure 4-16. Poor conditions of industrial facilities in Nor Nork (Jrvej) depot



Figure 4-17. Poor conditions of industrial facilities in Charbakh depot



No instrumental measurements of microclimate, lighting, noise, vibration and electromagnetic radiation ("EMR") have been performed at workplaces of both bus depots, including administrative offices and cabins of buses (workplaces of drivers) so far. The actual levels of harmful and hazardous aspects at workplaces are not evaluated. The criteria for evaluation of workplaces are defined in Order of RA Minister of Health №756-N on Approval of Sanitary Rules and Norms "Work Hygienic Classification by the Harmful and Hazardous Aspects of Working Environment and by the Parameters of Workload and Work Intensity".

Sanitary hygienic rooms

There is the lack of washing and dressing rooms, lavatories and break/rest rooms (sanitary-hygienic rooms) in both depots of "Yerevan Bus" CJSC. Even where some facilities of the Company are equipped with sanitary-hygienic rooms, their conditions are unsatisfactory (**Figure 4-18**).

Figure 4-18. Unsatisfactory conditions of washing and dressing/meal rooms



During the interviews with the representatives of "Yerevan Bus" CJSC, the Consultant was informed that the end points of routes (where the drivers shall have a rest and wait till the back tour), in most cases, were not equipped with the washing rooms and toilets. The Company should consider the possibility of equipping the route end points with at least washing rooms and toilets.

Harmful works and extra payment

According to Article 183 of the RA Labour Code, the employees engaged in harmful productions and works as well as positions and professions included in the list of heavy and harmful productions, works, professions and positions (approved by the RA Government Decree №1698-N dated 02.12.2010) should get a 30% add-on to their salaries.

Order №23-L of the Company, dated 31.05.2019, defines the list of Company's harmful professions that are subject to a 30% extra payment as follows:

- Tin-smith
- Motorist
- Battery electrician
- Vulcanizer
- Welder
- Auto mechanic
- Locksmith
- Washman.

Recommendations for section 4.7.4

- 1) Prepare a program for rehabilitation and upgrade of industrial facilities (washing stations, maintenance facilities and ware-houses) sanitary-hygienic rooms at Nor Nork (Jrvej) bus depot.
- 2) Prepare a program for rehabilitation and upgrade of industrial facilities (washing stations, maintenance facilities and ware-houses) sanitary-hygienic rooms at Charbakh bus depot (if new Arshakunyats depot is not constructed),

- 3) Evaluate the harmful and hazardous aspects (microclimate, noise, vibration, EMR, lighting, etc.) of working environment and workload and work intensity at workplaces in both bus depots in accordance with Order of RA Minister of Health №756-N (for Nor Nork depot - after rehabilitation and upgrade of industrial facilities and for new Arshakunyats depot - after commissioning),
- 4) Consider a possibility of equipping bus routes end points with proper washing and meal rooms as well as toilets.

4.7.5 Dangerous industrial objects

According to Article 6 of the RA Law on State Regulation of Technical Safety, the stationary and mobile petroleum and gas fueling stations are considered as dangerous industrial objects ("DIO") and therefore should be registered in the DIO State Registration Log-book by the National Technical Safety Center, annually checked and properly managed.

As mentioned before, both bus depots use petroleum stationary refueling stations (see **Figure 4-12**), however, none of them is registered in the DIO State Registration Log-book and annually examined/checked. It should be mentioned that the violation of the mentioned legal requirements regarding the DIO registration and management imposes penalty/fine equal to 1.0 mln. AMD (2000 USD) for each violation case.

Recommendations for section 4.7.5

- 1) Assign persons to be responsible for safe operation, technical maintenance and surveillance of stationary refueling stations in both bus depots.
- 2) Apply to the National technical safety center in order to register both petroleum stationary refueling stations in the DIO State Registration Log-book.
- 3) Sign contract(s) with an accredited company to conduct technical safety examination of both stationary refueling stations.

4.7.6 Major accidents and injuries

During the interviews with the representatives of the Company it was stated that no major accidents and work-related injuries have occurred in both bus depots during the last three years (2017 through to 2019). There are no accidents and incidents, as well as fire/ignition, registration log-books available in the bus depots though.

As part of the emergency prevention arrangements, the Company should identify potential emergencies that can happen as a result of its activities on- and off-site and periodically conduct training and drills to increase the capacity of the personnel to withstand emergency situations (see also **Section 4.7.2**).

Bus collisions are registered in the relevant log-book by Traffic Safety Service Engineer. All buses have mandatory insurance of responsibility for transportation means user, and the insurance certificates are updated every year. All buses pass technical surveillance/check-up by licensed companies twice a year.

Nor Nork (Jrvej) bus depot has an emergency shelter (see **Figure 4-19**), however, the Consultant was informed that its operability had not been checked for a long time.

Figure 4-19. Emergency shelter in Nor Nork (Jrvej) depot**Recommendations for section 4.7.6**

- 1) Identify potential emergency situations that can happen as a result of the Company's activities and elaborate the relevant emergency response plan.
- 2) Periodically conduct training and practical drills to increase the capacity of the personnel to withstand emergency situations.
- 3) Check the operability of Nor Nork (Jrvej) depot emergency shelter. If needed, upgrade it and equip with required protection means.

4.7.7 OHS inspections, audits and monitoring

No OHS and fire safety inspections have been done in both bus depots of "Yerevan Bus" CJSC by the relevant state inspection bodies during the last three years (2017-2019).

No OHS and fire safety external audits and monitoring have been conducted in Nor Nork (Jrvej) and Charbakh bus depots so far.

The Company does not practice the periodical internal audits of OHS, technical and fire safety issues, and working and sanitary-hygienic conditions in the Company's industrial facilities and administrative offices.

Recommendations for section 4.7.7

- 1) Elaborate a procedure for carrying out internal OHS, fire and technical safety audits and control (same as recommendation for **Section 4.7.1, c)**).
- 2) Perform periodical internal audits and control over the OHS, technical and fire safety issues within the industrial facilities of both bus depots.

4.7.8 OHS reporting

According to Decree №44-N of the RA State Statistical Council dated 28.12.2005, the large and medium sized enterprises operating in industrial, construction, transport and communication domains must prepare the statistical reports (template 1-AP (annual)) on working conditions and submit them to the State Statistical Agency. However, the mentioned statistical reports are not annually elaborated and submitted to the State Statistical Agency by the Company.

The internal OHS reporting between the "Yerevan Bus" CJSC and Yerevan municipality is not practiced.

Recommendation for section 4.7.8:

- 1) Prepare the statistical reports (template 1-AP) on working conditions and submit them to State Statistical Agency annually.

4.7.9 Professional deceases

Although it was reported that no cases of professional deceases were found as a result of periodical medical examinations, it is obvious that some problems related to the drivers' back bone and neck are likely to appear in future. Hypodynamia and defatigation (overwork) are also typical diseases for drivers. It is recommended by the Consultant to conduct a detailed medical survey (to be done by a specialized medical institution) to identify all relevant professional deceases typical to drivers and to propose relevant preventive actions. However, some general measures/actions, such as equipping driver workplaces with orthopedic seats, providing them with breaks, lunch and relevant rest rooms as well as limiting working hours are proposed.

To avoid a direct contact between bus drivers and passengers during the COVID-19 situation, as well as to prevent the proliferation of bacteria, some preventive measures were implemented in "Yerevan Bus" CJSC, including:

- The driver cabins were isolated/separated from the bus hall by polyethylene layer (**Figure 4-20, a**),
- The alcohol bottles were installed just near the bus entrance (**Figure 4-20, b**),
- Transportation of standees (standing passengers) was prohibited,
- The entrance to the bus without a mask was prohibited (**Figure 4-20, c**),
- The bus halls were periodically disinfected (**Figure 4-20, d**).

Figure 4-20. COVID-19 preventive measures



The list of persons, responsible for the implementation of preventive measures against the proliferation of new COVID-19 as well as daily disinfection works was approved by the "Yerevan Bus" CJSC director on 12.03.2020.

Recommendations for section 4.7.9

- 1) Equip the drivers' workplaces with orthopedic seats.
- 2) Provide drivers with breaks, lunch and relevant rest rooms,
- 3) Sign a contract with a specialized medical institution to conduct a detailed medical survey in order to identify all relevant professional deceases typical to drivers and to propose relevant preventive actions.
- 4) Taking into account the results and conclusions of the mentioned medical survey, consider the possibility to limit working hours of drivers.

4.7.10 Fire safety

The fire safety procedure of the Company has been approved by Order №15-L dated 03.10.2016. According to the Order, Chief Mechanic is held responsible both for organizing fire safety in the depots of "Yerevan Bus" CJSC and for conducting fire safety inductions and periodical trainings for workers. However, there are no persons responsible for fire safety in industrial facilities and administrative buildings.

Some flammable materials and wastes are stored and used in large quantities in both bus depots. These materials and wastes and their storage areas are summarized below in **Table 4-6**:

Table 4-6. Flammable materials/waste and their storage facilities

№	Flammable material/waste	Storage	Bus depot
1	Used tires	Outdoor areas and Industrial facilities	Nor Nork and Charbakh
2	Diesel	Reservoirs of refueling stations	Nor Nork and Charbakh
3	Motor oil (new and used)	Outdoor areas, industrial facilities and warehouses	Nor Nork and Charbakh
4	Plastic spare parts for buses (new and used)	Industrial facilities and warehouses	Nor Nork and Charbakh
5	Oil filters (new and used)	Industrial facilities and warehouses	Nor Nork and Charbakh
6	Wooden pallets and packaging	Warehouse	Nor Nork

However, in general, the industrial facilities at Nor Nork and Charbakh bus depots are equipped neither with valid primary fire-fighting equipment, nor with automatic fire extinguishing and alarm systems. Few available fire-extinguishers and associated equipment were found to be outdated and unsuitable for use (**Figures 4-21** and **4-22**). Only buses are retrofitted with up-to-date fire extinguishers (**Figure 4-23**).

Figure 4-21. Primary fire-fighting equipment unsuitable for use at Nor Nork (Jrvej) depot



Figure 4-22. Primary fire-fighting equipment unsuitable for use at Charbakh depot



Figure 4-23. Buses equipped with up-to-date / working fire extinguishers



Although it is required by the RA Law on Fire Safety as well as by the Fire Safety Rules (approved by the RA Minister of Territorial Administration and Emergency Situation), "Yerevan Bus" CJSC has neither evacuation plans, nor emergency response plans for industrial facilities and

administrative buildings. The Consultant was informed that no fire safety inspections had been conducted by the relevant state bodies during the last three years.

Recommendations for section 4.7.10

- 1) Appoint persons responsible for fire safety at industrial facilities and administrative buildings in both depots.
- 2) Organize the storage of flammable materials and wastes in compliance with the RA Fire Safety Rules (2015).
- 3) Elaborate evacuation plans for industrial facilities and administrative buildings of both depots of the Company's.
- 4) Sign a contract with a specialized company in order to conduct a fire safety audit at both bus depots, including: (i) check against the requirements and rules for storage of flammable materials and wastes, (ii) determination of required fire-fighting equipment, their types and quantities, (iii) identification of the facilities/sites that should be equipped with automatic fire extinguishing and alarm systems, and (iv) trainings/practical drills to be conducted for the Company's personnel and drivers, specifically.
- 5) Sign a contract with a specialized company to periodically check the validity of fire extinguishers installed in buses and recharge them, if required.

4.8 Social performance and management

4.8.1 Labour practices, HR management and working conditions

Human resources and labour related issues within the "Yerevan Bus" CJSC are managed by the Company's HR specialist according to the working contract dated 09.09.2013 and Job Description approved on 18.05.2020. HR specialist reports directly to the Company's Director.

The RA Labour Code is based on the eight fundamental ILO conventions. The Human Resource Policy of "Yerevan Bus" CJSC was elaborated based on the requirements of the RA labour legislation and approved by the Company's Director on 17.12.2015. It covers, *inter alia*, the following areas:

- 1) Roles and responsibilities of persons engaged in HR management,
- 2) Employment related issues,
- 3) Recruitment of personnel,
- 4) Training, qualification and knowledge examination,
- 5) Salaries and encouragement/motivation,
- 6) Vacation,
- 7) Employees complaints/grievances and proposals, and
- 8) Dismissal and retrenchment, etc.

Labour relations between the employer and employees are regulated based on employment contracts, while the working and rest regime, rules and norms of behavior, roles and responsibilities of employer and employees, employment and dismissal, salaries and bonuses, violation of labour requirements, etc. are defined by the Internal Code of Conduct approved by the Company's Director on 17.12.2015.

According to the staff schedule, approved by the Yerevan Mayor in 2014, there are 117 employees (excluding bus drivers) working in "Yerevan Bus" CJSC, of whom 102 are male and 15 are female.

The staff of the Company disaggregated by structural units and gender as of 27.12.2019 are summarized in **Table 4-7**.

Table 4-7. The Company's staff disaggregated by divisions and gender

No	Structural units	Number of workers	Male	Female
1	Management	7	5	2
2	Accounting department	8	3	5
3	Operational division	26	26	0
4	Traffic safety service	5	2	3
5	Technical service	50	49	1
6	Supporting personnel	21	17	4
Total		117	102	15
	Bus drivers	232	232	0

In recruiting, priority is usually given to the most qualified candidates. No gender discrimination evidences were identified during the field audits and interviews with the Company's representatives. Male and female candidates have the same employment opportunities, male and female employees have equal remuneration for the similar positions. Female employees are mainly represented in the Company's management, accounting department and HR as well as engaged as supporting personnel (cleaning staff). All the requirements of the Labour Code for pregnant and lactating women are met.

No evidencies for child (people under 18 years) and forced labour were identified during the visits to Nor Nork (Jrvej) and Charbakh bus depots. The Company has no under-age employees.

The employees' labour rights (salary and type of payment, rest and working hours, freedom of association, non-discrimination, safe working conditions and compensations in case of harm to employee's health, etc.) are communicated to them through the employment contracts. The employees' rights foreseen by the labour contracts are in line with the RA Labour Code.

Drivers, on-duty route regulators, on-duty mechanics and watchmen employed in "Yerevan Bus" CJSC are shift workers, whose vacation period as per their employment contracts is equals to 24 working days per annum. The other employees of "Yerevan Bus" CJSC are one shift (five days a week) workers. If needed, an employee may be asked to work during holidays for an additional overtime payment as regulated by the national labour legislation. Their vacation period is 20 working days per annum.

The drivers' salaries are calculated and paid on an hourly basis. It depends on time-period envisioned per trip along the route and number of trips conducted. In general, the average monthly salary of a bus driver is between 200,000 and 250,000 AMD (400-500 USD). The other employees are paid time-based salaries. The range of salaries at "Yerevan Bus" CJSC is between 77,000 and 220,000 AMD (170-440 USD) per month. The average salary of managers is about 300 USD/month. It is above the minimal monthly national salary, but slightly below the average monthly national salary.

Bonuses to the salaries are paid at the Company. In December 2019, 101 workers (except for bus drivers) of the Company got a 100% bonus to the salaries (the list of the nominees was approved on 27.12.2019 by the Company's Director).

The Company's employees engaged in harmful productions and works, as well as those occupying positions and professions included in the list of heavy and harmful productions, works, professions and positions (approved by the RA Government Decree №1698-N dated 02.12.2010), get a 30% add-on to their salaries. The list of professions subject to a 30% extra payment was approved by Order №23-L of the Company (see **Section 4.7.4**).

A collective agreement is not concluded. Membership at any trade union is voluntary according to the RA Labour Code and the staff are free to join, if desired.

Although a worker grievance mechanism is envisioned in the HR Policy, it was not implemented. All complaints are verbally discussed with HR specialist or with Director and if possible are solved.

"Yerevan Bus" CJSC does not plan any massive dismissal in the predictable future. Moreover, when the Project is implemented, the recruitment of new drivers will be needed. Routine dismissals are managed in line with the RA Labour Code.

Recommendations for section 4.8.1

- 1) Update the Company's Human Resource Policy based on the amendments made in the RA Labour Code during 2016 through to 2020.
- 2) Establish and maintain the worker grievance mechanism that is accessible to both the Company's and contractor employees (if any). The mechanism should allow for confidential complaints to be raised and addressed.

4.8.2 Community health, safety and security

Two potential risks and hazards associated with the operation of buses of "Yerevan Bus" CJSC are identified by the Consultant. These risks are as follows:

- Noise and emissions that are generated from the movement of buses and affect the population, and
- Car accidents and collisions.

As mentioned in **Sections 4.6.6 and 4.6.2**, the share of noise and air emissions from the Company's buses in the ambient noise value and background air concentration is very low (almost negligible) and is unlikely to be an issue of the population disturbance taking into account that bus routes do not operate at night time.

Car accidents and collisions may lead to human injuries and even fatalities. During the field audit, it was reported that no significant collisions had happened for the last three years. The reasons for car accidents can be associated with bus breakages/defects and drivers' health / mental conditions. It is almost impossible to fully eliminate car collisions, however, some preventive measures undertaken by the Company reduce the probability of such cases. These measures include: (i) periodical technical check-ups and maintenance of buses, (ii) periodical medical examination and daily medical check-ups, (iii) ensurance of proper workplaces and rest conditions for drivers, and (iv) equipment of buses with first aid kits. All the proposed measures are already envisioned in **Sections 4.6.6, 4.7.3 and 4.7.9**, therefore no additional recommendations are proposed here.

4.9 Land acquisition, involuntary resettlement and economic displacement

As mentioned in **Section 4.2**, the territory of Charbakh bus depot is the property of "Yerevan Bus" CJSC, while the territory of Nor Nork (Jrvej) bus depot has been rented from "Yerevantrans" CJSC according to the real estate renting contract dated 13.02.2012 for 10 years (till 13.02.2022). Most probably, the real estate renting contract for Nor Nork (Jrvej) bus depot will be prolonged in 2022, as both companies ("Yerevan Bus" CJSC and "Yerevantrans" CJSC) are managed by Yerevan municipality. "Yerevantrans" CJSC does not plan any land acquisition/expansion and therefore no involuntary resettlement and economic displacement activities can be triggered. However, if land acquisition issues arise in the future, the Company shall address them in accordance with the RA Land Code.

4.10 EHSS management in contactors/supply chain

The list of materials bought by the "Yerevan Bus" CJSC is presented below:

- 1) Fuel (diesel and petrol),
- 2) Motor oil,
- 3) Tyres,
- 4) Lead accumulators,
- 5) Paints and chemicals (antifreeze, etc.),
- 6) Bus spare parts, etc.

The Company also purchases specific services, such as technical check-ups of buses, mandatory insurance of responsibility for transportation means, bus pick-up services, etc.

The Company is owned by Yerevan municipality, and, hence, the purchase of goods and services is arranged as per the RA Law on Procurement. The Law defines the procurement procedure, which envisages: 1) Electronic Auction; 2) Tender; 3) Price inquiry; and 4) Procurement from a single source.

To initiate the procurement of goods and/or services for need of the Company, the relevant invitation should be launched and the potential bidders shall meet the qualification criteria set out in the Invitation. The invitations should set minimal criteria for the bidders, including: 1) Compliance of professional activity to the activities stipulated in the Contract; 2) Professional experience; 3) Technical means; 4) Financial means; and 5) Labor resources.

The hazardous properties of purchased materials/goods were not assessed by the Company. Therefore, in case of purchasing hazardous materials from producers/suppliers the Company will need to request them to provide the relevant Material Safety Data Sheets (MSDS) and will need to ensure the staff that will deal with these hazardous materials is informed about MSDSs.

Recommendations for section 4.10

- 1) When purchasing hazardous materials/goods, request the producers/suppliers of hazardous materials/goods to provide the Company with Material Safety Data Sheets (MSDSs).
- 2) Ensure that the Company's staff dealing with hazardous materials be aware of MSDS provisions.

4.11 External stakeholder engagement

4.11.1 Preliminary Stakeholder Identification

"Yerevan Bus" CJSC has not conducted a systematic stakeholder identification and does not have a formalised mechanism of disclosing and/or communicating information to its potential stakeholders or the wider public (not even a website). Therefore, the preliminary identification of main stakeholders has been conducted during this study. The following stakeholders are identified:

- Yerevan Municipality

Yerevan Municipality is responsible for the provision of transportation services to the population of the City through buses, trolleybuses, minibuses and underground (metro). Taking into account the recent tendency of a growing number of vehicles in the capital, the City authorities adopted the policy of increasing the volume of big capacity rolling stocks (buses and trolleybuses) and ceasing operation of minibuses. The public transportation services in Yerevan are provided by "Yerevan Bus" CJSC, "Yerevantrans" CJSC, "Electric Transport of Yerevan" CJSC and "Yerevan Metro after Karen Demirchyan" CJSC and coordinated by the Department of Transport of Yerevan Municipality.

- Operators of private buses and minibuses routes

Besides "Yerevan Bus" CJSC, 16 private bus operators and 64 private minibus operators¹⁸ (as of 2019) provide their services in Yerevan. These operators/companies are direct competitors of the Company.

- "Electric Transport of Yerevan" CJSC

There are 51 trolleybuses on the balance of "The Electric Transport of Yerevan" CJSC, among which there are 5 "Renault", 12 "Skoda" and 34 "LIAZ" trolleybuses. The Company serves five trolleybus routes, 40-42 units come out on routes daily.

- "Yerevan Metro after Karen Demirchyan" CJSC

The Yerevan Underground (Metro) has 10 stations, the length of the line is 12.1 km and the rolling stock includes 45 wagons. 26 wagons are operated on weekdays (13 rolling stocks), and at weekends the number is less - 24 wagons (12 rolling stocks). A significant growth in the number of passengers making use of the Underground has been noticed recently, which is largely due to the improved quality of transportation.

- Population (passengers)

The population of Yerevan is the main stakeholder of the Company. Poor operation of the public transport system has a direct impact on the comfort criteria and life quality of the population.

- People with disabilities

People with locomotor disabilities are interested in equipment of city buses with special wheelchair elevators. In accordance with Decision №182-N of the Municipality's Council of Elders as of 25.12.2019, the process of providing free tickets for parking spaces to the people on wheelchairs started and 102 tickets were given for 2020.

¹⁸<https://www.yerevan.am/en/transport-department/>

4.11.2 Stakeholder communication and information disclosure

Currently, the Company does not have web-site and a stakeholder communication and information disclosure plan. Some information about the public transport network in the City are presented at Yerevan Municipality official website (<http://www.yerevan.am>).

Some data about the routes of public transport are proposed in following sources:

- WikiRoutes (<https://wikiroutes.info/en/erevan/catalog>) is the public website where the individual users edit the route parameters as well as street and bus stop routing itself. There is no guarantee of data uniformity; the data seem to be very diverse in terms of latest update and accuracy. Moreover, only bus and trolleybus routes are widely recorded in the system; there were only 9 minibus routes available. For these reasons, this data source was used just in case of missing information in other sources.
- A2B Transport (<https://play.google.com/store/apps/details?id=robert.findtransport>) is the mobile application that was recommended to us by local users in Yerevan to show the current routing with relatively high reliability. We have taken the route mapping from this application. The list of routes available in A2B transport reaches more than 80% of the routes recorded by "Yerevan Trans" CJSC.

The measures to be implemented to improve the public transport network of the city are envisioned in Yerevan city annual and five-year development programmes.

4.11.3 Public grievance mechanism

The Company does not have a formal grievance mechanism for external stakeholders. They should have the opportunity to raise their complaints and proposals using the grievance management procedure. Therefore, it is recommended to develop and implement grievance management procedure at "Yerevan Bus" CJSC and make it available to the stakeholders via the multilanguage (Armenian, English and Russian) information leaflets and grievance registration forms to be displayed at the bus stops the entrances to both bus depots (in line with the EBRD PR10).

Currently, the complaints and proposals can be sent to the Yerevan Municipality via e-mail info@yerevan.am and <https://e-request.am>.

Recommendations for section 4.11

- 1) Create web-site for "Yerevan Bus" CJSC in order to establish direct communication channel with stakeholders.
- 2) Elaborate and implement grievance mechanism for external stakeholders.

5. Environmental and Social Assessment of the Project (Phase 1)

5.1 Environmental baseline

5.1.1 Project location and geography

Yerevan is the capital of the RA and the largest city of the country. The City is located at the meeting point of the Hrazdan River and the Ararat valley, a high altitude plateau of semi-desert character that requires irrigation most of the year. Covering 210 km of space, the City borders on Ararat (in the south and south-west), Armavir (in the west), Aragatsotn (in the north-west) and Kotayk (in the north and east) regions. The average altitude of Yerevan is 990 m above sea level ("MASL"), with a minimum of 865 m (Malatia-Sebastia, Shengavit, Erebuni, and Nubarashen districts) and maximum of 1,390 m (Arabkir, Nor-Nork, Davitashen, and Kanaqer-Zeytun districts). The upper part of the City is surrounded with mountains on three sides while it descends to the banks of the Hrazdan River to the south. The Hrazdan River divides Yerevan into two parts.

5.1.2 Climate and meteorology

Yerevan features a steppe climate with long, hot, and dry summers and short, but cold and snowy winters. This is explained by Yerevan being located on a plain surrounded by mountains and far from the sea and its effects. 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 ranges between 290 and 350 mm annually. Yerevan experiences an average of 2,700 sunlight hours per year.

Monitoring data of the "Yerevan-Erebuni" and "Yerevan-Arabkir" stations, presented in the RA Construction Norms II-7.01-2011 "Construction Climatology" (HHSn) approved by the Minister of Urban Development on 26.09.2011, were used to describe the baseline meteorological conditions in the areas of new Arshakunyats and Nor Nork (Jrvej) bus depots, respectively. The summary of the mentioned meteorological data (air temperature, relative humidity, precipitation and wind directions) are presented in **Tables 5-1, 5.2, 5-3 and 5-4**.

Table 5-1. Average air temperature by months

Settlement / meteorological station	Elevation, MASL	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
Yerevan - Arabkir	1113	-2.9	-0.8	5.1	11.8	16.3	20.8	24.5	24.2	19.9	13.1	6.4	0.1	11.5	-21	41

Table 5-2. 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
Yerevan - Arabkir	77	73	61	57	59	53	49	50	51	60	70	76	61	69	35

Table 5-3. Precipitation data

Settlement / meteorological station	Precipitation													Snow cover		
	Average monthly Maximum daily, mm												Maximum ten-days level, mm	Number of snow cover days	Maximum quantity of water in snow, mm	
	By months															
January	February	March	April	May	June	July	August	September	October	November	December	Annual				
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			
Yerevan - Arabkir	28	31	38	48	55	29	16	8	11	31	30	28	353	50	53	152
	22	28	26	34	47	47	34	22	47	34	30	26	47			

Table 5-4. Wind directions

Settlement / meteorological station	Months	Frequency, % by directions								Average monthly velocity, m/sec	Average annual velocity, m/sec
		Average velocity, m/sec									
		N	NE	E	SE	S	SW	W	NW		
Yerevan / Erebuni	Jan	4	9	11	14	21	25	12	4	0.7	1.5
		2.2	2.2	2.2	2.9	2.7	2.3	2.6	2.7		
	Apr	7	14	8	16	20	16	13	6	1.9	
		3.1	3.2	2.8	4.0	3.1	3.0	3.8	3.6		
	July	17	28	4	9	17	13	8	4	2.8	
		5.2	5.7	2.8	2.7	2.4	2.7	2.9	4.3		
Oct.	6	18	10	10	21	20	10	5	1.0		
	2.9	2.5	2.1	2.5	2.3	2.4	2.9	3.5			
Yerevan - Arabkir	Jan	13	29	8	7	14	20	6	3	0.9	2.0
		1.9	1.9	1.6	1.7	1.8	1.5	1.8	1.9		
	Apr	15	29	6	8	12	17	9	4	2.1	
		3.1	2.6	2.3	2.2	2.5	2.4	2.5	2.5		
	July	28	32	3	3	8	16	7	3	3.4	
		6.0	4.8	1.7	1.7	1.7	1.7	2.0	2.6		

	Oct.	17	37	6	5	10	16	6	3	1.8	
		2.9	2.5	2.0	1.9	1.7	1.9	1.9	2.0		

5.1.3 Landscape, geology and soil

According to the approved Yerevan City Master-plan for 2005-2020¹⁹ (hereinafter - "the Master-plan"), the territory of the City is divided into four vertical landscape zones/types:

- dry steppe with semi-desert elements,
- semi-desert with desert elements,
- desert with semi-desert elements, and
- lowland meadow.

The consolidated sediments from the upper Pliocene to the modern age mostly represented by volcanic, volcanic-sedimentary fractions found in the geological structure of the area. Rock layers such as dolerite basalt, andesite-basalt and semirock sediments are placed on them in some places. Tuffs are characterized by great strength, but have different deployment scenarios and splitting feature. Fragile soils are mainly modern slope sediments. Hrazdan valley slopes are composed of basalt and andesite-basalt lavas, and are steep.

Modern relief history begins with the formation of upper Pliocene when volcanic rocks of that age, as well as quaternary and modern formations, started to appear on the weathered and erosion-denudation surface of Miocene sediments. Modern relief partly interfered with the formations of old relief.

Landscape and soil compositions in Yerevan vary and comprise volcanic mountain chain, declivities, plains, and arable land. Soil is exposed to pressure caused by both human activities and natural forces such as erosion, salinization, chemical and biological pollution, which, if left uncontrolled, can lead to loss of biological productivity, desertification and biodiversity loss.

5.1.4 Seismic stability and tectonics

Yerevan City and the adjacent regions are located in a seismic area and considered to have a high degree of seismic risk along existing fault lines. Earthquakes in the area can reach the magnitude of 8-9 and above on the Richter scale and maximum horizontal acceleration of 0.4 g. There was a serious earthquake in 1988 in the northern regions of Armenia, measuring 6.9 on the Richter scale. That earthquake caused many deaths and was sensed in Yerevan.

Tectonically, the Yerevan region has a complex geological structure which is explained by its location in the north-west of the Small Caucasus meganticlinorium, Sevan-Amasia tectonic zones, i.e. in Cimerel foliation zone of Kapan-Gogaran. The Sevan-Amasia tectonic zone is described by an intensive foliation, which, in some areas, is equally steep and semicircle with complex ascents and descents.

¹⁹RA Government decree №2330-N "On approval of Yerevan city Master-plan (2005-2020)"

5.1.5 Water resources

5.1.5.1 Surface water

The main water artery of Yerevan is the Hrazdan River, the left tributary of the Arax River. It divides the City into two parts and feeds Yerevan Lake (an artificial lake on the Hrazdan River). The river starts from Sevan Lake and flows from the north-east to the south-west of the country. Its length is 141 km, and the water catchment basin is around 2,560 km² (without Sevan Lake). It falls into the Arax at 820 MASL.

Water quality data provided by Ecomonitoring Center²⁰ show that the Hrazdan already enters Yerevan with noticeable pollutant concentrations from anthropogenic activities upstream, and the pollution levels increase significantly as the river flows through Yerevan, mainly due to insufficient treatment of wastewater discharged into river. **Table 5-5** provides an overview of the water quality. It compares the situation in European rivers with Yerevan Lake and the Hrazdan River at the inlet into Yerevan as well as the outlet.

Table 5-5. Comparison of water quality in European rivers with the Hrazdan River and Lake Yerevan²¹

Water quality parameter	Annual average concentrations in European rives in 2012	Annual average concentrations in the Hrazdan River in 2015 (entering the city)	Annual average concentrations in Yerevan Lake in 2015	Annual average concentrations in the Hrazdan River in 2015 (leaving the city)
BOD ₅ ²² , mg/l	2.19	4.43	2.81	19.06
NH ₄ ²³ , µg/l	158	99	831	24,424
PO ₄ ²⁴ , mg/l	0.07	0.20	0.42	2.94

These figures show that the water entering Yerevan is of sufficient quality in terms of providing environment that enables the development of aquatic life according to local standards (defined in by RA Government Decree №75-N), however, the raising concentration of BOD₅, NH₄ and PO₄ indicates that the quality worsens as the water flows through the City. High values of BOD₅ and a high concentration of NH₄ indicate a high level of organic pollution in the river²⁵. A higher concentration of PO₄ in surface water in urban areas is usually caused by detergents present in wastewater.

Upon leaving the City, the Hrazdan River water quality is quite low, which bears a risk of negative effects on human health and development of aquatic life.

5.1.5.2 Groundwater

Groundwater is the only source of industrial and drinking water supply in Armenia²⁶. The drinking water system of Yerevan is fed from the Aparan aquifer²⁷. There are sedimentary and volcanic

²⁰"Hydrometeorology and Monitoring Center" SNCO under the ME.

²¹Yerevan's Green City Action Plan 2017.

²²Biochemical Oxygen Demand.

²³Ammonium.

²⁴Phosphates.

²⁵High level of organic pollution in rivers reduces the biodiversity of aquatic communities and microbiological quality.

²⁶Aghinian A. (2009) Ground Water Vulnerability Assessment of the Aparan Aquifer, Republic of Armenia, and Its Representation in A 3-D Model. In: Jones J.A.A., Vardanian T.G., Hakopian C. (Eds) Threats to Global Water Security. NATO Science for Peace and Security Series C: Environmental Security. Springer, Dordrecht.

²⁷Ibid.

rocks with both fracture and intergranular types of pores available in the territory of Yerevan. The quality and quantity of drinking water resources for Yerevan is subject to the regular monitoring by the "Hydrogeological Monitoring Centre" SNCO under the ME, as since 1994 there has been no long-term systematic monitoring of the overall groundwater quality and quantity in Yerevan region.

Thus, at present, information on availability and quality of groundwater bodies in Yerevan (and in the country as well) is limited due to the lack of hydrogeological inventory of groundwater basins and subsequent lack of data on groundwater quality therein.

5.1.6 Air quality

Air quality in Yerevan is significantly worse than in European cities of comparable size²⁸. High concentrations of dust particles, due mainly to erosion caused by deforestation, is the leading cause of low air quality in the City. Furthermore, SO₂ and NO_x emissions occur in significant concentrations. Emissions of NO_x are mostly related to the transport sector. Concentration levels of pollutants and the number of days on which limits have been exceeded are above the standards set by WHO and the EU.

Air quality has a direct impact on incidence of respiratory diseases and the general quality of the environment. It is also the most comprehensible assessment of environmental quality for the inhabitants of our City.

Air quality monitoring in Armenia is performed by the Ecomonitoring Center²⁹. The concentrations of dust, CO, NO_x, SO₂ and O₃ (ozone) are generally measured in the City atmosphere. 6,975 samples of air pollutants were taken at Yerevan's five air quality monitoring stations in 2019³⁰. Then, the obtained monitoring data are compared with values set in the RA Government decree №160-N that defines maximum permissible concentrations (MPC) of air pollutants in the atmosphere of residential areas (**Table 5-6**).

Table 5-6. MPC of air pollutants (dust, CO, NO_x, SO₂ and O₃)

Air pollutant	MPC, mg/m ³	
	Daily average	Maximum single
Dust	0.15	0.5
CO	3	5
NO ₂	0.04	0.2
SO ₂	0.05	0.5
O ₃	0.03	0.16

In 2019, the concentration of air pollutants (except dust) in the atmosphere were below the 2018 average level at all five monitoring stations (**Figure 5-1**). During the last five years, the background concentrations of SO₂, NO₂, and surface layer of ozone have decreased, while the concentration of dust has trended to increase (**Table 5-7**).

²⁸Yerevan's Green City Action Plan 2017.

²⁹Hydrometeorology and Monitoring Center" SNCO under the ME.

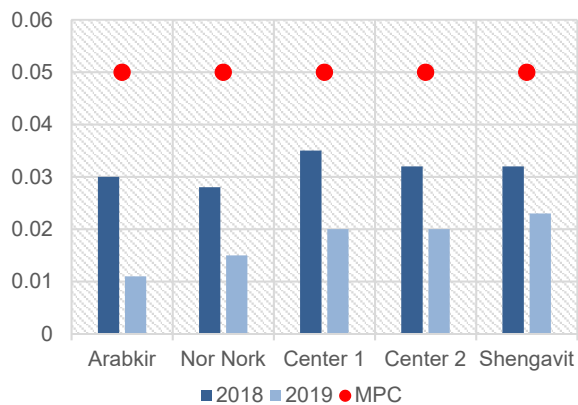
³⁰Report on atmospheric air pollutions in territory of the Republic of Armenia in 2019.

Table 5-7. Variations of average annual pollution in the City’s atmosphere in 2015-2019³¹

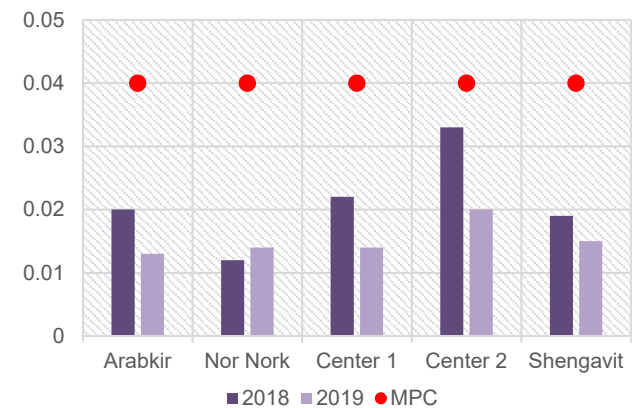
Air pollutant	Average annual concentrations, mg/m ³					Tendency
	2015	2016	2017	2018	2019	
Dust	0.109	0.95	0.143	0.110	0.128	0.0053
NO ₂	0.016	0.023	0.022	0.020	0.015	-0.0005
SO ₂	0.029	0.028	0.029	0.028	0.018	-0.0022
O ₃	0.006	0.005	0.008	0.007	0.006	-0.00004

Figure 5-1. Annual average concentrations of atmospheric air pollutants (SO₂, NO₂, O₃ and dust) measured in the City’s five monitoring points in 2018-2019 (mg/m³)

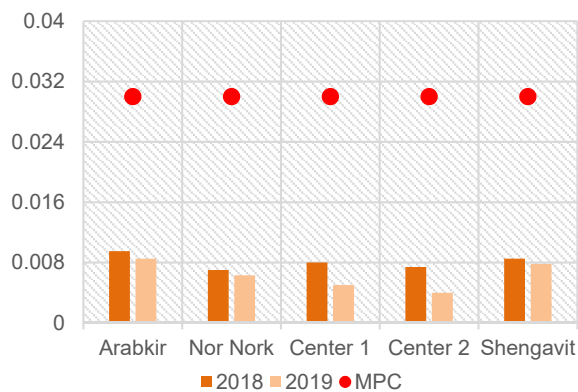
SO₂ average concentrations



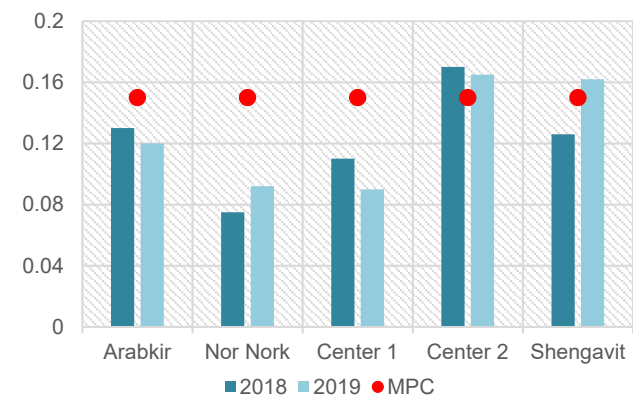
NO₂ average concentrations



O₃ average concentrations



Dust average concentrations



5.1.7 Noise and vibration

Currently, the dominant noise source in Yerevan is associated with the operation of urban transport (approximately 90%). The highest noise levels are generating in the center of Yerevan, where due to the high traffic density the national noise threshold limit values ("TLV") are violated even at nighttime. The TLVs set in national and WHO noise standards are summarized in **Table 5-8**.

³¹Ibid.

Table 5-8. Threshold limit values for noise

№	Premises and territories	Threshold limit values (TLV), dBA		
		National ³²		WHO ³³
		Equivalent to sound level	Maximum sound level	One hour equivalent to sound level
1	Workplace	80	-	85
2	Shops, trading halls, airport and railway stations waiting rooms, drop-off points of public service providers	60	75	70
3	Territories adjacent to residential buildings, clinics, ambulatories, rest houses, care homes, disabled persons homes, libraries, kinder gardens, schools and other educational facilities	6 ⁰⁰ -22 ⁰⁰	70	70
		22 ⁰⁰ -6 ⁰⁰	60	

The main sources of vibration in the City are the construction and road asphalt pavement activities, operation of industrial and manufacturing facilities, etc. The vibration generated from the transport sector is low (beside the vicinities of metro network that is laid quite away from the project sites) and can be neglected.

5.1.8 Waste management

Generally, waste management and recycling activities are not well developed in Armenia. Neither organized waste sorting, recycling, nor reuse activities take place. The City has three main landfills:

- **Nubarashen landfill** is the largest waste disposal site located 9-10 km away from the center of Yerevan and occupies 52.3 ha. Approximately 750-800 tons daily, 23,000 tons monthly and 280,000 tons of solid waste annually are disposed of at the landfill.
- **Ajapnyak landfill** is located at the area of the Spandaryan Industrial Hub of Ajapnyak administrative district and occupies approximately 8 ha.
- **Jrvej landfill** is located at the area of 6th field of Jrvezh Community and occupies 6.0 ha. Approximately 180-200 tons daily, 5,700 tons monthly and 68,000 tons of solid waste annually are disposed of at the landfill.

Armenia has no landfills for the disposal of industrial and hazardous wastes. However, some companies specialized in recycling and treatment of hazardous wastes, such as used tyres, lead accumulators, oil, ferrous and non-ferrous scrap, were established and operate.

5.1.9 Biodiversity

The flora and fauna of the Yerevan area are typical to the Yerevan floristic region. Mainly the petrophilvariants of the semi-desert flora are prevailing here with ephemeral and halophyte, psammophyte desert plant species. The fauna in the region is represented mostly by species, typical for desert and semi-desert landscapes. Amphibians (such as lakefrogs, Syrian spadefoots, greentoads), lizards (round-headed, snake-headed ones and long-legged skinks) and snakes

³²Sanitary Norms № 2-III-11.3 "Noise in the workplaces, in residential and public buildings and in residential construction areas"

³³Guidelines for Community Noise, World Health Organization (WHO), 1999

(blindsnakes, rhinosnakes) are common in the area. Birds and insects are diverse. Satyrs and big swallowtails are typical butterflies.

The Project area lies within the urban environment and no wild plants or animals inhabit it. No specially protected nature areas, endangered and other vulnerable ecosystems are available there.

5.1.10 Specially protected areas

The RA Government Decree №1059-N "On Approval of strategy, State program and measures regarding the specially protected areas ("SPA") of nature in the Republic of Armenia", specifies 34 sites, including 4 national parks, 3 reserves and 27 sanctuaries, as protected areas.

The desktop study conducted by the Consultant reveals several protected areas of regional level, out of which the closest ones are:

- Erebuni Reserve (89 ha) located 6-7 km far from the City boundary, and
- Khosrov Forest Reserve (29,000 ha), Sands of Goravan (200 ha) and Vordan Karmir (200 ha) sanctuaries situated at the distance of 15-25 km from the Yerevan boundary.

The mentioned protected areas are located quite far from the City and cannot be affected by the Project.

5.2 Socio-economic baseline

5.2.1 General

As stated in the Constitution of the Republic of Armenia (Article 108) Yerevan is a community. The local self-governance of Yerevan community (municipality) is regulated by the RA 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 the City Council members' seats the Mayor is elected through secret voting.

Yerevan community is divided into 12 administrative districts: Ajapnyak, Avan, Arabkir, Davtashen, Erebuni, Kentron (City Center), Malatia-Sebastia, Nor Nork, Nork-Marash, Nubarashen, Shengavit and Kanaker-Zeytun. The key characteristics of Yerevan districts are given in **Table 5-9**. The heads of administrative districts are appointed by the Mayor.

Table 5-9. The key characteristics of Yerevan administrative districts³⁴

Administrative District	Population, thousand residents	Total area of community, ha	Population density, residents per km ²
Ajapnyak	109.80	2,582	4,252.5
Avan	52.90	726	7,286.5
Arabkir	114.50	1,329	8,615.5

³⁴www.armstat.am

Administrative District	Population, thousand residents	Total area of community, ha	Population density, residents per km ²
Davtashen	42.50	647	6,568.8
Erebuni	129.30	4,749	2,722.7
Kentron (City Center)	125.50	1,335	9,400.7
Malatia-Sebastia	139.40	2,516	5,540.5
Nor Nork	133.10	1,411	9,433.0
Nork-Marash	11.60	476	2,437.0
Nubarashen	9.90	1,724	574.2
Shengavit	141.20	4,060	3,477.8
Kanaker-Zeytun	74.30	773	9,611.9
Total	1,084.00	22,328	

Yerevan is the largest economic, educational, scientific and cultural center 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.

5.2.2 Demography

Yerevan, the capital of Armenia, has the largest share of urban population in the country. Yerevan's population had drastically increased in the Soviet period, especially in the 1950s-1980s. The historical maximum of the 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 stabilized at the level of around 1.1 million residents. Since then, no significant fluctuations in the population number has been noted. The historical and up-to-date population data are given in **Table 5-10**.

Table 5-10. Population of Yerevan: 1990-2020

Yerevan population, thousand people	1990 (estimated)	2001 (Census results)	2011 (Census results)	2015 (estimated by the NSS)	2020 (estimated by the NSS)
	1,218	1,103.5	1,060.1	1,071.5	1,084.0

As seen from the data provided by the National statistical service ("NSS"), the population of Yerevan increased by 1% in 2011-2015 and by 1.5% in 2015-2020, while the total population of Armenia decreased by around 9% in the same period. This is mainly caused by internal migration, when people from the country's regions migrate to Yerevan for education and employment purposes. De facto, the population of Yerevan is 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's population by administrative districts is given in **Table 5-9**.

5.2.3 Minorities

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 within Armenian society and they are not classified as indigenous people. Basically, the minority people do not have difficulty in communicating in the Armenian language. The minority people (citizens) have all the rights and obligations of the 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 as follows: women - 54% and men - 46%.

5.2.4 Socio-economic indicators

Yerevan is the largest economic, educational, scientific and cultural center of Armenia, as well as its major transport and transit hub. Yerevan's share in the country's output is 42.4% in industrial sector, 53.9% in construction sector, 82.6% in retail trade, and 85.5% in services provision sector. Around 86% of multi-apartment residential buildings and around 30% of hotels are located in Yerevan.

The main sectors of the City's industry are food industry (including alcoholic beverages), chemical industry, and 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 the country's average (3,863.7 USD in 2014). According to the mentioned Program, the average GDP growth is assumed 4% per year towards 2025.

As of January 2020 the nominal monthly wages in Armenia amount to 183,030 AMD (around 313 EUR³⁵) and increased to 5.3% compared with the 2019. In public sector the average wages has 8.6% increase up to 155,407 AMD (266 EUR), while in private sector it is equal to 196,503 AMD (336 EUR) and increased to 3.8%³⁶.

As per the 2011 population census (last 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's populations (50% of women and 39% of men) have no income source; they are under the tutelage of their family members.

³⁵1EUR=585AMD

³⁶<https://b24.am/economy/80541.html>

The overall Gini coefficient for Armenia³⁷ is 0.05, suggesting a relatively equal distribution of wealth at the national level. The lowest Gini coefficient is seen in Yerevan (0.02), where nearly half of the population (47%) is in the highest wealth quintile. The highest Gini coefficients - that is, the least equitable distributions of wealth - are observed in Armavir (0.19) and Vayots Dzor (0.12)³⁸.

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 is 2.3%. Overall women earn less remuneration than men (68.5%). The decision on husbands' earnings are mostly managed jointly (79.9%). Around 46% of women in Yerevan do not own a housing, the same data for men is lower - 33.2%.

5.2.5 Poverty and social allowances

As per the "Report on poverty profile in Armenia in 2008-2018" published in 2019 by the RA NSS, the people are defined as poor if their monthly per capita income is less than 42,621 AMD (around 73 EUR), very poor if their monthly per capita income is less than 35,071 AMD (around 60 EUR) and extremely poor if their monthly per capita income is less than 24,827 AMD (43 EUR). This means that the criteria for extreme poverty is survival for 1.43 EUR per day. The key poverty indicators for Yerevan are presented in **Table 5-11**.

Table 5-11. Key poverty indicators in 2008, 2017 and 2018, %³⁹

	2008			2017			2018				
	Extre- mely poor	Mode- rately Poor	Poor	Extre- mely poor	Mode- rately Poor	Poor	Extre- mely poor	Mode- rately Poor	Poor	Poverty Gap	Poverty Severity
Urban Areas	1.9	13.0	27.6	1.2	9.8	25.0	1.0	11.5	24.9	4.4	1.2
Yerevan	1.1	8.1	20.1	1.0	8.3	22.4	1.0	9.0	19.9	3.4	0.9
Other Cities	2.8	18.2	35.8	1.3	11.5	27.9	1.1	14.2	30.3	5.5	1.5
Rural Areas	1.2	11.9	27.5	1.9	11.8	26.8	0.9	9.2	21.3	3.8	1.0
Total	1.6	12.6	27.6	1.4	10.6	25.7	1.0	9.6	23.5	4.2	1.1

Official unemployment rate in Yerevan is 10.6%; however, the actual unemployment rate might be higher. Among the population of Yerevan, around 15.6% receive retirement benefits and 1.6% receive social and other allowances.

³⁷The Gini coefficient of wealth indicates the concentration of wealth, with 0 representing an exactly equal distribution (everyone having the same amount of wealth) and 1 representing a totally unequal distribution (one person having all the wealth).

³⁸Armenia Demographic and Health Survey 2015-16. National Statistical Service, Ministry of Health, The DHS Program ICF available through <https://dhsprogram.com/pubs/pdf/FR325/FR325.pdf>

³⁹https://www.armstat.am/file/article/poverty_2019_a_2.pdf

5.3 Preliminary environmental assessment, impacts, opportunities and mitigation

5.3.1 General

Phase 1 of the Project consists of the following three components:

Component 1: Purchase of 100 CNG low floor buses (standard 12 m) to be in line with EURO V or higher standards,

Component 2: Construction of new Arshakunyats bus depot, including refueling and car washing stations,

Component 3: Upgrade/rehabilitation of Nor Nork (Jrvej) depot.

100 new low-floor CNG buses will be introduced into the five bus routes. As a result, 17 routes (5 bus and 12 minibus routes) will be terminated meaning that 50 old buses and 139 minibuses will be taken out of service. The annual vehicle kilometres / mileage of new fleet will be more than 3 times lower than that of the current 17 routes. According to the Project ToR, the buses to be purchased should comply with EURO V or higher standards as well as with high noise, safety and comfort criteria. Therefore, it can be assumed that the implementation of Component 1 will have an impact on the following environments/resources:

- Atmospheric air (emissions of air pollutants and greenhouse gases ("GHG")),
- Soil (waste generation as a result of bus operation),
- Resource efficiency (use of fuel and bus spare parts),
- Community health and safety (noise emission and car accidents),
- Passengers (comfort conditions),
- Drivers' health and safety.

The elaboration of the detailed design documents for Components 2 and 3 of the Project Phase 1 is ongoing. The layouts of Arshakunyats and Nor Nork (Jrvej) bus depots as well as the lists of facilities (presented in **Section 2.4.2**) to be constructed/upgraded in both depots are the only documents available for the E&S evaluation at the moment. Therefore, the Consultant has performed only a preliminary E&S assessment of the mentioned components based on the available E&S baseline data and walk-over surveys that provided the understanding of the sensibility of the depots' sites and surroundings, as well as the Consultant's local knowledge, expertise and practice.

5.3.2 E&S assessment of Component 1: impacts and opportunities

5.3.2.1 GHG assessment and air emissions

The environmental analysis of Component 1 related to the introduction of new bus fleet was performed by the Project Phase 1 Technical consultant⁴⁰. This analysis contains the assessment/calculations of an expected drop in GHG and exhaust emissions associated with the operation of new 100 buses instead of the 50 old buses and 139 minibuses to be withdrawn (see **Section 2.4.3**).

The GHG and exhaust emissions calculation was performed based on "EMEP/EEA air pollutant emission inventory guidebook, 2019" ("Guidebook") and EBRD protocol for assessment of GHG

⁴⁰Draft (Technical) Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020

emissions, while the monetization of the calculated emissions was conducted using "Methodology for the economic assessment of EBRD projects with high greenhouse gas emissions".

According to the Guidebook, the GHG and exhaust emissions calculation were conducted based on three parameters: emission factor for each type of vehicle / bus, fuel consumption, and annual mileage.

The emission factors of the considered vehicles / buses were taken and calculated as per the methods in the Guidebook for the following pollutants (**Table 5-12**):

- GHG emissions:
 1. Carbon dioxide (CO₂),
 2. Methane (CH₄).
- Air pollution emissions⁴¹:
 1. Particulate matter (PM),
 2. Nitrogen Oxide (NO_x).

Table 5-12. Emission factors for CO₂, CH₄, PM and NO_x

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
CO ₂ emission factor	g CO ₂ per g of CNG	1.280	1.280	0.980
CH ₄ emission factor	g CH ₄ per g of CNG	0.003	0.003	0.002
GHG emission factor ⁴²	g CO ₂ eq per g of CNG	2.822	2.822	2.803
PM _{2.5=10=tsp} emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000022	0.000022	0.000011
	g PM _{2.5=10=tsp} per km	0.01	0.01	0.005
NO _x emission factor	g NO _x per g of CNG	0.0220	0.0220	0.0055
	g NO _x per km	10	10	2.5
<i>For reference: fuel consumption</i>	<i>g per km</i>	455		

The annual vehicle kilometres / mileage of the new fleet are 6,098,271 km (Project scenario), while the same value for the terminated routes (buses and minibuses to be replaced by new buses) are 20,267,858 km, of which 5,625,541 km refer to buses and 14,642,317 km refer to minibuses (Baseline scenario).

The results of the environmental analysis (extracted from the Draft (Technical) Due Diligence Report, Yerevan Bus Renewal Project - Phase 1, August 2020) are given in **Annex 3**, while the summary of GHG and exhaust emissions calculation for the Baseline and Project scenarios are presented below.

Baseline scenario

The total amount of GHG and exhaust emissions calculated based on the annual mileage of the minibuses and urban buses currently operated in Yerevan are summarized in **Tables 5-13 - 5.15**.

⁴¹The environmental analysis did not include Sulphur dioxide (SO₂) and Nitrogen dioxide (N₂O) emissions as only CNG vehicles / buses were considered.

⁴²Calculated based on the Global Warming Potential (GWP) parameters.

Table 5-13. Summary of GHG emissions

GHG	Unit	EURO III Bus	EURO III Minibus	Total
Emission factor	g CO ₂ eq per g of CNG	2.822	2.822	-
Fuel consumption	g CNG per km	283.1	120	-
Annual mileage	km	5,625,541	14,642,317	20,267,858
Total annual emissions	tonne CO₂eq	4,494	4,958	9,452

Table 5-14. Summary of particulate matter emissions

PM	Unit	EURO III Bus	EURO III Minibus	Total
Emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000022	0.000022	-
Fuel consumption	g CNG per km	283.1	120	-
Annual mileage	km	5,625,541	14,642,317	20,422,947
Total annual emissions	tonne PM_{2.5=10=tsp}	0.035	0.039	0.074

Table 5-15. Summary of nitrogen oxides emissions

NO _x	Unit	EURO III Bus	EURO III Minibus	Total
Emission factor	g NO _x per g of CNG	0.022	0.022	-
Fuel consumption	g CNG per km	283.1	120	-
Annual mileage	km	5,625,541	14,642,317	20,422,947
Total annual emissions	tonne NO_x	35.0	38.62	73.62

Project scenario

The Project scenario (Phase 1) assumes that the currently operated buses and minibuses will be replaced with new CNG buses of emission standard EURO VI. The summaries of total annual GHG and exhaust emissions associated with this Project scenario are given in **Tables 5-16 - 5-18**.

Table 5-16. Summary of GHG emissions

GHG	Unit	EURO VI Bus
Emission factor	g CO ₂ eq per g of CNG	2.803
Fuel consumption	g CNG per km	381
Annual mileage	km	6,098,272
Total annual emissions	tonne CO₂eq	6,513

Table 5-17. Summary of particulate matter emissions

PM	Unit	EURO VI Bus
Emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000011
Fuel consumption	g CNG per km	381
Annual mileage	km	6,098,272
Total annual emissions	tonne PM_{2.5=10=tsp}	0.026

Table 5-18. Summary of nitrogen oxides emissions

NO _x	Unit	EURO VI Bus
Emission factor	g NO _x per g of CNG	0.0055
Fuel consumption	g CNG per km	381
Annual mileage	km	6,098,272
Total annual emissions	tonne NO_x	12.766

The calculated annual GHG and exhaust emissions for the Baseline and Project scenarios as well as their expected reduction as a result of Component 1 implementation are summarized in **Table 5-19**.

Table 5-19. Estimated annual reduction in GHG and exgaust emissions

Emissions	Baseline scenario, tonne	Project scenario, tonne	Reduction	
			in tonne	in %
GHG (CO ₂ eq)	9,452	6,513	-2,939	≈30
PM	0.074	0.026	-0.048	≈65
NO _x	73.62	12.766	-60.854	≈83

5.3.2.2 Resource efficiency and waste generation

The operation of public transport means (buses, minibuses, etc.) is accompanied with the planned consumption of maintenance items / expendables (oil, filters, tyres, accumulators, etc.), as well as with unpredictable use of vehicles/buses spare parts associated with the traffic collisions and accidents.

To evaluate the resource efficiency of Project Component 1, i.e. the use of 100 new CNG buses versus the operation of the existing fleet (buses and minibuses), the calculations of main maintenance items were conducted based on the document "Calculation of expenses for the passenger transportation by buses and minibuses", prepared by Yerevan municipality. This document sets norms / limits for buses and minibuses related to the consumption of motor oil, tyres and accumulators. Additionally, the E&S Consultant calculated the annual consumption of oil filters considering that they are replaced every time when motor oil is refilled. The consumption norms / limits of maintenance items, alongside their weights and required quantities that were used for resource efficiency determination, are given in **Table 5-20**.

Table 5-20. Consumption norms for motor oil, oil filters, tyres and accumulators

No	Item	Bus	Minibus
1. Motor oil			
1.1	Consumption norm (replacement frequency)	11000 km	10000 km
1.2	Required quantity (per replacement)	12.34 liter	5.5 liter
2. Oil filters			
2.1	Consumption norm (replacement frequency)	11000 km	10000 km
2.2	Weight ⁴³	0.6 kg	0.4 kg

⁴³Web-sites of oil filter producers

3. Tyres			
3.1	Consumption norm (replacement frequency)	80000 km	60000 km
3.2	Weight ⁴⁴	4 x 65 kg	4 x 16 kg
4. Accumulators			
4.1	Consumption norm (replacement frequency)	2 year	2 year
4.2	Weight ⁴⁵	46 kg	17 kg

The annual consumptions of motor oil, oil filters and tyres for the Project and Baseline scenarios were calculated based on the annual mileage of the new and existing bus / minibus fleets, respectively (see **Section 2.4.3**). The annual consumption of accumulators was determined considering that 5 new bus routes (100 new CNG buses) will replace the 17 terminated routes (50 old buses and 139 minibuses).

The annual consumption of maintenance items for the Baseline and Project scenarios and evaluation of resource efficiency for the Project Component 1 is summarized in **Table 5-21**.

Table 5-21. Annual consumption of maintenance items calculated for the Baseline and Project scenarios and resource efficiency values

Maintenance item	Baseline scenario			Project scenario	Resource efficiency
	Bus	Minibus	Total		
Motor oil	6,310 liters	8,053 liters	14,363 liters	6,841 liters	7522 liters
Oil filter	307 kg	586 kg	893 kg	333 kg	560 kg
Tyres	18.278 tonne	15.618 tonne	33.896 tonne	19.819 tonne	14.077 tonne
Accumulators	1.15 tonne	1.19 tonne	2.34 tonne	2.3 tonne	0.04 tonne
For references:					
<i>Average mileage</i>	<i>5,625,541 km</i>	<i>14,642,317 km</i>	<i>20,267,858 km</i>	<i>6,098,271 km</i>	
<i>Bus fleet</i>	<i>50</i>	<i>139</i>	<i>189</i>	<i>100</i>	

To summarize, due to the implementation of Project Component 1, 7,522 liters of motor oil, 560 kg (1421 pcs) of oil filters, 14.077 tonnes of tyres and 0.04 tonnes of accumulators will be saved annually. This means that the quantities of generated waste, such as used motor oil (3rd class of hazard), used oil filters (4th class of hazard), used tyres (4th class of hazard) and used lead accumulators (2nd class of hazard) will be reduced correspondingly.

5.3.2.3 Community health and safety

The impacts of Project Component 1 on community health and safety are associated with noise and air emissions as well as traffic collisions and accidents. As stated above, 100 new CNG buses to be purchased shall comply with the EURO V or higher air emission standards. It is obvious, that the level of noise generated during the operation of new buses will be lower than from the existing ones. In general, the reduction in air emissions and noise level that will be attained as a result of Component 1 implementation can have a positive impact on community health and safety. However, the share of new bus fleet in the total City traffic is very low, if not negligible.

⁴⁴MPO-8-99. Methodology for calculation of generated wastes' quantities: used tyres, 2004

⁴⁵MPO-4-99. Methodology for calculation of generated wastes' quantities: used accumulators, 2004

It is assumed that the operation of new up-to-date CNG buses will reduce the number and severity of traffic collisions and accidents as they will be in "good" working conditions (at least during the first three years of operation) and will be equipped with advanced safety alarm devices and systems. Therefore, the impact of Component 1 on community health and safety is considered positive.

5.3.2.4 Drivers' health and safety

It is assumed that 100 new up-to-date buses to be purchased will ensure healthier and safer conditions for drivers compared with the existing bus fleet. These conditions include orthopedic seats for drivers, bus operation and control advanced system, etc.

In addition, the operation of the public transport ticketing system will release the drivers from dealing with the cash payments and, as a result, the drivers will be able to fully concentrate on their key function, i.e. safe steering of buses.

5.3.2.5 Comfort conditions

The introduction of 100 new up-to-date buses will improve the comfort conditions of the City's public transport system. This will be accompanied with the implementation of tariff and ticketing system for the public transport network as well as of the Project Phase 2.


There is no information about whether 100 new buses will be equipped with special devices for people with disabilities, such as wheel-chairs or else.


5.3.3 Preliminary E&S assessment of Components 2 and 3, impacts and opportunities

The results of the preliminary E&S assessment of new Arshakunyats depot (to be constructed) and existing Nor Nork (Jrvej) depot (to be upgraded) are summarized in **Table 5-22**.

Table 5-22. Summary of the preliminary E&S assessment and mitigation for Arshakunyats new bus depot construction and existing Nor-Nork (Jrvej) bus depot upgrade

(AR - Arshakunyats new bus depot, NN - Nor Nork (Jrvej) bus depot)

No	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
I Construction / Upgrade stage				
I-1	Noise and vibration	Working personal Neighboring community	<p>(AR) The site selected for the construction of Arshakunyats bus depot is located in close vicinity to residential area. The distance between the boundary of the new depot and the nearest residential house is 25-30 m. Thus, the residents of neighbouring houses can be disturbed by the noise from the construction equipment. However, the impact will be temporary and can be mitigated by implementation of recommended measures.</p> <p>The seismic stability of the residential houses and the restaurant (see picture below) located within 40 m from the vibration source also can be impacted.</p> 	<ol style="list-style-type: none"> 1. Perform regular technical maintenance of used construction equipment and heavy vehicles, 2. Inform the residents of nearby houses at least two days before about high noise evolving activities, 3. Limit truck routes and speed (keep the recommended speed) where trucks may pass close to the sensitive receptors / houses, 4. Keep restrictions on working hours, weekends or public holidays, stop operation of construction equipment at night time (20:00-08:00), 5. Enforce the use of ear protective PPE among workers, 6. Perform mapping and pre-construction inventory of sensitive buildings located within the 40 m zone from the vibration sources, 7. While starting vibration-causing works monitor the vibration impact on the cracks formation and development. If the vibration level is above the TLV, stop the works and undertake alternative mitigation measures.
			<p>(NN) - Although the Nor Nork (Jrvej) bus depot is surrounded by the commercial facilities, there is a Jrvej residential area that is located to the south of the depot (see picture below). The distance between the depot boundary and the nearest residential area is 120-130 m. It is unlikely that the vibration from the construction works can affect the nearest houses and buildings, but the emitted noise can have some influence on the living quality of the neighbouring population.</p>	<ol style="list-style-type: none"> 1. Perform regular technical maintenance of used construction equipment and heavy vehicles, 2. Limit truck routes and speed (keep the recommended speed) where trucks may pass close to the sensitive receptors / houses,

No	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
				<ol style="list-style-type: none"> 3. Keep restrictions on working hours, weekends or public holidays, stop operation of construction equipment at night time (20:00-08:00), 4. Enforce the use of ear protective PPE among workers.
I-2	Air emissions	Air quality Community health and safety Neighboring community Working personal	<p>(AR) - The construction of new Arshakunyats bus depot will be accompanied with the earthworks and operation of construction equipment and vehicles. Therefore, dust emissions as well as gaseous emissions will be released and affect the neighbouring population (see picture above).</p> <p>(NN) - The construction of new facilities and rehabilitation / reconstruction of the existing facilities within Nor Nork (Jrvej) bus depot will generate gaseous emissions to the atmosphere and will impact the neighbouring population (see picture above).</p>	<ol style="list-style-type: none"> 1. Use modern construction machinery equipped with engines compliant with at least Euro III standards, with emission control and minimal noise characteristics, 2. Perform regular technical maintenance of used construction equipment and heavy vehicles, 3. While transporting friable materials keep the body of heavy vehicles covered, 4. Store friable materials at the construction site under the waterproof tent, 5. Restrict excavation and earthworks during the periods of strong winds, 6. Apply regular watering to on-site and off-site dirt roads, especially during the excavation and other earthworks, 7. Prohibit construction materials and waste burning.
I-3	Wastewater generation	Water resources	<p>(AR) - Wastewater can be generated as a result of site watering during the excavation and other earthworks. There are no surface water resources in the vicinities, so the wastewater as well as stormwater will penetrate the ground or will discharge into the nearest municipal stormwater sewage network.</p>	<ol style="list-style-type: none"> 1. Prohibit excavation and other earthworks during the unfavorable weather conditions (rain, snow), 2. Construct wastewater and stormwater diversion network (culvert) around the Project site to avoid wastewater penetration into the ground and soil pollution.

№	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
			<p>(NN) The area of Nor Nork (Jrvej) depot is connected with the municipal sewage system; hence, the wastewater and stormwater to be generated in the course of reconstruction works will be discharged into the municipal sewage network.</p>	-
I-4	Waste generation	Soil	<p>(AR and NN) - During the construction and rehabilitation activities in both depots, the construction and household wastes as well as ferrous and non-ferrous metal scrap, oiled soil and rags and used oil will be generated. They should be stored separately in special containers and specially allocated areas and periodically disposed of to the authorized landfills or passed to the licensed companies.</p> <p>The earthworks in Arshakunyats depot will be accompanied with the generation of top-soil and excavated ground materials.</p>	<ol style="list-style-type: none"> 1. Manage the top-soil stripped before the excavation works at Arshakunyats site according to the RA Government decree №1396-N (Procedure for top-soil use), 2. Store top-soil separately in a designated place, covered by waterproof tent, uncompressed and in such a manner that it does not lose its fertile characteristics, 3. Dispose the excavated ground materials in landfill / area recommended by Yerevan municipality, 4. Equip the construction site with household collection bins, 5. Equip the construction site and associated facilities with the waste separated collection / storage containers and locations, 6. Sign contracts with the licensed waste treatment / utilization and disposal companies.
I-5	Leakages and spills	Soil and groundwater	<p>(AR and NN) - During the construction / rehabilitation activities, the soil / topsoil can be contaminated as a result of accidental leakages of fuel, other oil products from the vehicles and construction equipment. The spillages of chemicals, like paints and solvents are also possible.</p> <p>The spill of friable materials may occur due to the improper operations/activities and/or unfavorable weather conditions.</p>	<ol style="list-style-type: none"> 1. Refuel the vehicles at the outside refueling stations, 2. Use spill catching protective trays when refueling the construction equipment on site, 3. Place the fuel and oil tanks in covered areas with berms or dikes installed to intercept spills. Where possible, the secondary containment trays for the fuel tanks should be applied, 4. Equip vehicles (transporting liquid materials) and liquid materials storage areas with absorbent materials and emergency spill-kits,

No	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
				5. Store the contaminated soil in special containers and periodically pass it to the specialized waste treatment / utilization companies.
I-6	Traffic density	Neighboring community Road infrastructure	(AR and NN) - During the construction / rehabilitation works some slight increase in traffic density along the Arshakunyats avenue - Shirak street (for Arshakunyats bus depot) and Tevosyan street - Hovhannisyan street (for Nor Nork (Jrvej) depot) can be expected. However, within the total traffic load in Yerevan, these impacts are seen as very low and can be neglected.	-
I-7	Biodiversity impact	Flora and fauna	(AR) - The selected site for Arshakunyats new bus depot is an abandoned semi-desert / semi-steppe area with rather poor biodiversity. However, before the start of construction activities the selected site and its surroundings shall be investigated, endangered species, if any, should be identified and relevant protective measures should be undertaken.	Before the start of construction works invite a specialized company or expert to perform a biodiversity survey in and around the Project site, identify the endangered species, if any, and propose relevant mitigation measures.
			(NN) - The area of Nor Nork (Jrvej) bus depot has been under the human impact for many years. So, no impacts on flora and fauna during the depot rehabilitation / upgrade is expected.	-
I-7	Physical displacement and land acquisition	Land-plots Area of site selected for Arshakunyats new bus depot	(AR) - It is envisioned to allocate land-plots located in the City's Shengavit district (at the crossing point of Arshakunyats avenue and Shirak street) for the construction of Arshakunyats new bus depot. According to the provided information, the land-plots to be allocated for the construction of depot belong to Yerevan community. So, most probably, the allocation of these land-plots to the Project needs will not trigger physical displacement or involuntary land acquisition.	<ol style="list-style-type: none"> 1. Conduct land acquisition for the purposes of Arshakunyats new bus depot construction based on the provisions of the RA Government decree №286 "On approval of procedure for the public and community owned land allocation and use as well as issuance of construction certificate". 2. If any impacts on land use / risks of economic displacement are identified for the local population, comply with the requirements of EBRD PR5.

No	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
			(NN) - The reconstruction / rehabilitation activities will be performed within the territory of Nor Nork (Jrvej) bus depot. No land acquisition will be required.	-
I-8	Impact on infrastructure	Infrastructure and facilities	(AR) - It is obvious that construction and operation of new Arshakunyats bus depot will require connection of internal communications and infrastructure with water, gas and power energy supply public utilities and wastewater sewage network. Therefore, the approvals of the relevant public service operators shall be obtained during the Project detailed design stage (before the start of construction).	Before the start of construction works, obtain approvals of the following public service operators: <ul style="list-style-type: none"> • Potable and technical / irrigation water supply (Veolia Jur CJSC), • Wastewater discharge and treatment (Veolia Jur CJSC), • Power energy supply (Electric Networks of Armenia CJSC) • Gas supply (Gazprom Armenia CJSC) • Telecommunication service providers (Ucom, Beeline/Telecom Armenia, MTS-Armenia, etc.).
			(NN) - It is not expected that the upgrade / rehabilitation of Nor Nork (Jrvej) bus depot will have a significant impact on the public service infrastructure.	-
I-9	Socio-economic impact	Working personal Population Subcontractors State budget (social payments from new jobs/salaries)	(AR and NN) - In general, the construction / rehabilitation works will have a positive impact on the economic development of Yerevan City, as well as the socio-economic profile of the region. Local/regional sub-constructors can be engaged to undertake some construction works. The Project is also important from the viewpoint of new jobs creation. Temporary workplaces will be created for the residents of the City and the neighbouring regions during the construction / rehabilitation activities, especially for the positions requiring low and medium qualifications.	-
I-10	Health and safety	Working personal	(AR and NN) - Construction and rehabilitation of the depots will be accompanied by simultaneous exploitation of vehicles and construction equipment at the construction sites as well as various hazardous works, namely fire works and works at heights, which may cause the following emergency situations: <ul style="list-style-type: none"> • Fire and ignitions, 	1. Ensure appropriate visual safety signs and posters within the site and near the entrances, 2. Secure working personnel with certified PPE and first-aid means,

№	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
			<ul style="list-style-type: none"> • Liquid leakages, • Injuries of workers, • Unproper sanitary-higienic conditions, • Accidents with operating equipment. 	<ol style="list-style-type: none"> 3. Conduct trainings on compliance with prescribed routes and speed for drivers of construction vehicles, 4. Ensure initial and periodical health examination of working personnel, 5. Ensure proper management of sanitary conditions for temporary (construction) workers, including hand-washing facilities, rest and lunch rooms, 6. Prepare a detailed emergency plan to reduce/eliminate accidents and other OHS risks, 7. Ensure the availability of fire-fighting means at workplaces and working zones.
I-11	Impact of cultural heritage	Cultural and historical monuments	<p>(AR) - The area envisioned for the construction of Arshakunyats bus depot site is not identified as a sensitive / valuable in terms of cultural heritage.</p> <p>However, the construction contractor should be aware of the measures to be undertaken when the chance artifacts are found.</p>	<ol style="list-style-type: none"> 1. Elaborate a Chance Find Procedure (CFP), 2. Train staff engaged in excavation and earthwork on the application of the CFP.
II Operation stage				
II-1	Noise and vibration	Working personal Neighboring community	<p>(AR) - As per the SN⁴⁶ 245-71 "Sanitary norms for design of industrial enterprises", the Sanitary Protective Zone ("SPZ") equals to 100 m is envisioned for bus service facilities. Thus, at least 100 m should be secured between the noise and/or air emission source and the nearby sensitive receptors (residential area and/or commercial facility).</p> <p>The site selected for the construction of Arshakunyats bus depot is located in close vicinity to the residential area. Distance between the depot border and the nearest residential houses is 25-30 m. The residential areas are located near the eastern and southern borders of depot site.</p>	<ol style="list-style-type: none"> 1. Limit the speed of buses (keep the recommended speed) where they may pass close to the sensitive receptors / houses, 2. Limit the operation of CNG refueling and washing stations at night time (20:00-08:00), 3. Enforce the use of ear protective PPE among workers.

⁴⁶Sanitary norms

№	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
			<p>Meanwhile, according to the Arshakunyats depot layout, the main noise and dust emission sources (CNG refueling and bus washing stations) are designed in the northern part of depot (see figure below and Annex 4). The minimal distances between the bus washing station and the adjacent residential house and the closest commercial facility (Renaissance restaurant) are 190 m and 150 m respectively. The minimal distances between the CNG refueling station and the closest residential house and commercial facility are 190 m and 120 m respectively. This means that the minimal SPZ around the main noise and air emission sources within the bus depot is ensured. Therefore, if Arshakunyats depot’s detailed design document complies with the proposed Master-plan / layout (see Annex 5), the requirements of national regulations related to the 100 m SPZ will be followed.</p> <p>Anyway, the operation of depot will cause some disturbance to the population of neighbouring houses, therefore, the mitigation measures are recommended.</p>  <p>(NN) - It is unlikely that any additional noise sources (beside CNG refueling station) can appear as a result of Nor Nork (Jrvej) depot rehabilitation. Meanwhile, the operation of new modern equipment and buses within the upgraded depot site even will reduce the level of emitted noise and vibration.</p>	

No	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
II-2	Air emissions	Air quality Community health and safety Neighboring community	(AR and NN) - The main air pollution sources in both depots will be the CNG refueling stations. They will replace the existing petroleum fueling stations in Nor Nork (Jrvej) and Charbakh bus depots (Charbakh bus depot is located 2 km away from the planned Arshakunyats bus depot site and will be closed once Arshakunyats depot is commissioned). Hydrocarbones are emitted from both types (CNG and petroleum) of refueling stations. Another air emissions' source will be the movement of buses within the parking areas of both depots. The existing bus fleet complies to EURO III, while new buses should be in line with EURO V and high standards; this will result in reduction in air emissions.	-
II-3	Wastewater generation	Water resources	(AR and NN) - Wastewater (mainly from the bus washing stations) generated at both depots will be connected to the municipal sewage network via the site drainage systems. Stormwater will be discharged into the stormwater sewage system. According to the provided layouts of Arshakunyats and Nor Nork (Krvej) bus depots, wastewater treatment stations are not envisioned.	Consider a possibility to include the wastewater treatment stations at least for washing stations into the detailed designs of both depots.
II-4	Waste generation	Soil	(AR and NN) - The types and quantities of wastes to be generated at both depots are described above in Sections 4.6.3 and 5.3.2.2 . Waste management at both depots shall be performed according to the requiements of national waste management legislation and international best practices. The concept of waste management hierarchy, i.e. waste avoidance ahead of recycling and disposal, should be applied, where possible.	The same as recommendations in Section 4.6.3 .
II-5	Leakages and spills	Soil and groundwater Flora and fauna	(AR and NN) - Bus repair and technical maintenance works at both depots may be accompanied with the accidental leakages of oil and other chemicals (antifreeze, brake fluid,	The same as recommendations ino Section 4.6.5 .

No	Impacts	E&S receptors	Summary of preliminary assessment	Management / Mitigation
			<p>solvets, paints, etc.). The leakages may also happen in storage areas/shops.</p> <p>The areas where accidental leakages can take place should be equipped with oil and chemical spill-kits.</p>	
II-6	Biodiversity impact	Flora and fauna	(AR and NN) - During the operation stage, the areas of Arshakunyats and Nor Nork (Jrvej) bus depots will be under the human impact, so no effect on flora, fauna and wildlife will be expected.	-
II-7	Physical displacement and land acquisition	Community Individuals and legal entities	(AR and NN) - No physical displacement and involuntary land acquisition is expected during the operation stage of Arshakunyats and Nor Nork (Jrvej) bus depots.	-
II-8	Socio-economic impact	Working personal Population	(AR) - After constructing and commissioning Arshakunyats bus depot, Charbakh existing bus depot will be closed. It is expected that most of the personnel from Charbakh depot will re-employed in Arshakunyats depot. Moreover, some additional workplaces will be created in CNG refueling station.	-
			(NN) - It is unlikely that additional workplaces will be created after Nor Nork (Jrvej) bus depot's rehabilitation / upgrade.	-
II-9	Health and safety	Working personal	(AR and NN) - The requirements of the RA on fire safety, as well as OHS legislation, shall be implemented at both depots. The CNG refueling stations are considered as dangerous industrial objects ("DIO") according to the RA Law on State Regulation of Technical Safety. Therefore, before commissioning, design documents of CNG refueling stations should undergo expert examination of technical safety. During the operation stage, the CNG refueling stations should be registered in the DIO State Registration Log-book and annually examined/checked.	<ol style="list-style-type: none"> 1. Before commissioning, ensure the design documents of CNG refueling stations at both depots undergo a technical safety examination. 2. Register the CNG refueling stations in the DIO State Registration Log-book. 3. Sign contract(s) with an accredited company to conduct annual technical safety examinations of both CNG refueling stations. 4. Same as envisioned in Section 4.7.

5.4 Mitigation and management

The management and mitigation of the Project's risks and impacts will be performed jointly by Yerevan municipality and "Yerevan Bus" CJSC in line with the latter's current ESHS management procedures and practices (**Chapter 4**) that are expected to be supplemented by the Project-specific mitigation measures, as well as actions needed to bring the ESHS management practices, as relevant, in compliance with the EBRD requirements (**Table 5-23**).

5.5 Monitoring and supervision

The main objective of the monitoring is to measure and control the changes or modifications of the E&S / OHS factors that are affected by the proposed Project activities. Any variations of the E&S media have to be monitored to determine the degree to which the environment and population are affected and to establish corrective E&S measures. ESHS monitoring refers to the periodic inspections and testings to be performed to assess the impacts caused by Arshakunyats new bus depot (during the construction and operations stages) and Nor Nork (Jrvej) bus depot (during the rehabilitation and operation stages) on the surrounding environment and communities. At the same time, the environmental conditions impacting the Project should be monitored as well in order to adjust the Project works accordingly.

The proposed ESHS monitoring works during the construction / upgrade and operation stages are as follows:

1. Meteorological data monitoring (construction stage): The meteorological - climatic data should be monitored during the construction stage to identify windy and rainy days and stop the excavation and other earthworks, if necessary.
2. Air quality (construction stage): The air quality measurements and monitoring at the nearest residential areas and other sensitive receptors should be regularly conducted. The instrumental measurements should be done before (baseline data) and during the construction activities and compared with the permissible concentrations approved for the residential areas (approved by the RA Government Decree №160-N dated 02.02.2006). The following parameters should be monitored: dust (PM2.5, PM10), NOx, SO2, CO.
3. Noise measurements (construction stage): The noise equivalent and maximum levels at the nearest residential areas and other sensitive receptors should be regularly measured. The instrumental measurements should be done before (baseline data) and during the construction activities and compared with the noise threshold limit values (the RA Sanitary Norms №2-III-11.3 "Noise in the workplaces, in residential and public buildings and housing in construction areas" and WHO's Guidelines for community noise).
4. Seismic stability / vibration monitoring (construction stage): The buildings and houses located within 40 m from the vibration sources shall be identified and their mapping and pre-construction inventory should be done. While starting vibration-causing works monitor the vibration impact on the cracks formation and development. If the vibration level is above the TLV, stop the works and undertake alternative mitigation measures.
5. Periodic inspection of preventive contamination actions (construction and operation stages): The water spray, waste, ground, top-soil and other materials covering and

storage activities, working personnel instructions, equipment maintenance operations, etc. should be periodically inspected.

6. Health and safety audits and inspections (construction and operation stages).
7. Fire security audits and inspections (construction and operation stages).
8. Ongoing monitoring of compliance with the EBRD's ESHS requirements and preparation of annual monitoring reports for the EBRD to inform on the Project's ESHS performance and the progress with the ESAP implementation.

Table 5-23. Environmental and Social Assessment: Compliance Summary Table

Colour coding: **blue** - exceeding compliance (EC), **green** - fully compliant (FC), **yellow** - partial compliance (PC), **reddish** - material non-compliance (MN)

NOP - the compliance status can not be evaluated as associated with the Project implementation stages

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1	Assessment and Management of Environmental and Social Risks and Impacts				
<p>Summary: According to the RA legislation the Project is classified as "C" category activities and is subject to national environmental impact assessment and expert examination. The construction and upgrade works can be started only after obtaining a positive EIA conclusion. The ESHS management practices of the Company does not comply with the provisions of internationally recongized EHS management system. The organizational structure of "Yerevan Bus" CJSC does not envisage staff positions for managing day-to-day environmental and OHS activities. The ESHS monitoring and/or audits (internal and external) are not performed.</p>					
1.1	Environmental and Social Assessment	NOP	<p>The results of site visits / field audits and interviews with the managers of "Yerevan Bus" CJSC have not revealed any activities that could be a subject of EIA and/or state environmental examination. Both bus depots were constructed during the former Soviet Union time and no significant investments (besides the purchase of bus fleet) have been observed there by the Consultant.</p> <p>According to the RA Law on Environmental Impact Assessment and Expert Examination, the construction, rehabilitation, extension and closure/dismounting of buildings with 1,500m² and more area is considered as an intended activity of "C" category and is subject to EIA and State expert examination.</p>	Acquire a positive conclusion/permit from the Ministry of Environment before starting any construction/rehabilitation or dismantling of buildings with 1,500m ² and more surface. Identify any applicable requirements of the RA Law on EIA and Expert Examination and follow them if/when new activities/projects are initiated.	1.1
1.2	Environmental and Social Management Systems	MN	<p>There are no internationally recognized environmental, social or OHS management systems implemented in "Yerevan Bus" CJSC. The Company has no ESHS policy documents defining the objectives, commitments and responsibility of top management in the relevant domains (environmental policy). As a result, no programs/plans to</p>	<p>1) Develop and implement the key elements of environmental and OHS management systems in "Yerevan Bus" CJSC. As a reference, rely on the requirements of ISO 14001 and ISO 45001.</p> <p>2) As the first step:</p>	1.2, 1.4
1.3	Environmental and Social Policy				

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1.4	Environmental and Social Management Plan		<p>ensure the performance of ESHS management systems are developed and implemented.</p> <p>Although the certification of environmental and OHS management systems in accordance with the ISO 14001 and ISO 45001 standards, respectively, is not a formal EBRD's requirement, the EHS activities and practices of "Yerevan Bus" CJSC should at least commensurate with the level of its environmental and OHS risks/issues. The key elements of ISO management systems standards, such as planning, support, operation, evaluation and improvement shall be implemented.</p>	<p>(i) define the EHS objectives as well as main commitments and responsibilities of the Company and document them in environmental and OHS policies,</p> <p>(ii) elaborate and perform the EHS plan/program targeted at the implementation of environmental and OHS objectives and commitments.</p> <p>3) Provide training and awareness raising to the Company's personnel in relation to the requirements of environmental and OHS management systems standards.</p>	
1.5	Organisational Capacity and Commitment Environmental and Social Management Systems	PC	<p>The Company's Chief Engineer bears the overall responsibility for OHS issues. There are no specifically-trained specialists with a due background to manage day-to-day OHS activities, as well as environmental and social issues. Some health and safety requirements are implemented by Traffic Safety Service engineers as part of their duties. Daily medical check-ups of bus drivers are performed by the medical personnel (3 nurses). Some environmental functions/roles are delegated to other units of "Yerevan Bus" CJSC.</p> <p>Thus, it can be stated that currently, the Company does not have sufficient capacities to effectively manage the ESHS activities.</p> <p>The roles and responsibilities of the Company's personnel are defined in the relevant Job Descriptions. These Job Descriptions were elaborated in 2020 for most of the professions that exist in the Company.</p>	<p>1) Appoint a person to be responsible for "Yerevan Bus" CJSC environmental, social and health safety ("ESHS") performance. The appointed person (ESHS specialist) should work under the overall supervision of the Company's Director and in close cooperation with Chief Engineer.</p> <p>2) Conduct specific training on environmental, social and OHS management and best practices for the ESHS specialist in specialized institutions.</p> <p>3) Provide awareness raising to the Company's managers and specialists regarding the ESHS requirements to be followed when performing their professional duties.</p> <p>4) Identify and evaluate the environmental aspects/impacts that relate to the activities and operations of Yerevan Bus" CJSC (this is also required by ISO 14001:2015 standard, clause 6.1.2).</p> <p>5) Identify and document the environmental obligations and requirements related to the environmental aspects of Yerevan Bus" CJSC (this is also required by ISO 14001:2015 standard, clause 6.1.3).</p> <p>6) Define methodologies and procedures on how to implement the requirements of the applicable obligation stemming from the national and EBRD's E&S requirements.</p>	1.3-1.4

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1.6	Third-Party Risk	PC	<p>The Company is owned by Yerevan municipality, and, hence, the purchase of goods and services is arranged as per the RA Law on Procurement.</p> <p>To initiate the procurement of goods and/or services for need of the Company, the relevant invitation should be launched and the potential bidders shall meet the qualification criteria set out in the Invitation. The invitations should set minimal criteria for the bidders, including: 1) Compliance of professional activity to the activities stipulated in the Contract; 2) Professional experience; 3) Technical means; 4) Financial means; and 5) Labor resources.</p> <p>The hazardous properties of purchased materials/goods were not assessed by the Company.</p>	<ol style="list-style-type: none"> 1) When purchasing hazardous materials/goods, request the producers/suppliers of hazardous materials/goods to provide the Company with Material Safety Data Sheets (MSDSs). 2) Ensure that the Company's staff dealing with hazardous materials be aware of MSDS provisions. 	1.5
1.7	Project Monitoring and Reporting	PC	<p>No environmental inspections have been conducted by the relevant state authority (RA Inspectorate for Nature Protection and Mineral Resources) during 2017-2019. Internal ESHS audits are not practised by the Company.</p> <p>No third party (external) audits are conducted in "Yerevan Bus" CJSC.</p> <p>The ESHS monitoring to measure and control the changes or modifications of the environmental and social / OHS factors to be affected by the proposed Project activities should be conducted.</p>	<ol style="list-style-type: none"> 1) Include data on generation and storage of hazardous waste in quarterly reports on environmental taxes and nature utilization fares. 2) Prepare annual statistical reports on waste generation, utilization and disposal (template N1-waste) according to Order №112-N of the RA Minister of Environment and submit them to the State Statistical Agency. 3) Prepare an ESHS monitoring plan to include: <ul style="list-style-type: none"> • Meteorological data monitoring (construction stage), • Air quality (construction stage), • Noise measurements (construction stage), • Seismic stability / vibration monitoring (construction stage), • Periodical inspection of preventive contamination actions (construction and operation stages), • Health and safety audits and inspections (construction and operation stages), • Fire security audits and inspections (construction and operation stages), • Monitoring of compliance with the EBRD's ESHS requirements and preparation of monitoring reports for the EBRD to inform on its ESHS performance and the progress with the ESAP implementation. 	1.6-1.8

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
2	Labour and Working Conditions				
Summary: Labour and working conditions at the Company are generally in line with the provisions of the national legislation. Meanwhile, to comply with the best international labour practices, the Human Resources (HR) policy of "Yerevan Bus" CJSC should be updated and the worker grievance mechanism procedure should be elaborated and adopted.					
2.1	Human Resource Policies and Working Relationships	PC	The RA Labour Code is based on the eight fundamental ILO conventions. The Human Resource Policy of "Yerevan Bus" CJSC was elaborated based on the requirements of the RA labour legislation and approved by the Company's Director on 17.12.2015. It covers, inter alia, the following areas: (i) Roles and responsibilities of persons engaged in HR management, (ii) Employment related issues, (iii) Recruitment of personnel, (iv) Training, qualification and knowledge examination, (v) Salaries and encouragement/motivation, (vi) Vacation, (vii) Employees complaints/grievances and proposals, and (viii) Dismissal and retrenchment, etc.	Update the Company's Human Resource Policy based on the amendments made in the RA Labour Code during 2016 through to 2020.	2.1
2.2	Child and Forced Labour	FC	No evidencies for child (people under 18 years) and forced labour were identified during the audit in Nor Nork (Jrvej) and Charbakh bus depots. The Company has no under-age employees.	N/A	
2.3	Non-Discrimination and Equal Opportunity	FC	The employees' labour rights are communicated to them through the employment contracts. The employees' rights foreseen by the labour contracts are in line with the RA Labour Code. In recruiting, priority is usually given to the most qualified candidates. No gender discrimination evidences were identified during the field audits and interviews with the Company's representatives. Male and female candidates have the same employment opportunities. All the requirements of the Labour Code for pregnant and lactating women are met.	N/A	
2.4	Workers Organizations	FC	A collective agreement is absent. Membership at any trade union is voluntary according to the RA Labour Code and the staff are free to join, if desired.	N/A	

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
2.5	Wages, Benefits, and Conditions of Work, Worker Accommodation	FC	Male and female candidates have the same employment opportunities. Male and female employees have equal remuneration for the similar positions.	N/A	
2.6	Collective Dismissals	FC	The rights to labour of "Yerevan Bus" CJSC employees are secured by the national legislation for public servants. Practically, it is unlikely to retrench an employee unless the reasons set by the legislation.	N/A	
2.7	Grievance Mechanism	MN	Although a worker grievance mechanism is envisioned in the HR Policy, it was not implemented. All complaints are verbally discussed with HR specialist or with Director and if possible are solved.	Establish and maintain the worker grievance mechanism that is accessible to both the Company's and contractor employees (if any). The mechanism should allow for confidential complaints to be raised and addressed.	2.2
2.8	Non-Employee Workers	FC	No such practices are identified during the audit.	N/A	
2.9	Supply Chain	PC	The Company does not assess labour issues in contractors/suppliers.	Same as for Item 1.6.	
3	Resource Efficiency and Pollution Prevention and Control				
	Summary: The Project implementation, i.e. the introduction of 100 new CNG buses into the City public network instead of the existing old buses and minibuses will contribute to the improvement of the Company's resource efficiency performance as well as reduction of GHG and exhaust emissions. However, the current environmental practices applied at both depots are not satisfactory. The principles of waste management and good housekeeping are not applied by the Company. The territories of both Charbakh and Nor Nork (Jrvej) bus depots are piled with hazardous wastes, and it is only household waste that is periodically removed from the sites. The permits required by the national legislation are not obtained.				
3.1	Resource Efficiency	FC	Due to the implementation of the Project (50 old buses and 139 minibuses will be replaced by 100 new CNG buses), 7,522 litres of motor oil, 560 kg (1421 pcs) of oil filters, 14.077 tonnes of tyres and 0.04 tonnes of accumulators will be saved annually.	N/A	

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
3.2	Water	MN	<p>During the field audit of Nor Nork (Jrvej) depot the underground water borehole was noticed. The Consultant was informed that the bore-hole was drilled by "Yerevantrans" CJSC (land-plot owner) and did not have a water permit. Meanwhile, the Company sometimes use the water from the borehole, mainly for irrigation purposes.</p> <p>Inefficient use of water resources in Nor Nork (Jrvej) depot bus washing station was noted to be practiced.</p>	<ol style="list-style-type: none"> 1) Obtain a permit for the underground water extraction from the Ministry of Environment according to the requirements of the RA Water Code and Government Decree №218-N. 2) Consider a possibility to include the wastewater treatment stations at least for washing facilities into the detailed designs of Arshakunyats and Nor Nork (Jrvej) depots. 3) Consider the possibility to rehabilitate the wastewater treatment station at Charbakh bus depot, if the latter will not be conserved/closed as a result of the Project implementation. 4) Elaborate resource (including water) efficiency and saving management plan. 	3.1-3.3
3.3	Waste	MN	<p>The territories of both Charbakh and Nor Nork (Jrvej) bus depots are piled with hazardous wastes, and it is only household waste that is periodically removed from the sites by Yerevan Communal Waste Collection Company. During the last years, all the generated wastes of different classes of hazard were stored in the buildings/sites of the bus depots and were not removed to the landfills or passed to the licensed companies for utilization or treatment.</p> <p>The Company does not have proper waste storage facilities/areas and waste storage containers. Wastes of different classes of hazard are mixed and stored together. The used oil storage areas are not equipped with the secondary containments and oil / chemicals spill-kits.</p> <p>During the construction and rehabilitation activities in both depots, the construction and household wastes as well as ferrous and non-ferrous metal scrap, oiled soil and rags and used oil will be generated.</p>	<ol style="list-style-type: none"> 1) Ensure compliance with the requirements of the RA waste management legislation, including: <ol style="list-style-type: none"> (i) Register the wastes generated by "Yerevan Trans" CJSC in waste registration log-books as required by the RA Government Decree №1343-N, (ii) Elaborate the hazardous waste passports and submit them to the Ministry of Environment for approval as required by the RA Government Decree №47-N, (iii) Prepare the report on registration of waste generation facilities and submit it to the Ministry of Environment for approval as required by the RA Government Decree №500-N, (iv) Elaborate waste generation norms and their disposal limits document and submit it to the Ministry of Environment for approval as required by the RA Government Decree №2291-N. 2) Ensure separate collection of generated wastes in special containers and equip relevant facilities/sites for safe waste storage. 3) Sign contracts with the specialized waste management companies to periodically hand the generated wastes over to them for utilization, treatment or disposal purposes. 	3.4-3.5

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
3.4	Pollution Prevention and Control - Air Emissions	FC	<p>There are no significant stationary air pollution sources operating within the both depots of "Yerevan Bus" CJSC. The process of CNG burning in bus engines is the main source of the Company's air pollution emissions (particulate matter ("PM"), nitrogen oxide (NOx)) and greenhouse gases emissions (carbon dioxide (CO2) and methane (CH4)).</p> <p>For the Baseline and Project scenarios, the estimated reduction in exhaust emissions (PM and NOx) is expected to be 65% and 83%, respectively.</p>	N/A	
3.5	Pollution Prevention and Control - Air Emissions (for construction stage)	NOP	<p>The construction of new Arshakunyats bus depot will be accompanied with the earthworks and operation of construction equipment and vehicles. Therefore, dust emissions as well as gaseous emissions will be released and affect the neighbouring population.</p> <p>The construction of new facilities and rehabilitation / reconstruction of the existing facilities within Nor Nork (Jrvej) bus depot will generate gaseous emissions to the atmosphere and will impact the neighbouring population.</p>	<ol style="list-style-type: none"> 1) Use modern construction machinery equipped with engines compliant with at least Euro III standards, with emission control and minimal noise characteristics, 2) Perform regular technical maintenance of used construction equipment and heavy vehicles, 3) While transporting friable materials keep the body of heavy vehicles covered, 4) Store friable materials at the construction site under the waterproof tent, 5) Restrict excavation and earthworks during the periods of strong winds, 6) Apply regular watering to on-site and off-site dirt roads, especially during the excavation and other earthworks, 7) Prohibit construction materials and waste burning. 	3.6
3.6	Pollution Prevention and Control - GHG	NOP	<p>The process of CNG burning in bus engines is the main source of the Company's air pollution emissions (particulate matter ("PM"), nitrogen oxide (NOx)) and greenhouse gases emissions (carbon dioxide (CO2) and methane (CH4)).</p> <p>For the Baseline and Project scenarios, the expected reduction in GHG (CO₂ equivalent) is estimated to be 30% or 2,939 tonne annually.</p>	N/A	

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
3.7	Pollution Prevention and Control - Leakages and Spills	MN	Requirements pertaining to proper storage and handling of hazardous wastes and materials are not implemented in Nor Nork and Charbakh depots. The warehouses and storage facilities/sites are not equipped with secondary containments, trays and spill-kits or any other safeguarding tools. During the field audit, a lot of leakages were noticed by the Consultant in oil storage facilities/sites and/or near the oil drums, bus parking areas and diesel fueling stations within the Company's bus depots.	<ol style="list-style-type: none"> 1) Secure the areas, where fuel/oil/chemicals leakages potentially can take place, with fuel / oil spill-kits and secondary containments and trays, 2) Perform technical examination and testing of fuel storage tanks/reservoirs in both depots and assess their integrity and validity, 3) Elaborate a spill prevention and respond procedure and conduct practical drills with workers engaged in fuel filling operations on the risks of oil/chemicals leakages and on how to respond to them. 	3.7-3.9
3.8	Pollution Prevention and Control - Leakages and Spills (for construction stage)	NOP	During the construction / rehabilitation activities, the soil / topsoil can be contaminated as a result of accidental leakages of fuel, other oil products from the vehicles and construction equipment. The spillages of chemicals, like paints and solvents are also possible.	<ol style="list-style-type: none"> 1) Refuel the vehicles at the outside refueling stations, 2) Use spill catching protective trays when refueling the construction equipment on site, 3) Place the fuel and oil tanks in covered areas with berms or dikes installed to intercept spills. Where possible, the secondary containment trays for the fuel tanks should be applied, 4) Equip vehicles (transporting liquid materials) and liquid materials storage areas with absorbent materials and emergency spill-kits, 5) Store the contaminated soil in special containers and periodically pass it to the specialized waste treatment / utilization companies. 	3.10
3.9	Substances and Materials - Top-soil and Excavated Materials	NOP	The earthworks in Arshakunyats depot will be accompanied with the generation of top-soil and excavated ground materials.	<ol style="list-style-type: none"> 1) Manage the top-soil stripped before the excavation works at Arshakunyats site according to the RA Government decree №1396-N (Procedure for top-soil use), 2) Store top-soil separately in a designated place, covered by waterproof tent, uncompressed and in such a manner that it is does not lose its fertile characteristics, 3) Dispose the excavated ground materials in landfill / area recommended by Yerevan municipality. 	3.11-3.12
3.10	Substances and Materials - ACM	PC	Asbestos-containing material (ACM) roofs are partly used in the Company's both bus depots. It is proposed to implement piecemeal replacement of asbestos roofs.	Prepare a program of phased ACMs roofs replacement for Charbakh and Nor Nork (Jrvej) bus depots.	3.13

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4	Health, Safety and Security		<p>Summary: The requirements of the national legislation related to the OHS and fire safety are partly implemented at both depots of the Company. OHS and fire safety procedures are documented and OHS trainings are conducted. Medical examination of personnel is regularly performed. However, there are several domains where significant mitigation actions/measures are recommended and should be implemented. The facilities of depots should be equipped with proper sanitary-hygienic conditions, fire-extinguishing means / tools, medical kits. The working personnel shall be secured with certified PPE, etc. The dangerous industrial objects should be annually examined and hazardous works shall be performed under the managed conditions. Internal OHS and fire safety audits are not practiced in "Yerevan Bus" CJSC.</p>		
4.1	Occupational Health and Safety	PC	<p>In total, ten OHS procedures were elaborated in Nor Nork (Jrvej) and Charbakh bus depots in 2016. These include the OHS procedures for different works and professions like drivers, welders, technicians, electricians, repair workers, etc.</p> <p>The procedures for implementation of dangerous works (fire-works, works at height, etc.) were in place. Hazardous works were not identified and documented. No evidence of documented permissions for dangerous works implementation.</p> <p>The provision of PPE to the working personnel is not properly planned and carried out. The types and norms of PPE to be given to the workers depending on their professions and harmful/hazardous factors of working environment are not defined and documented.</p>	<p>1) When a competent OHS specialist is appointed and trained, redistribute OHS roles and responsibilities among the Company's personnel and update the relevant provisions of Order №13-L dated 19.09.2016 (on Regulation of Workers Health and Safety System within "Yerevan Bus" CJSC).</p> <p>2) Prepare a list of procedures required for effective functioning of the Company's OHS management system. This list shall at least include:</p> <ul style="list-style-type: none"> (i) Procedure for safe implementation of dangerous works (fire-works, works at height, etc.), (ii) Procedure defining the PPE types, norms, wearing periods and rules, (iii) Procedure for OHS and fire safety audit and control, (iv) OHS and fire safety induction guide/leaflet, etc. <p>3) Ensure the availability of the records required by the OHS and fire safety legal acts as well as internal procedures and regulations.</p>	4.1-4.2

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
		PC	<p>The persons responsible for OHS induction and periodical trainings were assigned at each division of the Company according to Order №13-L dated 19.09.2016. The OHS inductions are conducted for new employees and visitors. The results of OHS training with employees are registered in the OHS training registration log-books.</p> <p>The workers engaged into the implementation of dangerous works did not pass the tailored safety training before start of work. No evidences/ records on personnel OHS and fire safety trainings as well as knowledge and competency examination were identified.</p> <p>Nor Nork (Jrvej) and Charbakh bus depots were not equipped with OHS and fire safety posters, prohibition and warning signs and training rooms.</p>	<ol style="list-style-type: none"> 1) Elaborate OHS and fire safety induction guide/leaflet (<i>same as recommended in KPI ref. 4.1, action 2-(iv)</i>) and assign the Company's competent OHS specialist to deliver OHS inductions. 2) Conduct specific OHS training with the personnel engaged in implementation of dangerous works according to the provisions of Procedure for Safe Implementation of Dangerous Works (<i>can be done when action recommended in KPI ref. 4.1, action 2-(i) is implemented</i>). 3) Establish a personnel qualification commission to be responsible for carrying out knowledge and competency examination. Prepare an OHS and fire safety annual training program for the Company's personnel, conduct a knowledge and competency examination of the personnel, and document its results. 4) Equip the OHS specialist's office with necessary OHS and fire safety training posters or envisage separate training room. Retrofit the industrial facilities and territory of both bus stations with safety (prohibition, warning, fire safety and evacuation) signs. 	4.3-4.4
		PC	<p>During the audit, the Consultant was informed that all bus drivers working in "Yerevan Bus" CJSC underwent periodical medical examinations and the relevant records were made in their personal sanitary (medical) books.</p> <p>Daily medical check-ups of drivers are conducted by the Company's nurse. The blood pressure, temperature, alcohol, etc. are checked and the results are registered in drivers' trip tickets. In case of any counter-indication, the driver is substituted.</p>	Equip the industrial facilities, administrative buildings and buses with first aid kits.	4.5

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
		MN	<p>The working environment and conditions in bus parking, maintenance and washing facilities (industrial facilities) do not comply with the applicable sanitary and hygienic norms/standards. The poor conditions of facilities and lack of heating and air conditioning systems could not ensure the allowable values of microclimate, lighting, etc. as well as ergonomic parameters at workplaces.</p> <p>There is the lack of washing and dressing rooms, lavatories and break/rest rooms (sanitary-hygienic rooms) in both depots of "Yerevan Bus" CJSC. Even where some facilities of the Company are equipped with sanitary-hygienic rooms, their conditions are unsatisfactory.</p> <p>The employees engaged in harmful productions and works as well as positions and professions included in the list of heavy and harmful productions, works, professions and positions get a 30% add-on to their salaries.</p>	<ol style="list-style-type: none"> 1) Prepare a program for rehabilitation and upgrade of industrial facilities (washing stations, maintenance facilities and warehouses) sanitary-hygienic rooms at Nor Nork (Jrvej) bus depot. 2) Prepare a program for rehabilitation and upgrade of industrial facilities (washing stations, maintenance facilities and warehouses) sanitary-hygienic rooms at Charbakh bus depot (if new Arshakunyats depot is not constructed). 3) Evaluate the harmful and hazardous aspects (microclimate, noise, vibration, EMR, lighting, etc.) of working environment and workload and work intensity at workplaces in both bus depots in accordance with Order of RA Minister of Health №756-N (for Nor Nork depot - after rehabilitation and upgrade of industrial facilities and for new Arshakunyats depot - after commissioning). 4) Consider a possibility of equipping bus routes end points with proper washing and meal rooms as well as toilets. 	4.6-4.8
		MN	<p>No OHS and fire safety inspections have been done in both bus depots of "Yerevan Bus" CJSC by the relevant state inspection bodies during the last three years (2017-2019). No OHS and fire safety external audits and monitoring have been conducted in Nor Nork (Jrvej) and Charbakh bus depots so far.</p> <p>The Company does not practice the periodical internal audits of OHS, technical and fire safety issues, and working and sanitary-hygienic conditions in the Company's industrial facilities and administrative offices.</p>	<ol style="list-style-type: none"> 1) Elaborate a procedure for carrying out internal OHS, fire and technical safety audits and control (<i>same as recommended in KPI ref. 4.1, action 2-(iii)</i>). 2) Perform periodical internal audits and control over the OHS, technical and fire safety issues within the industrial facilities of both bus depots. 	4.9
		MN	<p>The statistical reports (template 1-AP (annual)) on working conditions are not annually elaborated and submitted to the State Statistical Agency by the Company.</p>	<p>Prepare the statistical reports (template 1-AP) on working conditions and submit them to State Statistical Agency annually.</p>	4.10

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.2	Occupational Health and Safety (for construction stage)	NOP	Construction and rehabilitation of the depots will be accompanied by simultaneous exploitation of vehicles and construction equipment at the construction sites as well as various hazardous works, namely fire works and works at heights, which may cause the following emergency situations: (i) Fire and ignitions, (ii) Liquid leakages, (iii) Injuries of workers, (iv) Unproper sanitary-hygienic conditions, and (vi) Accidents with operating equipment.	<ol style="list-style-type: none"> 1) Ensure appropriate visual safety signs and posters within the site and near the entrances. 2) Secure working personnel with certified PPE and first-aid means. 3) Conduct trainings on compliance with prescribed routes and speed for drivers of construction vehicles. 4) Ensure initial and periodical health examination of working personnel. 5) Ensure proper management of sanitary conditions for temporary (construction) workers, including hand-washing facilities, rest and lunch rooms. 6) Prepare a detailed emergency plan to reduce/eliminate accidents and other OHS risks. 7) Ensure the availability of fire-fighting means at workplaces and working zones. 	4.11
4.3	Community Health and Safety	PC	<p>The noise and air emissions from the Company's buses in the ambient noise value and background air concentration is very low (almost negligible) and is unlikely to be an issue of the population disturbance taking into account that bus routes do not operate at night time.</p> <p>Car accidents and collisions may lead to human injuries and even fatalities. During the field audit, it was reported that no significant collisions had happened for the last three years. The reasons for car accidents can be associated with bus breakages/defects and drivers' health / mental conditions. It is almost impossible to fully eliminate car collisions, however, some preventive measures undertaken by the Company reduce the probability of such cases.</p>	<ol style="list-style-type: none"> 1) Periodical technical check-ups and maintenance of buses. 2) Ensure proper workplaces and rest conditions for drivers. 3) Equip the buses with first aid kits. 	4.12
4.4	Infrastructure, Building, and Equipment Design and Safety	MN	The seismic stability of some buildings/structures within the both bus depots is a critical issue. They are old and unsafe. The representatives of the Company informed the Consultant that one of the buildings in Charbakh depot was largely demolished in the past. This building was previously used as a warestore, but was partly destroyed.	Engage a specialized organization in order to check/test the seismic stability of the buildings used in Charbakh and Nor Nork (Jrvej) bus depots. Identify and isolate the buildings that do not comply with the minimum criteria of seismic stability. If possible, dismount the buildings with low seismic characteristics.	4.13

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.5	Infrastructure, Building, and Equipment Design and Safety - Dangerous Industrial Objects	MN	Currently, both bus depots (Nor Nork (Jrvej) and Charbakh) use petroleum stationary refueling stations, however, none of them is registered in the DIO State Registration Log-book and annually examined/checked. According to the Project layouts, CNG refueling stations will be installed in Arshakunyats and Nor Nork (Jrvej) bus depots.	<ol style="list-style-type: none"> 1) Assign persons to be responsible for safe operation, technical maintenance and surveillance of stationary refueling stations in both bus depots. 2) Apply to the National technical safety center in order to register both petroleum stationary refueling stations in the DIO State Registration Log-book. 3) Sign contract with an accredited company to conduct technical safety examination of both stationary refueling stations. 4) Before commissioning, ensure the design documents of CNG refueling stations at both depots undergo a technical safety examination. 5) Register the CNG refueling stations in the DIO State Registration Log-book. 6) Sign contract with an accredited company to conduct annual technical safety examinations of both CNG refueling stations. 	4.14-4.16
4.6	Infrastructure, Building, and Equipment Design and Safety (for construction stage)	NOP	The construction and operation of new Arshakunyats bus depot will require connection of internal communications and infrastructure with water, gas and power energy supply public utilities and wastewater sewage network. Therefore, the approvals of the relevant public service operators shall be obtained during the Project detailed design stage (before the start of construction).	<p>Before the start of construction works, obtain approvals of the following public service operators:</p> <ul style="list-style-type: none"> • Potable and technical / irrigation water supply (Veolia Jur CJSC), • Wastewater discharge and treatment (Veolia Jur CJSC), • Power energy supply (Electric Networks of Armenia CJSC) • Gas supply (Gazprom Armenia CJSC) • Telecommunication service providers (Ucom, Beeline, MTS-Armenia, etc.). 	4.17
4.7	Hazardous Materials Safety	PC	Main types of hazardous materials used in both depots are engine oil, lead accumulators, other chemicals, bus spare parts and diesel in fueling stations. Requirements pertaining to proper storage and handling of hazardous wastes and materials are not implemented in Nor Nork and Charbakh depots.	Same as for Item 3.7-3.8.	
4.8	Product and Services Safety	N/A			

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.9	Traffic and Road Safety (for construction stage)		During the construction / rehabilitation works some slight increase in traffic density along the Arshakunyats avenue - Shirak street (for Arshakunyats bus depot) and Tevosyan street - Hovhannisyan street (for Nor Nork (Jrvej) depot) can be expected. However, within the total traffic load in Yerevan, these impacts are seen as very low and can be neglected.	-	
4.10	Noise (for construction stage)	NOP	The site selected for the construction of Arshakunyats bus depot is located in close vicinity to residential area. The distance between the boundary of the new depot and the nearest residential house is 25-30 m. Thus, the residents of neighbouring houses can be disturbed by the noise from the construction equipment. Although the Nor Nork (Jrvej) bus depot is surrounded by the commercial facilities, there is a Jrvej residential area that is located to the south of the depot. The distance between the depot boundary and the nearest residential area is 120-130 m. It is unlikely that the vibration from the construction works can affect the nearest houses and buildings, but the emitted noise can have some influence on the living quality of the neighbouring population.	<ol style="list-style-type: none"> 1) Perform regular technical maintenance of used construction equipment and heavy vehicles. 2) Inform the residents of nearby houses at least two days before about high noise evolving activities. 3) Limit truck routes and speed (keep the recommended speed) where trucks may pass close to the sensitive receptors / houses. 4) Keep restrictions on working hours, weekends or public holidays, stop operation of construction equipment at night time (20:00-08:00). 5) Enforce the use of ear protective PPE among workers. 	4.18
4.11	Vibration (for construction stage)	NOP	The seismic stability of the residential houses and the restaurant located within 40 m from the vibration source at Arshakunyats bus depot construction site should be monitored.	<ol style="list-style-type: none"> 1) Perform mapping and pre-construction inventory of sensitive buildings located within the 40m zone from the vibration sources. 2) While starting vibration-causing works monitor the vibration impact on the cracks formation and development. If the vibration level is above the TLV, stop the works and undertake alternative mitigation measures. 	4.19
4.12	Natural Hazards	MN	Yerevan City and the adjacent regions are located in a seismic area and considered to have a high degree of seismic risk along existing fault lines. Earthquakes in the area can reach the magnitude of 8-9 and above on the Richter scale and maximum horizontal acceleration of 0.4 g.	Same as for Item 4.9.	

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.13	Exposure to Disease	PC	Although it was reported that no cases of professional deceases were found as a result of periodical medical examinations, it is obvious that some problems related to the drivers' back bone and neck are likely to appear in future. Hypodynamia and defatigation (overwork) are also typical diseases for drivers.	<ol style="list-style-type: none"> 1) Equip the drivers' workplaces with orthopedic seats. 2) Provide drivers with breaks, lunch and relevant rest rooms, 3) Sign a contract with a specialized medical institution to conduct a detailed medical survey in order to identify all relevant professional diseases typical to drivers and to propose relevant preventive actions. 4) Taking into account the results and conclusions of the mentioned medical survey, consider the possibility to limit working hours of drivers. 	4.20-4.22
4.14	Emergency Preparedness and Response	PC	<p>No major accidents and work-related injuries have occurred in both bus depots during the last three years (2017 through to 2019).</p> <p>As part of the emergency prevention arraignments, the Company should identify potential emergencies that can happen as a result of its activities on- and off-site and periodically conduct training and drills to increase the capacity of the personnel to withstand emergency situations.</p>	<ol style="list-style-type: none"> 1) Identify potential emergency situations that can happen as a result of the Company's activities and elaborate the relevant emergency response plan. 2) Periodically conduct training and practical drills to increase the capacity of the personnel to withstand emergency situations. 3) Check the operability of Nor Nork (Jrvej) depot emergency shelter. If needed, upgrade it and equip with required protection means. 	4.23-4.24

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.15	Fire Safety	MN	The fire safety procedure of the Company has been approved by Order №15-L dated 03.10.2016. According to the Order, Chief Mechanic is held responsible both for organizing fire safety in the depots of "Yerevan Bus" CJSC and for conducting fire safety inductions and periodical trainings for workers. However, there are no persons responsible for fire safety in industrial facilities and administrative buildings.	<ol style="list-style-type: none"> 1) Appoint persons responsible for fire safety at industrial facilities and administrative buildings in both depots. 2) Organize the storage of flammable materials and wastes in compliance with the RA Fire Safety Rules (2015). 3) Elaborate evacuation plans for industrial facilities and administrative buildings of both depots of the Company. 4) Sign a contract with a specialized company in order to conduct a fire safety audit at both bus depots, including: (i) check against the requirements and rules for storage of flammable materials and wastes, (ii) determination of required fire-fighting equipment, their types and quantities, (iii) identification of the facilities/sites that should be equipped with automatic fire extinguishing and alarm systems, and (iv) trainings/practical drills to be conducted for the Company's personnel and drivers, specifically. 5) Sign a contract with a specialized company to periodically check the validity of fire extinguishers installed in buses and recharge them, if required. 	4.25-4.28
5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement				
	Summary: According to the provided information, the land-plots to be allocated for the construction of the new depot belong to Yerevan community. So, most probably, the allocation of these land-plots to the Project needs will not trigger physical or economic displacement or involuntary land acquisition.				
5.1	General	FC	It is envisioned to allocate land-plots located in the City's Shengavit district (at the crossing point of Arshakunyats avenue and Shirak street) for the construction of Arshakunyats new bus depot. According to the provided information, the land-plots to be allocated for the construction of depot belong to Yerevan community. So, most probably, the allocation of these land-plots to the Project needs will not trigger physical displacement or involuntary land acquisition.	<ol style="list-style-type: none"> 1) Conduct land acquisition for the purposes of Arshakunyats new bus depot construction based on the provisions of the RA Government decree №286 "On approval of procedure for the public and community owned land allocation and use as well as issuance of construction certificate". 2) If any impacts on land use / risks of economic displacement are identified for the local population, comply with the requirements of EBRD PR5. 	5.1
5.2	Monitoring and Evaluation	N/A			
5.3	Physical Displacement and Resettlement Assistance	N/A			

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
6	Biodiversity Conservation and Sustainable Management of Living Natural Resources				
Summary: The site selected for the construction of Arshakunyats depot is an abandoned area within the City boundaries surrounded by the residential blocks and commercial facilities. In the south and east, the site borders on Shirak street and Arshakunyats avenue, respectively, and is exposed to human impacts. It is unlikely that endangered flora and/or fauna species will be found there; however, a biodiversity survey in and around the selected site is proposed to be conducted.					
6.1	Biodiversity Conservation	NOP	The selected site for new Arshakunyats bus depot is an abandoned semi-desert / semi-steppe area with rather poor biodiversity. However, before the start of construction activities the selected site and its surroundings shall be investigated, endangered species, if any, should be identified and relevant protective measures should be undertaken.	Before the start of construction works invite a specialized company or expert to perform a biodiversity survey in and around the Project site, identify the endangered species, if any, and propose relevant mitigation measures.	6.1
6.2	Sustainable Management of Living Natural Resources	N/A			
6.3	Supply chain	N/A			
7	Indigenous People				
This PR is not applicable to this Project (see Section 3.3)					
8	Cultural Heritage				
Summary: Although, the territory envisioned for the construction of new Arshakunyats new depot is not recognized as an area with the potential for cultural heritage finds, it is proposed to have a Chance Finds Procedure in place during any earth/excavations work and to have this fully understood by the Construction Contractor staff.					
8.1	Consultation with Affected People, Communities and Other Stakeholders	N/A			
8.2	Assessment of Risks and Impacts	N/A			
8.3	Chance Finds Procedure	NOP	The area envisioned for the construction of Arshakunyats bus depot site is not identified as a sensitive / valuable in terms of cultural heritage. However, the construction contractor should be aware of the measures to be undertaken when the archaeological remain are found.	1) Elaborate a Chance Find Procedure (CFP). 2) Train staff engaged in excavation and earthwork on the application of the CFP.	8.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
8.4	Legally Protected and Internationally Recognized Areas	N/A			
8.3	Project's use of Cultural Heritage	N/A			
10	Information Disclosure and Stakeholder Engagement				
Summary: Neither the mechanism of disclosing and/or communicating information to the potential stakeholders or the wider public, nor the procedure to address external stakeholders' grievances is developed and implemented by the Company / Yerevan municipality. The latter should implement measures to establish communication channels/tools with the Project stakeholders, i.e.: affected groups and interested parties.					
10.1	Engagement during Project Preparation	MN	"Yerevan Bus" CJSC has not conducted a systematic stakeholder identification and does not have a formalised mechanism of disclosing and/or communicating information to its potential stakeholders or the wider public (not even a website). The preliminary identification of main stakeholders has been conducted during this study.		
10.2	Engagement during Project Preparation	NOP	Stakeholder engagement planning, analysis and monitoring have not been practiced by the Company. Within the scope of this ESHS study the Consultant will elaborate the SEP, which is to ensure the compliance of the Project with the PR10 requirements during its design, construction / rehabilitation and operation phases.	1) Implement the Stakeholder Engagement Plan (SEP) covering the design, construction/rehabilitation and operational stages to ensure an on-going process of dialogue is established with affected parties and the public on Project related environmental and social issues. 2) Use the following communication channels with stakeholders: mass-media, public discussions and posters to be displayed at the buildings' walls of the administrative offices to disclose information about the routine operations of the Company, initiatives, projects under implementation and to be implemented. 3) Periodically evaluate and update the SEP.	10.1-10.2
10.3	Engagement during Project Implementation and External Reporting				
	Changes to Project Environmental and Social Risks and Impacts	NOP			
10.4	Grievance Mechanism	MN	The Company does not have documented grievance mechanism for external stakeholders. Meanwhile, stakeholders should have the opportunity to raise their complaints and proposals using the grievance management procedure.	1) Create a web-site for "Yerevan Bus" CJSC in order to establish direct communication channel with stakeholders. 2) Elaborate and implement a grievance mechanism for external stakeholders.	10.3

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
Overall Compliance					
	National Environmental, Social, Health and Safety Requirements	PC	The Company should make efforts to significantly improve its environmental and OHS performance and national legislation compliance status by implementing the actions/measures envisaged by the ESAP. The key national non-compliances are the absence of environmental permits (at least for groundwater bore-hole and generated wastes) and records, outdated and incomplete fire extinguishing means, improper housekeeping and response to oil leakages and other emergencies, availability of historical aspects (exploitation of seismically unstable buildings), lack of sanitary-hygienic conditions, PPE, etc.	Implement the actions in this table and ESAP	
	EU Environmental, Social, Health and Safety Requirements	PC	The operations of both depots are found to be partly in line with the EBRD and EU ESHS requirements. There are several areas of non-compliance or partial compliance that needs to be improved. The identified non-compliances relate to the absence of: <ul style="list-style-type: none"> • Properly operated management systems (environmental, social, OHS), • The policy documents, programs and procedures (environmental, OHS, social), • Monitoring over the ESHS performance, • Proper waste handling procedure and practices, • Documented grievance mechanism, • Documented emergency response procedures, etc. 	Implement the actions in this table and ESAP	

Annex 1

List of the Interviewees

1. Elbak Tarphoshyan - "Yerevan Bus" CJSC, Director
2. Andranik Manukyan - "Yerevan Bus" CJSC, Chief engineer
3. Armine Eritcyan - "Yerevan Bus" CJSC, HR specialist
4. Sayat Grigoryan - "Yerevan Bus" CJSC, Storekeeper
5. Marat Ghukasyan - "Yerevan Bus" CJSC, Head of workshop
6. Melik Sahakyan - "Yerevan Bus" CJSC, Head of route
7. Sirarphi Avagyan - "Yerevan Bus" CJSC, Chief accountant
8. Narine Melkonyan - "Yerevan Bus" CJSC, Accountant
9. Naira Baghdasaryan - "Yerevan Bus" CJSC, Accountant
10. Dinara Davtyan - "Yerevan Bus" CJSC, Cleaner
11. Ruben Ghukasyan - "Yerevan Bus" CJSC, Chief mechanic (remote discussions)
12. Edgar Galstyan - Yerevan Municipality, Head of transport department (remote discussions)
13. Nora Martirosyan - Yerevan Municipality, Sustainable Urban Development Investment Program, Project director (remote discussions)
14. Garik Siroyan - Yerevan Municipality, Sustainable Urban Development Investment Program, Institutional specialist

Annex 2

List of documents provided by Yerevan municipality and "Yerevan Bus" CJSC

1. "Yerevan Bus" CJSC staff schedule,
2. Organizational structure of "Yerevan Bus" CJSC,
3. Human resources policy of "Yerevan Bus" CJSC,
4. Order № 123/A, dated 01.06.2017,
5. Order № 23-L, dated 31.05.2019,
6. Order № 15-L, dated 03.10.2016,
7. Order № 13-L, dated 19.09.2016,
8. Order № 39-L, dated 27.12.2019,
9. Calculation of fuel components,
10. Bus driver labour contract №19, dated 04.11.2019,
11. Real estate renting contract dated 13.02.2012 between "Yerevantrans" CJSC and "Yerevan Bus" CJSC,
12. The list of "Yerevan Bus" CJSC employees presented for monetary reward, dated 27.12.2019,
13. The route network of the Yerevan regular transportation within the city (Annex 1 - Decision №665-A of the Mayor of Yerevan city, dated 11.03.2015),
14. Minibus routes (Annex 2 - Decision №665-A of the Mayor of Yerevan city, dated 11.03.2015),
15. List of employees safety and health instructions, dated 03.10.2016,
16. Labour agreement №1, dated 07.07.2014,
17. Labour contract with Senior engineer for safe traffic, dated 01.02.2012,
18. Labour contract №65 with Medical nurse, dated 01.09.2017,
19. Labour contract (without number) with Human resources manager, dated 09.09.2013,
20. "Yerevan Bus" CJSC Internal code of conduct, dated 17.12.2015,
21. Job description for Senior engineer for safe traffic, dated 18.05.2020,
22. Job description for Chief specialist of human resources, dated 18.05.2020,
23. Job description for Medical nurse, dated 07.06.2018,
24. Job description for Driver, dated 01.04.2012,
25. Instruction of the head of the motorcade, dated 01.04.2012,
26. Contract for paid services №E/A-05, dated 19.02.2020,
27. List of shift workers of "Yerevan Bus" CJSC, dated 19.02.2020,
28. List of bus drivers of "Yerevan Bus" CJSC, dated 19.02.2020,
29. Personal sanitary books: 2 pcs,
30. Quarterly reports on environmental taxes and nature resources utilization payments for 2019.

Annex 3

Environmental Impact Analysis

The environmental analysis of the Project is related to the expected reduction in greenhouse gas (GHG) and toxic air emissions as a result of the introduction of the new bus fleet.

The assessment is based on comparison of 'without project' situation with 'with project' situation, including proposed investment, over the asset operating lifetime.

1.1 Methodology

The methodology of emission is based on the two three parameters, traffic performance, fuel consumption and emission factor of each type of vehicle. Only CNG buses and minibuses have been considered to the environmental analysis, but no diesel buses / minibuses or passenger cars.

Vehicle types

As mentioned above in the Yerevan Municipality are largely used vehicles with CNG fuel. Due to analysis of bus network was identified bus routes no. 3, 5, 7, 28 and 33 which will be affected.

This bus routes is operated by CNG buses only. As was mentioned in Bus routes proposal, the overlap of bus routes by Gazelle minibuses on parallel routes, was considered. Vehicle fleet of minibuses is consisting of also CNG vehicles only. For this reason, the environmental analysis includes only CNG vehicles and other fuel type was not considered. The list of considered vehicles is below:

- EURO III CNG bus
- EURO III CNG minibus
- EURO VI CNG bus

Emission factor

The emission factor of considered vehicles was taken and calculated based on the data the Guidebook. Emission factor has been calculated for next pollutants:

- GHG emissions:
 - Carbon dioxide (CO₂),
 - Methane (CH₄),
- Air Pollution emissions:
 - Particulate matter (PM),
 - Nitrogen Oxide (NO_x).

Because we have considered CNG vehicles only we have not included Sulphur dioxide (SO₂) and Nitrogen dioxide (N₂O) emissions to environmental analysis.

Fuel consumption

- As the values of Emission factors mentioned in the Guidebook are expressed in unit (g pollutant per km or kg pollutant per km) we have decided to transfer the emission factor values to new units "g pollutant per Kg of CNG" or "Kg pollutant per Kg CNG", based on the fuel consumption mentioned in the Guidebook. In view of this process, the emission factor per kg of CNG fuel was obtained and we could to use the real values of CNG consumption.

Traffic performance

- Key traffic performance expressed in vehicle-kilometers and passenger-kilometers was used for purpose of Environmental analysis.

1.1.1 Emission factor

As was mentioned above, the Environmental analysis has calculated based on the emission factor per vehicle, fuel consumption and traffic performance. The calculation was based on the methodology described in the Guidebook. Tier 1 and Tier 2 approaches were used.

The review of considered pollutants and used approach we mention in text below:

- GHG emissions:
 - Carbon dioxide (CO₂) – Tier 1,
 - Methane (CH₄) – Tier 2,
- Air Pollution emissions:
 - Particulate matter (PM) – Tier 2,
 - Nitrogen Oxide (NO_x) – Tier 2.

Carbon dioxide emission

The approach uses fuel as the activity indicator. Emissions of ultimate CO₂ is directly derivate from combustion of fuel. For this reason, the emission factor of CNG buses mentioned in Tier 1 of Guidebook was considered in this analysis. This approach is related to the fuel and it is not depending on the vehicle type or emission standards of vehicles.

The CO₂ Emissions from fuel consumption was considered only. The CO₂ emissions from lube was not considered.

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
Fuel	-		CNG	
CO ₂ emission factor	g CO ₂ per g of CNG	2.743	2.743	2.743

Methane emission

Calculation of emission factor of Methane is based on the Tier 2 method. This method considers the fuel used by different vehicle categories and their emission standards. The emission factor was calculated from Emission factor related to the vehicle-kilometers and fuel consumption. Both parameters are mentioned in the Tier 2 in Guidebook.

The Fuel consumptions was applied to convert of emission factor related to vehicle-kilometer to the emission factor related to amount of fuel. Exhaust emission factors of the Methane for mini buses (marshrutka) and urban buses are set out in table below.

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
Fuel	-		CNG	
Emission standard	-	EURO III	EURO III	EURO VI
CH ₄ emission factor	g CH ₄ per km	1.280	1.280	0.980
Fuel consumption	g per km	455	455	455
CH ₄ emission factor	g CH ₄ per g of CNG	0.003	0.003	0.002

GHG emission

Total emission factor of GHG emissions is calculated as CO₂ equivalent (CO₂e) because the greenhouse gases has different impacts on Global warming. For comparison of different greenhouse gases was set out parameter Global Warming Potential (GWP). In Environmental analysis was used GWP values for Carbon dioxide and Methane. The GWP values was taken from GHG protocol and are listed below.

Parameter	Unit	Carbon dioxide (CO ₂)	Methane (CH ₄)
Global potential value	-	1	28

Total GHG emission factor calculation as CO₂ eq is the following:

$$CO_2e_{qj} = \sum [EF_{ij} \cdot GWP_i]$$

Where:

CO₂e_{qj} – emission factor of CO₂ equivalent for vehicle category *j*

EF_{ij} – technology-specific emission factor of pollutant *i* for vehicle category *j*

GWP_i – Global Warming Potential value of pollutant *i*.

Summary of GHG emission factor is mentioned in table below.

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
Fuel	-		CNG	
Emission standard	-	EURO III	EURO III	EURO VI
CO ₂ emission factor	g CO ₂ per g of CNG	1.280	1.280	0.980
CH ₄ emission factor	g CH ₄ per g of CNG	0.003	0.003	0.002
CO ₂ GWP value	-		1	
CO ₂ GWP value	-		28	
GHG emission factor	g CO ₂ eq per g of CNG	2.822	2.822	2.803

Particulate matter

Calculation of emission factor of Particulate matter is also based on the Tier 2 method. The pollutant PM_{2.5=10=tsp} as considered for purpose of environmental analysis. As the mentioned in text above this method considers the fuel used by different vehicle categories and their emission standards. The same approach was applied just like in the case of calculation of the Methane emission factor.

Exhaust emission factors of the Particulate Matter for used vehicles are set out in table below.

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
Fuel	-		CNG	
Emission standard	-	EURO III	EURO III	EURO VI
PM _{2.5=10=tsp} emission factor	g PM _{2.5=10=tsp} per km	0.01	0.01	0.005
Fuel consumption	g per km	455	455	455
PM _{2.5=10=tsp} emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000022	0.000022	0.000011

Nitrogen Oxide

Calculation of emission factor of Nitrogen Oxide is also based on the Tier 2 method.

Exhaust emission factors of the Particulate Matter for used vehicles are set out in table below.

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
Fuel	-		CNG	
Emission standard	-	EURO III	EURO III	EURO VI
NO _x emission factor	g NO _x per km	10	10	2.5
Fuel consumption	g per km	455	455	455
NO _x emission factor	g NO _x per g of CNG	0.0220	0.0220	0.0055

1.1.2 Value of emissions

In order to compare of change in emission exhaust the pollutants mentioned above was monetized. The prices of pollutants was taken from technical note published by EBRD "Methodology for the economic assessment of EBRD projects with high greenhouse gas emissions".

Year of analysis	Unit	CO ₂ eq	Nitrogen oxides	Particulate Matter
2020	€ per tonne	37 – 74	8,010	28,732
2030	€ per tonne	46 – 92		

2030 and later	Annual increase	+ 2.25%	-	-
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The lower bound of CO₂eq price was assumed for purpose of Environmental analysis.

1.1.3 Traffic performance

As mentioned above the vehicle-kilometers and passengers-kilometers was used in emission analysis. For selection of project routes was used the study of New Bus Network and Integrated Tariff and Ticketing System, Final Network Proposal; prepared by WYG International Limited in January 2019.

1.2 Exhaust emission calculation

Calculation of total exhaust emission is based on the emission factor, real or expected fuel consumption and total annual mileage.

Calculation of Emission exhaust was due to following formula:

$$\text{Emissions}_{i,j} = \sum [M_j \cdot FC_j \cdot EF_{i,j}]$$

Where:

Emissions_{i,j} – emission of pollutant *i* for vehicle category *j*,

M_j – total annual distance driven by all vehicles of category *j* (veh-km),

FC_j – fuel consumption of vehicle *j* (g/km)

EF_{i,j} – technology-specific emission factor of pollutant *i* for vehicle category *j* (g/veh-km).

1.2.1 Fuel consumption

Value of Fuel consumption based on the operating data given by municipality Yerevan was used for more precision calculation of emission exhaust. The average fuel consumption on affected routes operated by existing CNG buses was used for purpose of Environmental analysis.

Value of fuel consumption 12kg per 100 km was used in case of minibuses.

Fuel consumption of new CNG buses was derived from technical specification of bus manufacturer. Because in time of preparation of this document we did not know the model of new CNG buses EURO VI, we used the three reference buses, which was included in tender in Tbilisi. Fuel consumption of new CNG buses was calculated as average consumption of all referenced buses.

Resulted values of fuel consumption used in environmental analysis are showed in the table below.

Parameter	Unit	EURO III Bus	EURO III Minibus	CNG bus EURO VI
	kg CNG per 100km	28.31	12	38.1
Fuel consumption	g CNG per km	283.1	120	381

1.2.2 Scenario Base Case

In Table below is given the total amount of emissions for pollutants calculated based on the total annual mileage of minibuses and urban buses in Yerevan.

Mileage in Base Case scenario was assumed 5,625,541 km of buses per year and 14,642,317 km of minibuses per year. Summary of annual mileage assumed in Base Case is mentioned in the table below.

Annual mileage

	Unit	EURO III Bus	EURO III Minibus	TOTAL
Annual mileage	km	5,625,541	14,642,317	20,267,858

In next tables is Emission exhaust summary in Base case scenario. The pollutants are mentioned in the separate tables.

Summary of GHG emission

	Unit	EURO III Bus	EURO III Minibus	TOTAL
Emission factor	g CO ₂ eq per g of CNG	2.822	2.822	-
Fuel consumption	g CNG per km	283.1	120	-
Annual mileage	km	5,625,541	14,642,317	20,422,947
Total annual emissions	Tonne CO ₂ eq	4,494	4,958	9,452

Summary of Particulate Matter emission

	Unit	EURO III Bus	EURO III Minibus	TOTAL
Emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000022	0.000022	-
Fuel consumption	g CNG per km	283.1	120	-
Annual mileage	Km	5,625,541	14,642,317	20,422,947
Total annual emissions	tonne PM _{2.5=10=tsp}	0.035	0.039	0.074

Summary of Nitrogen oxides emission

	Unit	EURO III Bus	EURO III Minibus	TOTAL
Emission factor	g NO _x per g of CNG	0.022	0.022	-
Fuel consumption	g CNG per km	283.1	120	-
Annual mileage	Km	5,625,541	14,642,317	20,422,947
Total annual emissions	tonne NO _x	35.0	38.62	73.62

The environmental analysis has been evaluated for 12 years period. The first year of analysis is year 2021 and last year of analysis is 2032.

In table below is showed Environmental analysis summary for evaluated period.

Emission summary of Base case (tonne)

Pollutant	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PM _{2.5=10=TSP}	0.883	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
NOx	883	74	74	74	74	74	74	74	74	74	74	74	74
CO ₂ eq	113,424	9,452	9,452	9,452	9,452	9,452	9,452	9,452	9,452	9,452	9,452	9,452	9,452
TOTAL EMISSION	114,308	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526

Cash flow summary of Base case (€)

Pollutant	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PM _{2.5=10=TSP}	25,383	2,115	2,115	2,115	2,115	2,115	2,115	2,115	2,115	2,115	2,115	2,115	2,115
NOx	7,076,267	589,689	589,689	589,689	589,689	589,689	589,689	589,689	589,689	589,689	589,689	589,689	589,689
CO ₂ eq	4,848,995	357,422	365,289	373,329	381,547	389,945	398,528	407,300	416,265	425,428	434,792	444,574	454,577
TOTAL COSTS	11,950,644	949,226	957,093	965,133	973,351	981,749	990,332	999,104	1,008,069	1,017,232	1,026,596	1,036,379	1,046,382

1.2.3 Scenario Project Case

In scenario Project case is assumed with replacement of existing buses and minibuses by new CNG buses of emission standard EURO VI.

Daily mileage in Project Case was assumed that 6,098,272 km per year. Summary of assumed annual mileage and total emission exhaust in Project Case is mentioned in the tables below.

Annual mileage

	Unit	EURO VI Bus
Annual mileage	Km	6,098,272

In next tables is Emission exhaust summary in Project case scenario. The pollutants are mentioned in the separate tables.

Summary of GHG emission

GHG emission	Unit	EURO VI Bus
Emission factor	g CO ₂ eq per g of CNG	2.803
Fuel consumption	g CNG per km	381
Annual mileage	km	6,098,272
Total emission	Tonne CO₂eq	6,513

Summary of Particulate Matter emission

GHG emission	Unit	EURO VI Bus
Emission factor	g PM _{2.5=10=tsp} per g of CNG	0.000011
Fuel consumption	g CNG per km	381
Annual mileage	km	6,098,272
Total emission	tonne PM_{2.5=10=tsp}	0.026

Summary of Nitrogen Oxide emission

GHG emission	Unit	EURO VI Bus
Emission factor	g NO _x per g of CNG	0.0055
Fuel consumption	g CNG per km	381
Annual mileage	km	6,098,272
Total emission	tonne NO_x	12.766

The environmental analysis has been evaluated for 12 years period. The first year of analysis is year 2021 and last year of analysis is 2032.

In table below is showed Environmental analysis summary for evaluated period.

Emission summary of Project case (tonne)

Pollutant	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PM _{2.5=10=TSP}	0.3	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
NOx	153	12.766	12.766	12.766	12.766	12.766	12.766	12.766	12.766	12.766	12.766	12.766	12.766
CO ₂ eq	78,160	6,513	6,513	6,513	6,513	6,513	6,513	6,513	6,513	6,513	6,513	6,513	6,513
TOTAL EMISSION	78,313	6,526	6,526	6,526	6,526	6,526	6,526	6,526	6,526	6,526	6,526	6,526	6,526

Cash flow summary of Project case (€)

Pollutant	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PM _{2.5=10=TSP}	8,803	734	734	734	734	734	734	734	734	734	734	734	734
NOx	1,227,084	102,257	102,257	102,257	102,257	102,257	102,257	102,257	102,257	102,257	102,257	102,257	102,257
CO ₂ eq	3,341,418	246,297	251,719	257,259	262,922	268,709	274,624	280,668	286,846	293,160	299,613	306,354	313,247
TOTAL COSTS	4,577,305	349,288	354,709	360,250	365,912	371,700	377,614	383,659	389,837	396,151	402,603	409,345	416,238

Emission savings (tonne)

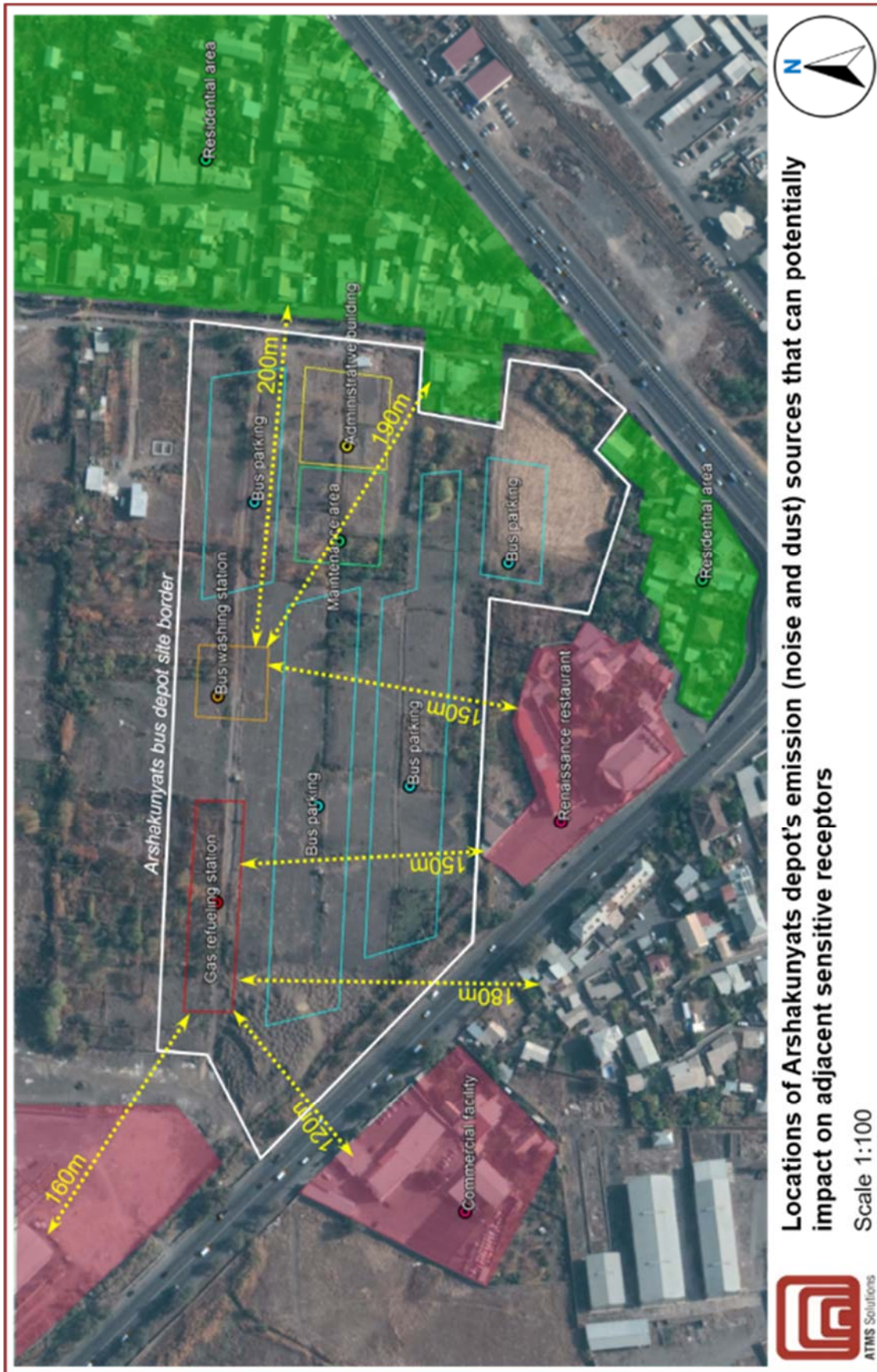
Pollutant	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PM _{2.5=10=TSP}	0.58	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
NOx	730	61	61	61	61	61	61	61	61	61	61	61	61
CO ₂ eq	35,264	2,939	2,939	2,939	2,939	2,939	2,939	2,939	2,939	2,939	2,939	2,939	2,939
TOTAL EMISSION	35,995	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

Total savings (€)

Pollutant	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PM _{2.5=10=TSP}	16,580	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382
NOx	5,849,184	487,432	487,432	487,432	487,432	487,432	487,432	487,432	487,432	487,432	487,432	487,432	487,432
CO ₂ eq	1,507,576	111,124	113,570	116,070	118,625	121,236	123,904	126,632	129,419	132,267	135,179	138,220	141,330
TOTAL SAVINGS	7,373,339	599,938	602,384	604,883	607,438	610,049	612,718	615,445	618,232	621,081	623,992	627,034	630,144

Annex 4

Locations of Arshakunyats depot emission sources



Annex 5

Master-plan of new Arshakunyats depot

