

MAY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

FINAL REPORT – FINAL



COWI

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PROJECT NO.

A226634

DOCUMENT NO.

A226634-007

VERSION

04

DATE OF ISSUE

31.05.2023

DESCRIPTION

Final Report - final

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

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ABBREVIATIONS

Abbreviation	Explanation
BCR	Benefit-Cost Ratio
C&D	Construction & Demolition (Waste)
CAPEX	Capital Expenditures
CDR	Central Development Region
CDSPP	Corporate Development and Stakeholder Participation Programme
CS	Composting Station
ESP	Eastern Europe Energy Efficiency and Environment Partnership
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	Economic internal rate of return
EBRD	European Bank for Reconstruction and Development
ENPV	Expected net present value
EPIU	Environmental Projects Implementation Unit (now NOIEP)
ESAP	Environmental and Social Action Plan
ESP	Environmental and Social Policy
GET	Green Economy Transition
GHG	Greenhouse Gases
GPS	Global Positioning System
HHI	Household income
IDG	International Donor Grant
IFI	International Financial Institution
IMCA	Inter-municipal cooperation agreement
IMJSC	Inter-municipal joint stock company
IRR	Internal rate of return
ISWM	Integrated Solid Waste Management
JSC	Joint Stock Company
LPA	Local Public Authority

Abbreviation	Explanation
LTIP	Long-term Investment Programme
M&E	Mechanical and electrical equipment
MARDE	Ministry of Agriculture, Regional Development and Environment, Republic of Moldova
MDL	Moldavian Leu (currency)
MoEnv	Ministry of Environment
MoF	Ministry of Finance
MSW	Municipal Solid Waste
NAER	National Agency for Energy Regulation
NOIEP	National Office for Implementation Environment of Projects (former EPIU)
NTS	Non-Technical Summary
OPEX	Operational Expenditures
PIP	Priority Investment Programme
PIU	Project Implementation Unit
RFID	Radio-frequency identification
SEP	Stakeholder Engagement Plan
SLA	Service Level Agreement
SOJSC	State-owned joint stock company
SS	Sorting Station
SWM	Solid Waste Management
TA	Technical Assistance
ToR	Terms of Reference
TS	Transfer Station
WMZ	Waste Management Zone

1 Introduction

This Final Report has been prepared by the team of **COWI A/S** (the Consultant) within the assignment "Moldova Solid Waste Project" (further the Project) executed on behalf of the **European Bank for Reconstruction and Development** (EBRD, the bank) and in close co-operation with the Moldavian **Ministry Environment (MoEnv;** former Ministry of Agriculture, Regional Development and Environment (MARDE), the Client), and the representatives from **Waste Management Zone 1** (WMZ-1, the Pilot Region).



Figure 1 Map of the Republic of Moldova

According to the Waste Management Strategy of the Republic of Moldova for 2013-2027 (Gov. Decision Nr. 248 from 10.04.2013), the territory of WMZ-1 consists of Cahul Rayon¹, Cantemir Rayon, Taraclia Rayon, and Autonomous Territorial Unit of Gagauzia (ATUG). The ATUG, where population speaks mainly Russian, includes three districts: Comrat, Ceadir-Lunga, and Vulcanesti. The districts of ATUG are rather small and do not have the same status as the Rayons mentioned above. The WMZ-1 is located in the southern part of the country, bordering the countries of Romania and the Ukraine, and is part of the Southern Development Region (SDR) of Moldova.

The Feasibility Study (FS) from GIZ (2015) for the Integrated Waste Management System (IWMS) for WMZ-1 did not include Comrat District of ATUG in the proposed system. Comrat District was included in WMZ-2, according to the waste management concept for this zone (and including ATUG) developed by Ircon and SWECO in 2017 within the project "Technical and institutional support of solid waste management in Southern Moldova", supported by the international Development Cooperation of the Czech Republic. The waste from all municipalities from Comrat District was

¹Error! Bookmark not defined.

supposed to be transported to the planned regional landfill near Cimislia Town in WMZ-2; a transfer station (TS) was planned to be located near Comrat Town for this purpose.

MoEnv decided to include all area of ATUG within the SWM system of WMZ-1, including Comrat District. Comrat is the largest city and the administrative centre of ATUG, which brings an advantage in terms of organizational setup and management capacity for implementing the new regional-scale SWM system in WMZ-1.

Figure 2 below presents the updated infrastructure for SWM in WMZ-1. The SWM infrastructure was updated based on MoEnv requests following the discussions on the Interim Report. Hence, the regional SWM infrastructure for WMZ-1 includes three Transfer Stations (TSs), one TS in Cania (Cantemir Rayon), another TS in Taraclia Town (Taraclia Rayon), and the other TS in Comrat Town (Comrat District), and a Sanitary Landfill (LF), a Sorting Station (SS) for separately collected recyclables, and a Composting Station (CS) for green waste near Cahul Town (Cahul Rayon).

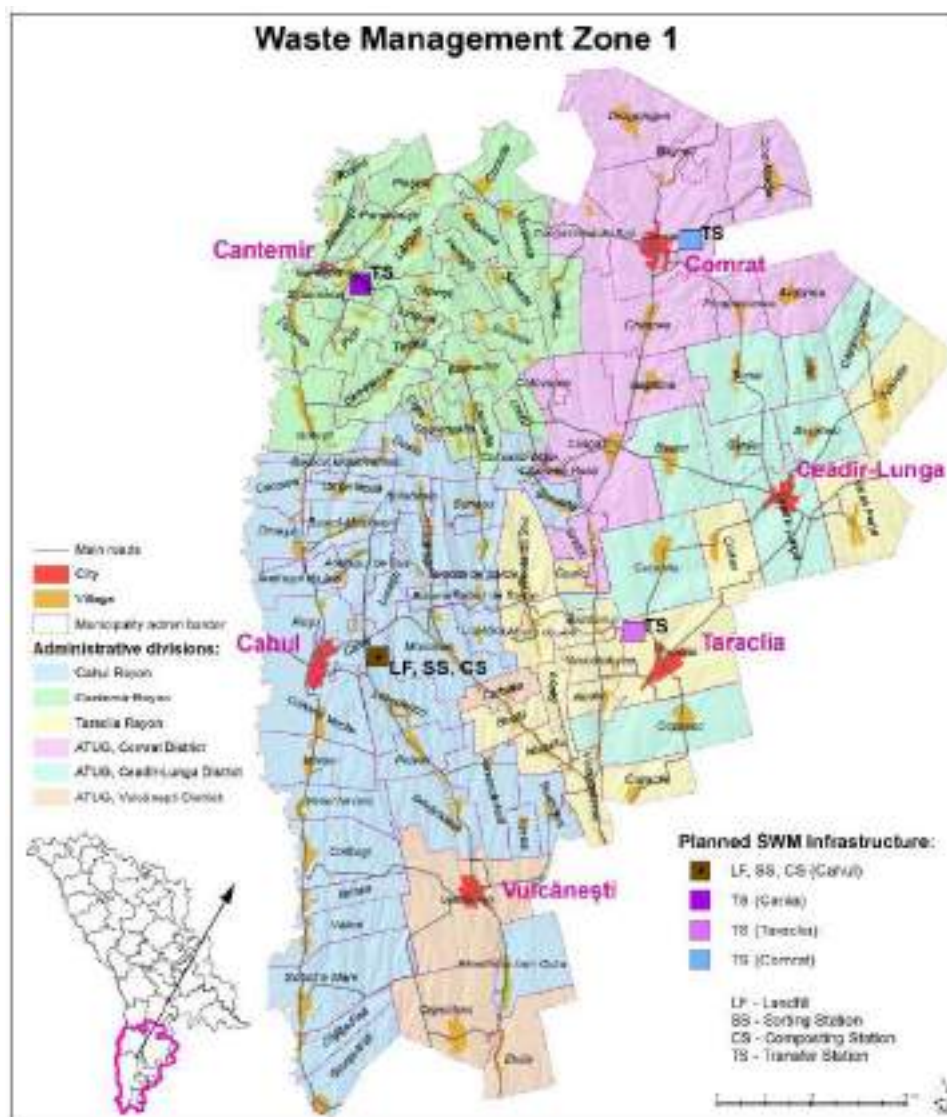


Figure 2 WMZ-1 with updated SWM infrastructure

This Final Report presents the outcomes from the Consultant's assessment as a follow up on the Inception Report, the Interim Report, the draft Financial Model as well as several discussions with

EBRD, MoEnv and other key stakeholders from the pilot region. The Gap Analysis Study complements and adjusts the SWM system presented in the Feasibility Study (GIZ, 2015) but it does not make any conceptual changes to the initial SWM system. The updated SWM system for WMZ-1 is conceptually similar to the updated SWM systems proposed by the Consultant in the Gap Analysis Studies for the other two waste management zones (i.e., WMZ-5 and WMZ-8).

Following the Introduction, *Chapter 2* contains the Consultant's assessment and recommendations regarding the technical and economic feasibility of the Project.

Chapter 3 presents the outcome of discussions with the key stakeholders of the Project for tailoring a robust institutional set-up for the future SWM system.

Chapter 4 presents the financial analysis and financial model for the Project.

Chapter 5 presents findings from the environmental and social assessment of the Project and is supplemented by appendices including the EBRD Performance Requirements Compliance Table, the Environmental and Social Action Plan, the Stakeholder Engagement Plan and the Non-Technical Summary that could be prepared for the public disclosure.

Chapter 6 presents considerations regarding the procurement and contracting strategy for the Project implementation.

Chapter 7 describes potential risks and proposed measures for mitigating these Project risks.

Alignment of the proposed Project with the Bank's mandate in terms of Green Economy Transition (GET) and promotion of gender equality is addressed in *Chapter 8*.

Appendices to this report include documents supporting the assessments and recommendations presented in various *Chapters*.

2 Technical and Economic Feasibility of the Project

2.1 Market analysis and demand forecasts

2.1.1 Gap analysis – Assess demand for SWM services

The assumptions on population forecasts for the catchment area (WMZ-1) provided by the FS (GIZ, 2015) used data on present population for years of 2007 to 2013. During the elaboration of the FS in 2015 the census 2014 data on population was not available. Hence, to improve the forecast of present population for WMZ-1, the updated data used by the Consultant includes the data on present population according to census 2004 and census 2014 (National Bureau of Statistic: www.statistica.md). The updated data was used to calculate the growth rate for each municipality. The calculated growth rate was then used for the population forecasts for the years 2025-2047.

The population forecast shows that the population in WMZ-1 is decreasing each year by 1.37%. If this development continues, the population in WMZ-1 will decrease from 300,500 in 2021 to 222,500 in 2047.

The updated population forecasts carried out by the Consultant revealed small differences (approx. +2%) comparing to the population forecasts for the year of 2021 in the original FS (which did not include Comrat District at that time). The updated population data was used to update the data on the customers of the SWM services in WMZ-1.

The data on municipal waste generation and forecasts, including streams of waste and related generators, was updated according to the more recent data used in the FSs for WMZ-5 and WMZ-8, which is correlated with similar data in the region. It should be noticed that this data is based on assumptions (which are valid in the opinion of the Consultant) as data on waste generation in Moldova, including WMZ-1, is not available.

Other waste streams, such as agricultural wastes, food processing wastes, industrial wastes, etc. are not part of MSW. These waste streams were not considered by the original FS (GIZ, 2015) and shall not be considered for this assignment as they are out of the responsibilities of the Local Public Authorities (LPAs). At the same time, data on generation of these waste streams is not available.

According to the National Bureau of Statistic (www.statistica.md), including additional data collected from LPAs, about 90% of urban population and 40% of rural population in WMZ-1 are currently connected to SWM services.

The population and MSW generation forecasts according to FS (GIZ, 2015) and updated data for the year of 2021 are presented in Table 1. The forecasts of WMZ-1 were updated by using the waste generation indicators described in the FSs for WMZ-5 and WMZ-8 (GIZ, 2017). The generated MSW presented in Table 1 includes all MSW amounts in the municipalities regardless of waste collection coverage. The MSW generated rate in WMZ-1 is 231 kg/capita/year according to FS forecast data and 212 kg/capita/year according to updated data by the Consultant. The waste generation rate in urban areas is higher (321 kg/capita/year), while the waste generation rate in rural areas is lower (165 kg/capita/year). Comparing data on MSW generation in the region as per Eurostat, the

² Eurostat data: <https://ec.europa.eu/eurostat/databrowser/view/env_wasmun/default/table?lang=en>.

generation rate in WMZ-1 is close to the rate in Romania (287 kg/capita/year). Considering that WMZ-1 is a moderately developed region, the MSW generated rate used in the original FS (GIZ, 2015) and updated model is appropriate and comparable with neighbouring country of Romania.

The MSW forecast shows that the generated MSW in WMZ-1 is correlated with the decrease of the population in the region. The generated MSW is estimated to decrease from 63,600 tons in 2021 to 50,700 tons in 2047.

The data on composition of household and similar waste for the year of 2021 (based on the assumptions used in the FS and updates) is presented in Table 2. The composition presented is a good estimate and it is comparable with the data in other WMZ's and the region. There is no national data available on MSW composition.

Table 1 Population and waste generation forecast, WMZ-1

	Year 2021 (FS forecast)			Year 2021 (updated forecast)		
	Total	Urban	Rural	Total	Urban	Rural
Population (1.000 inhabitants):	294.8	95.7	199.1	300,5	89,0	211,6
Population (%):	100	32	68	100	30	70
Waste generation (1.000 tons/year):	68.2	34.9	33.3	63,6	28,6	35,0
Waste from households	54.7	24.5	30.3	51	19,9	31,5
Similar waste (from institutions and commercial companies)	9.1	6.1	3.0	8	5,0	3,2
Park/garden waste	1.9	1.9	0.0	2	1,7	0,0
Other waste (street waste, bulky, waste from markets)	2.4	2.4	0.0	2	2,1	0,3
Waste generation (kg/cap/year)	231	365	167	212	321	165

Data source: FS (2015), COWI, 2022

Table 2 Waste composition in WMZ-1

	Year 2021				
	%		1,000 tons		
	Urban	Rural	Total	Urban	Rural
Household waste:	100%	100%	51,4	19,9	31,5
Plastic	11%	6%	4,1	2,2	1,9
Paper & cardboard	6%	3%	2,1	1,2	0,9
Glass	5%	5%	2,6	1,0	1,6
Metal	4%	2%	1,4	0,8	0,6
Organic/green waste	57%	37%	23,0	11,3	11,7
Textile	3%	3%	1,5	0,6	0,9
Inert	5%	35%	12,0	1,0	11,0
Other	9%	9%	4,6	1,8	2,8
Waste similar to household waste:	100%	100%	8,1	5,0	3,2
Plastic	20%	10%	1,3	1,0	0,3
Paper & cardboard	40%	40%	3,2	2,0	1,3
Glass	10%	10%	0,8	0,5	0,3
Metal	5%	5%	0,4	0,2	0,2
Organic	7%	15%	0,8	0,3	0,5
Textile	8%	8%	0,6	0,4	0,3
Inert	3%	5%	0,3	0,1	0,2
Other	7%	7%	0,6	0,3	0,2

Data source: FS (2015), COWI, 2022

Taking into consideration the above data, it is estimated (for year 2021) that the MSW in WMZ-1 contains about 16,000 tons of recyclables (mainly packaging waste of plastic, paper/cardboard, metal, and glass), 25,500 tons of bio-waste (including the organic fraction from the household and similar wastes = 23,800 tons and waste from parks and gardens = 1,700 tons). The other combustible fraction of the household and similar waste is estimated at about 2,200 tons, excluding recyclables and organic waste.

2.1.2 Gap analysis – Current SWM practices

The information on SWM practices described in the FS (GIZ, 2015) was old, referring to the situation in 2013-2014. The Consultant updated the information on SWM practices by sending questionnaires to all LPAs in WMZ-1. According to the updated information, there are 22 publicly owned SWM operators in 22 LPAs of WMZ-1. Additionally, the SWM services in other 15 municipalities are provided directly by the LPAs without any registered company. The largest operators, represented by Municipal Enterprises, are working in the urban areas. The operators working in rural areas are quite small.

The largest SWM operators are represented by 5 Municipal Enterprises working in Cahul Town (I.M. Gospodaria Comunal-Locativa Cahul), Cantemir Town (I.M. Apa Canal Cantemir), Comrat Town (I.M. Gospodaria Locativ-Comunala Comrat), Taraclia Town (I.M. Apa Canal Taraclia), and Vulcanesti Town (I.M. Gospodaria Locativ-Comunala Vulcanesti). There is no individual SWM operator working in Ceadir-Lunga Town; the SWM service is provided directly by the Department of Public Works and Sanitation of Ceadir-Lunga LPA.

According to reported data from LPAs and the National Bureau of Statistics, about 90% of urban population and 40% of rural population in WMZ-1 are currently connected to SWM services. The connection to SWM services in each rayon is fluctuating around the same rates as for the entire WMZ-1. The MSW collection in WMZ-1 is carried out by using collection points with containers of 1.1 m³ or 0.7m³ capacity and by door-to-door collection with bins of 120 l or 240 l capacity or bags. At collection points about 1,600 containers are used while for door-to-door collection about 8,700 bins are used. Majority of containers and bins are old (over 5 years) and need replacement. About 26 compaction trucks (mainly in urban areas) and 16 tractors (mainly in rural areas) are used for waste collection in WMZ-1. Most waste collection vehicles used are old and of outdated technology which cannot be used for the new system.

The population not covered by SWM services are usually transporting the waste to local dumpsites. Part of population dump the waste in the nature (streams, open fields, illegal dumpsites) or even burn it in their backyard.

The current data on quantities of collected waste is estimated as there is no weighbridge at the waste disposal sites in WMZ-1. The reported quantities of collected MSW to the National Bureau of Statistics by the waste collection operators in the region is also approximated as it is based on the number and volume of trucks used to collect the waste.

The collected MSW (from population, institutions, and businesses) reported by National Bureau of Statistics for the year of 2020 in WMZ-1 is 380,100 m³ (Cahul Rayon - 54,100 m³, Canteamir Rayon - 8,600 m³, Taraclia Rayon - 84,100 m³, Ceadir-Lunga District of ATUG - 99,300 m³, Vulcanesti District of ATUG - 19,200 m³, Comrat District of ATUG - 114,800 m³). The information of the collected MSW reported by the National Bureau of Statistics is overestimated. The reported information on the MSW collected is based on the volume of vehicles used to collect the waste but not on actual weight

of the waste. There are no weighbridges at any of the dumpsites in WMZ-1. The waste collection vehicles are not always full. Additionally, the transported waste reported to National Bureau of Statistics may include other types of waste (e.g. manure or other agricultural wastes), which are not part of MSW.

The Consultant estimates that 35,000 - 40,000 tons of MSW is collected in urban and rural areas of WMZ-1, representing 63% of the forecasted MSW generated in WMZ-1 described in Table 1.

No information on the collection of construction and demolition waste or any other waste streams is available. The hazardous waste is not part of MSW and it is not the responsibility of LPAs. According to the law, hazardous waste is the responsibility of the generators. Companies must monitor and ensure processing/neutralization or safe storage of the generated hazardous waste. At the same time, there is no special facility for hazardous waste treatment or disposal in the Republic of Moldova. Some hazardous waste (medical waste, used oils, batteries, and containers/packaging materials used for paints, pesticides, and other toxic chemicals) from day-to-day activities of households ends up in the MSW stream. According to composition analyses of MSW, the hazardous waste is usually about 0.5% of the MSW, which translates to about 300 tons per year of such waste for the entire WMZ-1. The design of transfer stations, sorting station, and the regional landfill includes separate containers (metal 1.1 m³ containers) for temporary storage of hazardous waste. It should be noticed that the system for the collection of used batteries, lamps, and other waste from electrical and electronic equipment (WEEE) is in operation in the Republic of Moldova (www.e-circular.org/statistici/operatori; www.e-reciclare.md); people can get rid of such waste at the major stores selling such goods or other bring in locations.

The collected MSW is disposed of at 116 waste disposal sites (mainly dumpsites) in WMZ-1 with a total area of about 150 ha (average area of per site is 1.3 ha). 14 of the dumpsites (with a total area of 28 ha) are located in Comrat District. Only a few of the dumpsites are authorised. Figure 3 below represents the distribution of dumpsites within WMZ-1 according to the inventory of waste disposal sites carried out in 2013 by MoEnv. In urban areas the MSW is transported to the waste disposal sites by the SWM companies. In most villages, the MSW is transported individually by the residents to the local dumpsites.

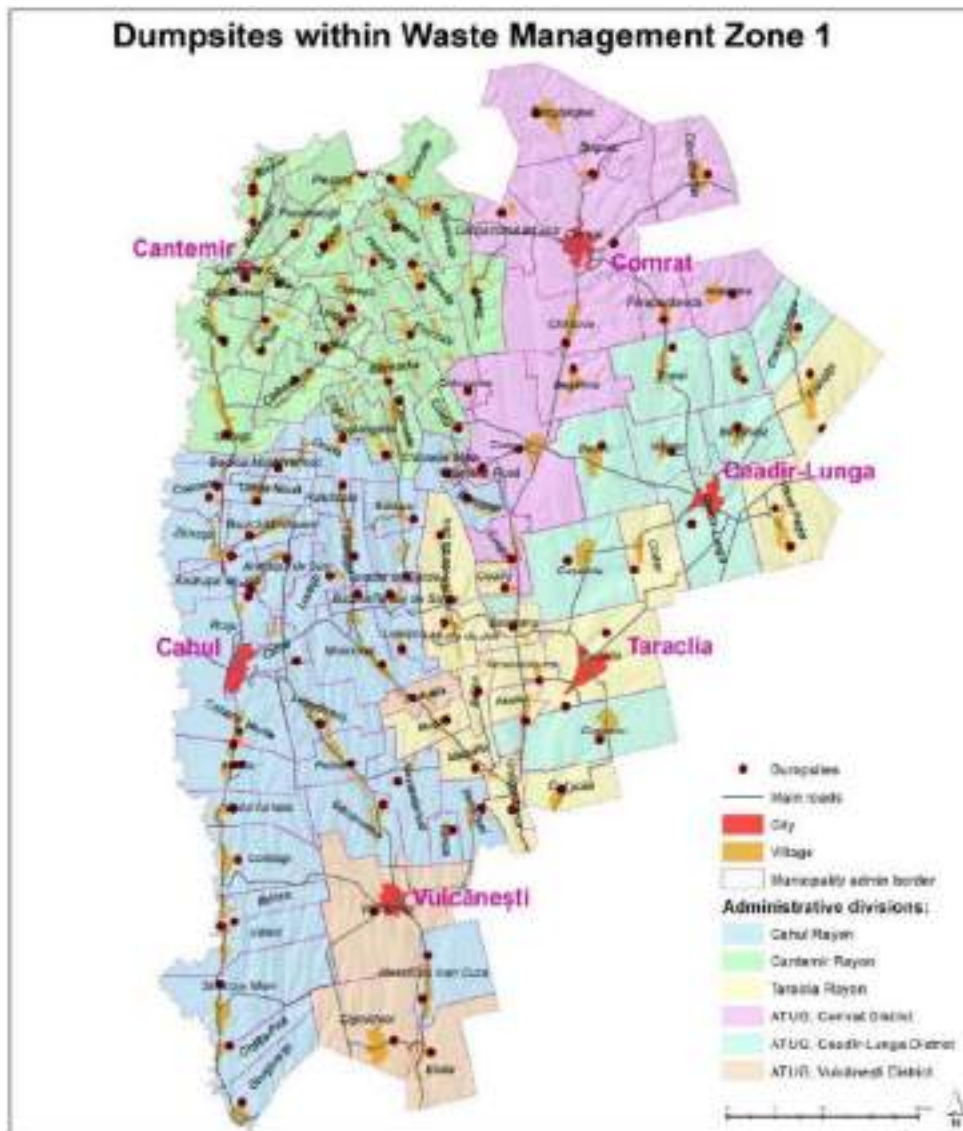


Figure 3. Locations of dumpsites within WMZ-1

Generally, the collected waste in WMZ-1 is delivered to dumpsites, which do not comply with requirements on environmental and human health protection. They are not fenced, not monitored, and not equipped with weighbridges. More detailed information on dumpsites is provided in the FS (GIZ, 2015).

Waste picking is not a common practice in the region because of low market value of recyclables contained in the MSW. Only scrap metal (that has a better market value) is collected from disposal sites by a small number of waste pickers. No data on the number of active waste pickers is available. No waste pickers were observed during field visits.

Home composting is not a common practice in the region. Many residents transport the organic waste (agricultural waste) to local dumpsites or dump it directly in the nature.

Waste separation at source is carried out only in a few of municipalities (Cantemir Town, Muasaitu Village, Ceadir-Lunga Town, Copceac Village, Comrat Town) in WMZ-1. Only small quantities of recyclables are collected; no data on the collected recyclables is available.

There is no statistical data on the quantities of recyclable materials collected and sold/procured in Moldova. The main buyer of plastic material on Moldovan market is ABS. ABS is operating sorting and processing facilities in other WMZ's as Chisinau and Orhei. There are two glass container companies in Chisinau (Chisinau Glass Factory, Glass Container Company) that procure and process recyclable glass bottles. The biggest buyer and processor of cardboard and paper is Candelux-com (paper mill) operating in Chisinau; it collects over 70% of the cardboard/paper recyclables on the market. Cardboard items production company (Combinatul de Articole din Carton) is another company based in Chisinau that buys and process paper and cardboard. Metalferos JSC is a state-owned company that collects, buys, process, and export scarp metals. Until recently, Metalferos JSC had exclusivity for export of scrap metals. However, the law has been changed and more companies get authorisations (form the Environmental Agency of MoEnv) to export such materials. In 2021, 15 companies besides Metalferos JSC were authorised to export such materials. As mentioned above, the system for collection of WEEE is in operation in Moldova and the companies exporting such waste are also getting authorisation form the Environmental Agency of MoEnv.

Other dealers procure recyclables (mainly plastic materials and cardboard) to export them to neighbouring countries. The local prices (collected by the Consultant in 2021) for the main recyclable materials are presented in Table 3 below.

Table 3 Local prices for recyclable materials 2021

Recyclable materials	Price (MDL/ton) 2021
Cardboard	1,800
Mixed PET	2,500
Sorted transparent PET	4,000
Sorted blue PET	3,000
Sorted green and brown PET	2,000 - 2,500
Mixed broken glass bottles/containers	100 - 500
Metal (steel and aluminium) cans/containers	1,000 - 4,000

Depending on petrol prices, the prices for plastics are fluctuating on the international market, which also influences the local market prices. The model of the FS is using conservative prices for the recyclable materials, which is a good strategy taking into consideration fluctuating prices of the recyclable materials on the global market.

2.1.3 Gap analysis – Analysis of the future MSW supply and demand

With the update of the population and MSW generation, the general model related to MSW supply and demand used by the original FS is valid and shall be used as basis for the organisation of the future MSW system in WMZ-1. However, the model had to be updated to accommodate for the inclusion of Comrat District of ATUG in the SWM system for WMZ-1. The details on MSW generation rates used and calculations are provided in the updated Financial Model. The updated Financial Model was mainly constructed based on the models elaborated for the other two WMZs (WMZ-5 and WMZ-8) as the SWM systems for these WMZs are conceptually similar.

Since the population considered in the FS (GIZ, 2015) for the WMZ-1 was higher than after population adjustment considering new Census data, the capacity of the system components (planned according to the original FS) is sufficient, even with the inclusion of Comrat District of ATUG into WMZ-1.

The main characteristics of the SWM systems proposed by the original FS (GIZ, 2015) and the gap analysis (2022) are presented in Table 4. The main changes in the updated SWM system proposed by the Consultant include:

- > upgrading the waste collection system to increase the recovery of recyclables;
- > including Comrat District of ATUG in the SWM system of WMZ-1 by adding a transfer station near Comrat Town;
- > excluding the composting station initially planned at Cania transfer station;
- > excluding the composting station and sorting station for recyclables initially planned at Taraclia transfer station.

The details on the changes made to the SWM system are presented in the next section.

The capacity of the sorting facility (for separate at source collected recyclables) and containers for the collection of recyclables were updated considering the national targets for recycling of packaging materials; according to the [Government Decision Nr. 561 from 31-07-2022 on approving of regulation on packaging and packaging waste](#) the global recycling target for of packaging waste is 45%.

The regional landfill site near Cahul Town has sufficient capacity to allow landfilling of all MSW generated in WMZ-1 for at least 20 years. There is additional public land available near the site to allow for waste disposal beyond 20 years if needed. The sites planned for the other facilities are sufficient in size to allow their construction and appropriate operation afterwards.

Table 4 Main characteristics of the original and updated SWM system

SWM system components	SWM system, FS, GIZ 2015	Updated SWM system, COWI 2022
Population to be serviced	295,900	278,800
MSW, generated per year (tonnes)	67,400	60,000
MSW, total for 20 years (tonnes)	1,374,500	1,106,400
Collection of residual waste (main equipment)	Containers (1,100 l): 6,139 Bins (120 l): 12,057 Compaction trucks (16 m ³ /6 m ³): 23/16	Containers (1,100 l): 4,350 Bins (120 l): 35,400 Compaction trucks (16 m ³ /10 m ³ /6 m ³): 9/13/16

Collection of recyclables (main equipment)	Containers (1,100 l): 1,512 Net cages (1,100 l): 1,071 Bell container for glass (1,100 l): 125 Compaction trucks (16 m ³): 4 Truck for glass (16 m ³): 1	Containers, see-through (1,100 l): 5,030 Compaction trucks (16 m ³ /10 m ³ /6 m ³): same trucks used for collection of residuals
Transfer Station (TS)	TS 1, Cania: capacity 11,000 t/y TS 2, Taraclia: capacity 22,000 t/y	TS 1, Cania: capacity 8,000 t/y TS 2, Taraclia: capacity 15,000 t/y TS 3, Comrat: capacity 12,000 t/y
Sorting Station (SS), recyclables	SS 1, Cahul: capacity 4,000 t/y SS 2, Taraclia: capacity 2,000 t/y	SS 1, Cahul: capacity 6,000 t/y
Composting Station (CS), green waste	CS 1, Cahul: capacity 1,700 t/y CS 2, Cania: capacity 225 t/y CS 3, Taraclia: capacity 1,400 t/y	CS 1, Cahul: capacity 1,600 t/y
Regional Landfill (LF)	LF, Cahul: capacity 1.2 Mio t/>21 years	LF, Cahul: capacity 1.2 Mio t/>21 years

According to the latest information received from LPAs, most available waste trucks at waste management operators are too old to be considered for the new SWM system. Only 6 units of compaction trucks (4 units of 10-16 m³ MAZ trucks in Comrat and 2 units of 9 m³ GAZ trucks in Cahul) procured between 2017-2021 can be considered as reserve trucks for the new SWM system. Since these trucks are of poor quality (and based on old technology), they cannot be efficiently used as main waste collection trucks for the planned new SWM system. Although a small part of bins/containers have been recently procured in some LPAs, they shall not influence the procurement plans for such equipment for the new SWM system. By the time, the new SWM system is implemented, all the containers used now by the municipalities in WMZ-1 will need to be replaced anyway. Hence, all SWM system components in WMZ-1 will be renewed.

2.2 Project design

2.2.1 Design components

The original planned SWM system planned in the FS (GIZ, 2015) was designed to cover a population of almost 300,000 people located in Cahul, Cantemir, and Taraclia Rayons and two districts from ATUG (Ceadir-Lunga and Vulcanesti). However, after the population update according to new population census data, the population in the considered original area decreased to almost 231,000 (for the year of 2027, just before the updated SWM system shall start operation). With the inclusion of Comrat District of ATUG into WMZ-1, the population to be covered amount to 279,000 people (in 2027, just before the beginning of operation of the updated SWM system). Hence, the original planned SWM system in the FS is valid even if Comrat District of ATUG is included into WMZ-1.

The management of MSW as described in the original FS need to be implemented with some adjustments, which are described below:

- > *Upgrading the waste collection system* to allow for increase of recyclables recovery as requested by MoEnv. The upgraded waste collection system will be based on the collection of three waste fractions: dry waste (recyclables, except for glass); wet waste (residual waste); and glass. The collected recyclables (i.e., plastic, cardboard/paper, metal) in the dry bin will go through the sorting station for material recovery. The collected glass in the separate containers will not go through the sorting station but sold to recycling companies just after collection. The modification of the waste collection system implies the following: distribution of two bins of 120 l capacity (dry & wet) to each household with “door-to-door” collection of waste; placing at least two containers of 1.1 m³ capacity (dry and wet) at a collection point in the localities using the “bring system”; placing containers of 1.1 m³ capacity near shops in all localities for separate collection of glass. In this context, it is important to notice that implementation of a hybrid system where the residual waste (wet waste) is collected by the door-to-door system and the recyclable waste (dry waste) is collected by the bring system (i.e., public collection points with containers for recyclables only) is not recommended. Such a hybrid system has two major problems: 1) the recovery rate of recyclables will be reduced since many households will not use the public collection points for recyclables but place all the waste (residual MSW and recyclables) in the wet bin used for door-to-door collection; 2) there is a high risk that some households will bring other types of solid wastes (residual MSW, agricultural waste, construction waste, etc.) to the public collection points designated for recyclables only. Thus, where implemented, the door-to-door collection system shall be used for both residual MSW (wet waste) and recyclables (dry waste); only glass shall be collected separately (to avoid problems at the sorting station) using limited number of containers (1.1 m³) placed near shops/markets.
- > *Implementation of “door-to-door” collection of waste* in 25% of households (approx. 20,500 units) in rural areas with good road access. This implies: i) including additional 20,500 units of 120 l bins for residual waste collection from individual households in rural areas; ii) adjust the number of 1.1 m³ metal containers designated for residual waste collection at collection points. This will reduce the speed of the waste collection trucks, which implies including enough reserve capacity of compaction trucks in the system.
- > *Use of “bring system” with 1.1 m³ containers.* From the information provided in the FS (GIZ, 2015), no investment costs for waste collection points (concrete slabs for containers) are included. The containers for the “bring system” cannot be placed directly on the ground. Prefabricated concrete slabs shall be used to establish waste collection points where 1.1 m³ containers are placed on. These concrete slabs shall be prefabricated elements that are just brought and placed at the locations defined in advance by LPAs. Doing so, the collection points will represent removable structures for which construction permits are not necessary. The procurement of prefabricated slabs for the waste collection points shall be part of the supply tender. Some collection points exist in towns but none of them exist in villages. Concrete slabs for containers, mainly in rural areas, shall be included for the “bring system” in the updated SWM system. Almost all 1.1 m³ containers (for residual waste and recyclables) will need concrete slabs, with exception of about 20% of the containers as it is assumed that they are placed on an available collection point or paved ground.

The design of such a prefabricated container slab is presented Figure 4 below. Depending on the number of containers needed in one spot, several concrete slabs/pads can be placed next to each other to accommodate more containers at a waste collection point (see Figure 5).

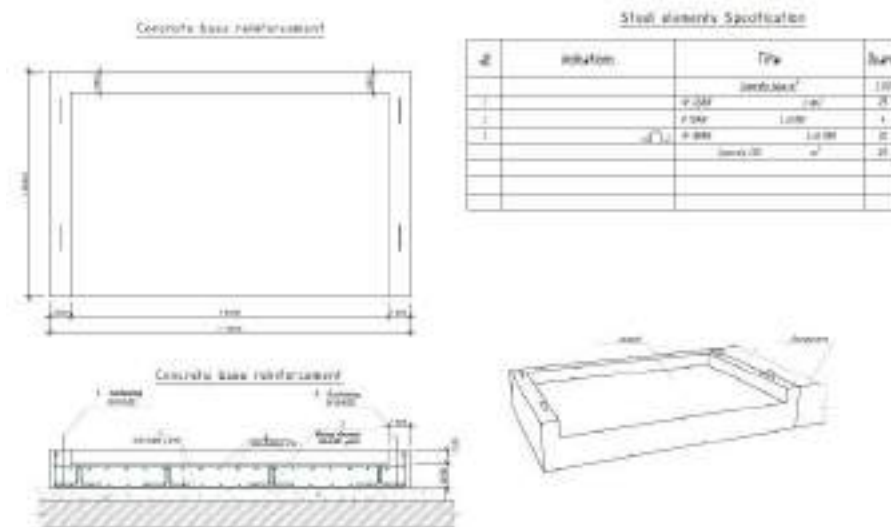


Figure 4. Concrete slab for container



Figure 5. Example of a collection point with 3 concrete slabs

- > **Type and number of containers used for separate collection of recyclables.** The FS (GIZ, 2015) proposed to use simple plastic 1.1 m³ containers for paper/cardboard, cages/net boxes for plastic and metal, and special bel-shaped containers for glass. According to the FS (GIZ, 2015), source-separated collection of recyclables shall be organised only in urban areas; paper/cardboard and glass is to be organised only in Cahul City. Hence, the proposed number of containers for recyclables covers only some urban area. It is proposed to increase the number of containers for recyclables and extend the collection of recyclables in all localities (urban and rural) to contribute to the achievement of the national recycling targets; collection points with containers for recyclables shall be used for this purpose. The most efficient containers used in Moldova for source-separated collection of plastic recyclables are net cages where people see the content inside. The proposed cages/net boxes for plastic and metal are efficient in collecting clean recyclables, however they need to be emptied manually by the collection crew. The bell-shaped containers for glass need special collection trucks. To overcome these limitations, it is proposed to use metal 1.1 m³ see-through containers for recyclables, which can be easily handled by regular garbage trucks. Examples of metal 1.1 m³ containers with mesh and plexiglass sides are presented in Figure 6 below. The use of proposed containers will increase the efficiency of waste separation at source. Hence, to simplify and make the system more

efficient it is proposed to use the following containers for recyclables: blue metal 1.1 m³ containers with plexiglass sides (Figure 6, right) for paper/cardboard; yellow metal 1.1 m³ containers with mesh sides (Figure 6, left) for plastic and metal; green 1.1 m³ metal container (with plexiglass sides or without) for glass. All these containers can be serviced by regular compaction trucks; no special trucks for servicing bell-shaped containers for glass is needed with the adjusted collected system.



Figure 6. Example of a metal 1,100 l containers with mesh (left) and plexiglass (right) sides

- > *Digital monitoring of the waste collection process.* To ensure the monitoring of the waste collection process, an automated waste collection tracking system shall be implemented. The monitoring information will increase the efficiency of the waste collection by allowing for appropriate adjustments of the waste collection routes and other related processes. The implementation of such a system requires: i) installation of Radio-frequency Identification (RFID) tags to all containers; ii) installing Global Positioning System (GPS) units, fuel sensors, and RFID readers on the trucks; iii) optimisation of the software system (at the GPS monitoring service provider); iv) connection to the service for the monitoring of the collection trucks. There are several companies in Moldova which provide such services. It is important to notice that the SWM operators will have access to the monitoring system through a simple web browser without the need of special software and hardware. The monitoring system (including database) will be hosted by the service provider; the service provider will maintain the system as part of the service provision fee paid by SWM operators on each vehicle monitored.
- > *Containers for Construction & Demolition (C&D) waste.* Containers (roll-on) for C&D waste were added to the system to allow for collection of C&D waste when needed. The containers will be also used for green waste transport when needed. The hook-lift truck at the transfer stations shall be used to transport these containers.
- > *Vehicles for supervisors and pick-up trucks at transfer stations.* Vehicles for supervisors responsible for waste collection were added to the system to allow for a better management of waste collection activities. Additionally, pick-up trucks were added at the transfer stations to improve the mobility of the supervisors and workers at the facilities when needed.
- > *Transfer Stations type.* The FS proposes transfer stations with compaction units and closed 30 m³ metal containers. Even if these type of transfer stations are very efficient in compacting MSW, they also have some disadvantages. Comparing to transfer stations with simple unloading bays with open containers, these type of transfer stations are more expensive to construct,

equip, and operate. They need higher ramps for the unloading bays, the compactor unit and containers used are more expensive, the compaction unit needs uninterrupted power source to run. The compaction unit needs power to always compact the waste delivered at the unloading bays, otherwise the unloading bays cannot be used. Hence, it is proposed to use transfer stations with ordinary unloading bays with open 40 m³ containers, with a rolling compactor (mobile machinery) for compacting the waste in the container when necessary. Additionally, by using easier TSs, more unloading bays can be constructed to accommodate containers for all types of MSW (i.e., residual waste, deferent types of recyclables, green waste) that must be transported separately to the landfill or treatment facilities. The TS in Cania and Taraclia shall have respectively 4 and 5 unloading bays.

- > *Taraclia Sorting Station.* The inclusion of an additional SS (for sorting of separately collected recyclables) at Taraclia TS is not recommended. To optimize the costs and increase the efficiency of the facility, it is proposed to have only one SS at the Regional Landfill site in Cahul, where the recyclables are delivered via the TSs. This will also allow the possibility to extend the SS at the Regional Landfill for sorting of mixed waste if such a decision is taken in the future.
- > *Cania and Taraclia Composting Stations.* The inclusion of additional CS (for green waste) at Cania and Taraclia TSs is not recommended. To optimize the costs and increase the efficiency of the facility, it is proposed to have only one CS at the Regional Landfill site in Cahul, where green waste is delivered via the TSs. The planned capacity of the CS at the Regional Landfill site is sufficient to receive the green waste from all urban areas in WMZ-1, including Comrat District.
- > *Comrat Transfer Station.* To include Comrat District of ATUG into the SWM system of WMZ-1, a TS must be constructed near Comrat Town. The distance from Comrat Town to the Regional Landfill site in Cahul is 80 km. At the same time, the distance from Comrat Town to the nearest TS near Taraclia Town is 50 km. Hence, it is not feasible to deliver the MSW by the waste collection vehicles from Comrat District directly to either Taraclia TS or Cahul Regional Landfill. Taking into consideration the quantity of MSW generated in Comrat District (approx. 12,000 tons/year), it is feasible to transport the generated MSW via a TS (using long-distance trucks with two containers of 40 m³ each) if the transport distance is above 40 km. The site for the building of the TS was identified in the FS for WMZ-2, however Comrat Municipality identified a new site just near the current landfill to be used for building of the TS. The new site for TS proposed by Comrat Municipality was evaluated by the Consultant (see Appendix 2) and it is suitable for the construction of the TS. The TS shall have the same design concept as proposed for Cania or Taraclia, with a capacity of 12,000 tons/year of MSW. Comrat TS shall have 5 unloading bays.
- > *Closure of dumpsites.* The proposal of setting up transitional dumpsites as described in the FS (GIZ, 2015) is not feasible. This type of activity should have started long time ago as it needs a lot of planning and discussions with LPAs. Moreover, the experience from other projects (e.g. GIZ projects in Floresti and Soldanesti) indicates that LPAs do not accept the idea of setting up transitional dumpsites on their territories. According to the FS, the estimated budget for the closure of all dumpsites (106 dumpsites with a total area of about 130 ha) in WMZ-1 is EUR 2.3 million, meaning that the average closure budget is about EUR 17,700 per hectare. This budget shall increase to EUR 2.8 million to also include the closure of dumpsites in Comrat District of ATUG (14 dumpsites with a total area of about 28 ha).

The closure activities for small dumpsites include just compaction of waste and simple coverage with soil, while the closure activities for larger dumpsites shall include more sophisticated

measures in compliance with EU Directive on the landfill of waste. The budget is appropriate for the proposed activities on dumpsites closure. However, it is difficult to make any accurate cost estimate as so many dumpsites are involved. The closure of dumpsites shall be planned with the start of operation of the new regional landfill. With the operation of the regional landfill, the dumping of waste at dumpsites within WMZ-1 shall not be allowed; local council decisions shall be approved on this issue. Considering, that there are about 120 dumpsites (with an average area of 1.3 ha per dumpsite) in WMZ-1, carrying out civil works for the closure of these dumpsites shall be done during a period of 1-2 years.

The SWM system components according to the FS and updates/adjustments done by the Consultant are presented in Table 4 above. The map with the adjustment of the regional SWM infrastructure and delineated waste collection catchments are presented in Figure 7.

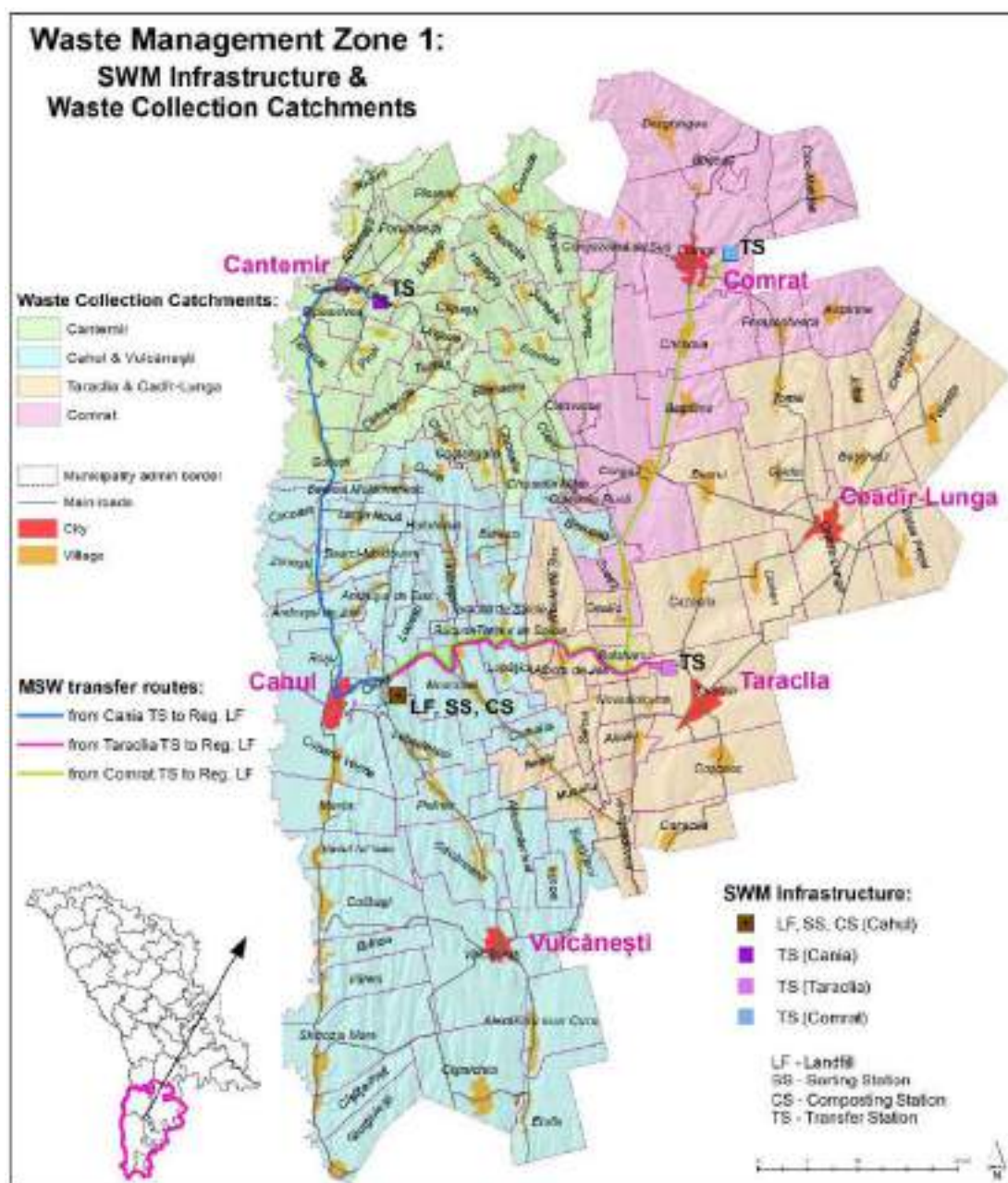


Figure 7. The updated regional SWM infrastructure and waste collection catchments for WMZ-1

According to the map, the municipalities within WMZ-1 were grouped in four waste collection catchment areas taking into consideration their proximity to Transfer Stations and the regional, sanitary Landfill. The name of the waste collection catchments includes the name of the district/rayon in which the Transfer Station or the Regional Landfill is located. Cantemir Waste Collection Catchment includes the municipalities within Cantemir Rayon (excluding Visiniovca, Sadic, Samalia, and Cietu municipalities). Cahul Waste Collection Catchment includes the municipalities within Cahul Rayon (excluding Chioselia Mare and Borceag municipalities), all municipalities within Vulcanesti District of ATUG, and Budai Municipality within Taraclia Rayon. Taraclia Waste Collection Catchment includes the municipalities of Taraclia Rayon (excluding Budai Municipality), municipalities within Ceadir-Lunga District of ATUG (excluding Tomai Municipality), Chioselia Mare and Borceag municipalities within Cahul Rayon, and Chioselia Rusa and Svetlii municipalities within Comrat District of ATUG. Comrat Waste Collection Catchment includes the municipalities within Comrat District of ATUG (excluding Chioselia Rusa and Svetlii municipalities), Visiniovca, Sadic, Samalia, and Cietu municipalities within Cantemir Rayon, and Tomai Municipality within Ceadir-Lunga District of ATUG. The Financial Model for WMZ-1 takes into consideration these four waste collection catchment areas to organize the required detailed analysis.

As it can be observed from the map, some municipalities located at the district/rayon border were included in the waste collection catchments in which the Transfer Station or Regional Landfill is closer to them even if the municipalities belong administratively to different districts/rayons. For example, four municipalities from Cantemir Rayon (i.e., Visiniovca, Sadic, Samalia, and Cietu) are part of Comrat Waste Collection Catchment as they are closer to the Transfer Station in Comrat.

A review of the regional SWM infrastructure for WMZ-1, according the upgraded SWM system, is presented in Appendix 5. Additional details on MSW transport via the transfer stations are presented in Appendix 8.

2.2.2 Investment cost (CAPEX)

According to the data from the FS (Tables 10-2 to 10-6, pp. 176-178), the total investments for the original SWM system (1st phase and 2nd phase investments) were EUR 18.1 million; the investments for the closure of small dumpsites were not included. The total investments for the 1st phase amount to EUR 14.75 million (excluding dumpsites closure) as per Table 10.7 (pp. 177) of the FS (GIZ, 2015).

The investments for the upgraded SWM system (with the proposed improvements) amount to EUR 28.29 million (see Table 5). Hence, the total investments in the improved SWM system (1st phase and 2nd phase investments) increased by EUR 10.19 million comparing to the investments for the original SWM system (as described by the FS).

Table 5 Investments according to the proposed improvements of the ISWM system

#	Investment cost item	Units	Cost per unit	Cost (1,000 EUR; no VAT)
1	Collection of waste:			9,982
1.1	Metal containers 1.1 m ³ , for residual waste	4,350	320	1,392
1.2	Bins 120 l, for residual waste in urban areas	14,900	30	447
1.3	Bins 120 l, for residual waste in rural areas	20,500	30	615
1.4	Bins 120 l, for recyclables in urban areas	14,900	30	447

1.5	Bins 120 l, for recyclables in rural areas	20,500	30	615
1.6	See-through metal containers 1.1 m ³ , for recyclables	5,030	350	1,761
1.7	Roll-on container, 9,8 m ³ , for C&D	16	3,400	54
1.8	Compaction trucks, 16 m ³	9	130,000	1,170
1.9	Compaction trucks, 10 m ³	13	92,000	1,196
1.10	Compaction trucks, 6 m ³	16	65,000	1,040
1.11	Vehicles for supervisors	4	16,000	64
1.12	Concrete slabs for containers at collection points	7,380	160	1,181
2	Transfer Station (TS), Cania:			715
2.1	Truck with hook-trailer	1	148,000	148
2.2	Roll-on containers (open), 40 m ³	8	6,400	51
2.3	Rolling compactor	1	29,600	30
2.4	Pick-up car	1	16,000	16
2.5	Construction of Cania TS (8,000 t/y capacity)	1	470,000	470
3	Transfer Station (TS), Taraclia:			908
3.1	Truck with hook-trailer	2	148,000	296
3.2	Roll-on containers (open), 40 m ³	12	6,400	77
3.3	Rolling compactor	1	29,600	30
3.4	Pick-up car	1	16,000	16
3.5	Construction of Taraclia TS (15,000 t/y capacity)	1	490,000	490
4	Transfer Station (TS), Comrat:			908
4.1	Truck with hook-trailer	2	148,000	296
4.2	Roll-on containers (open), 40 m ³	12	6,400	77
4.3	Rolling compactor	1	29,600	30
4.4	Pick-up car	1	16,000	16
4.5	Construction of Comrat TS (12,000 t/y capacity)	1	490,000	490
5	Waste collection monitoring system:			517
5.1	RFID tags for containers	80,180	6	481
5.2	GPS units, fuel sensor, and RFID readers for trucks	43	600	26
5.3	Optimisation of the software system	1	5,000	5
5.4	Service, first year	43	120	5
6	Sorting of recyclables, Cahul:			1,150
6.1	Sorting station equipment	1	650,000	650
6.2	Construction of Sort. St. (6,000 t/y capacity)	1	500,000	500
7	Composting of green waste, Cahul:			500
7.1	Composting station equipment	1	350,000	350
7.2	Construction of Comp. St. (1,600 t/y capacity)	1	150,000	150
8	Landfill, Cahul:			10,800
8.1	Landfill equipment	1	700,000	700
8.2	Construction works, phase 1, cell 1 – 289,000 m ³	1	4,800,000	4,800
8.3	Construction works, cell 2 – 362,500 m ³ *	1	1,100,000	1,100
8.4	Construction works, cell 3 – 432,500 m ³ *	1	1,600,000	1,600
8.5	Closure and re-cultivation of new landfill after operation*	1	1,800,000	1,800
8.6	Rehabilitation / Re-cultivation of the existing landfill	1	800,000	800
9	Closure of dumpsites:			2,808
9.1	Closure of dumpsites in Cahul	1	751,000	751
9.2	Closure of dumpsites in Cantemir	1	415,000	415

9.3	Closure of dumpsites in Taraclia	1	480,400	480
9.4	Closure of dumpsites in Ceadir-Lunga	1	189,000	189
9.5	Closure of dumpsites in Vulcanesti	1	478,000	478
9.6	Closure of dumpsites in Comrat	1	495,000	495
Total CAPEX (incl. phase 2 investments, excl. contingencies):				27,790
Total CAPEX (excl. phase 2 investments and contingencies):				23,290
Total CAPEX (Phase 1 investments and contingencies):				24,843
Note: * second phase investments (not to be included in the priority investments)				

The waste collection equipment (i.e. containers, bins, prefabricated concrete slabs for containers at collection points, waste collection trucks and other vehicles) need to be distributed between the largest LPAs of the waste collection catchments of WMZ-1. Hence, Table 6 below presents the distribution of waste collection items (including the related costs) between the largest LPAs of the waste collection catchments of WMZ-1. The distribution of the waste collection items is related to the waste generation in the respective waste collection catchment areas. This information will be used to distribute the waste collection items between the largest LPAs, as the founders of regional operator.

Table 6 *Distribution of waste collection equipment and related costs between waste collection catchments of WMZ-1*

#	Investment cost item	Units	Cost per unit	Cost, (1,100 EUR no VAT)
1	Waste Collection equipment			
1,1	Metal containers 1.1 m³, for residual waste	4,350	320	1,392
	Cantemir	539	320	172
	Taraclia	1,190	320	381
	Cahul	1,702	320	545
	Comrat	919	320	294
1,2	Bins 120 l, for residual waste in urban areas	14,900	30	447
	Cantemir	451	30	14
	Taraclia	4,492	30	135
	Cahul	6,352	30	191
	Comrat	3,605	30	108
1,3	Bins 120 l, for residual waste in rural areas	20,500	30	615
	Cantemir	3,779	30	113
	Taraclia	5,236	30	157
	Cahul	7,560	30	227
	Comrat	3,925	30	118
1,4	Bins 120 l, for recyclables in urban areas	14,900	30	447
	Cantemir	454	30	14
	Taraclia	4,514	30	135
	Cahul	6,340	30	190
	Comrat	3,592	30	108
1,5	Bins 120 l, for recyclables in rural areas	20,500	30	615
	Cantemir	3,837	30	115

#	Investment cost item	Units	Cost per unit	Cost, (1,100 EUR no VAT)
	Taraclia	5,003	30	150
	Cahul	7,675	30	230
	Comrat	3,985	30	120
1,6	See-through metal containers 1.1 m³, for recyclables	5,030	350	1,761
	Cantemir	518	350	181
	Taraclia	1,387	350	485
	Cahul	2,021	350	707
	Comrat	1,104	350	386
1,7	Roll-on container, 9,8 m³, for C&D	16	3.400	54
	Cantemir	4	3.400	14
	Taraclia	4	3.400	14
	Cahul	4	3.400	14
	Comrat	4	3.400	14
1,8	Compaction trucks, 16 m³	9	130.000	1,170
	Cantemir	1	130.000	130
	Taraclia	2	130.000	260
	Cahul	4	130.000	520
	Comrat	2	130.000	260
1,9	Compaction trucks, 10 m³	13	92.000	1,196
	Cantemir	2	92.000	184
	Taraclia	3	92.000	276
	Cahul	5	92.000	460
	Comrat	3	92.000	276
1,1	Compaction trucks, 6 m³	16	65.000	1,040
	Cantemir	3	65.000	195
	Taraclia	4	65.000	260
	Cahul	6	65.000	390
	Comrat	3	65.000	195
1,11	Vehicles for supervisors	4	16.000	64
	Cantemir	1	16.000	16
	Taraclia	1	16.000	16
	Cahul	1	16.000	16
	Comrat	1	16.000	16
1,13	Concrete slabs for containers at collection points	7,380	160	1,181
	Cantemir	957	160	153
	Taraclia	2,077	160	332
	Cahul	2,823	160	452
	Comrat	1,523	160	244
	Total Waste Collection Equipment			9,982

2.2.3 Design and investment adjustments

Comparing to the investments for the ISWM system described in the FS (Tables 10-2 to 10-6, pp. 176-178) and the ones for the improved system (as described in Table 6 above), the changes are related to the following:

- > Upgrading the waste collection system to include the collection of three waste fractions: dry waste (recyclables, except for glass), wet waste (residual waste), and glass. The updated waste collection system requires:
 - 1) use of two bins of 120 l capacity (dry & wet) by each household/client with “door-to-door” collection of waste;
 - 2) use of minimum two containers of 1.1 m³ capacity (dry and wet) at a collection point in the localities using the “bring system”;
 - 3) use containers of 1.1 m³ capacity near shops in all localities for separate collection of glass.
- > Updating the number of 1.1 m³ containers for residual waste and recyclables with the updated collection system, including implementation of door-to-door collection for 25% of households in rural areas.
- > Including 120 l bins for door-to-door collection of waste in rural areas (25% of households).
- > Updating the number of compaction trucks to have more reserve capacity in the system to compensate for the updated collection system, including implementation of door-to-door collection in 25% of the households in rural areas.
- > Changing the type of containers for the collection of recyclables (from simple plastic 1.1 m³ containers to metal 1.1 m³ containers with mesh or plexiglass sides).
- > Including concrete slabs for 1.1 m³ containers at the waste collection points to improve the “bring system”.
- > Including a waste collection monitoring system to allow for appropriate monitoring and any adjustments (when necessary) of the waste collection routes and other related processes.
- > Adding roll-on containers for C&D waste.
- > Updating the waste transfer system and type of transfer stations.
- > Exclusion of composting stations in Cania and Taraclia, which were planned at the TSs.
- > Exclusion of sorting station in Taraclia, which was planned at TS.
- > Adding vehicles for supervisors managing the waste collection process and pick-up trucks for supervisors managing the transfer stations.
- > Including the costs for closure of dumpsites.
- > Adjusting the costs of SWM equipment, which have increased for many items in the FS, especially for mobile equipment.
- > Rounding up the numbers related to units of containers and unit prices for equipment and construction works.

The priority investments according to the original FS (Table 10-8, pp.178) and proposed adjustments to the ISWM system are presented in Table 7. Compared to the FS, the priority investments (excluding technical assistance contracts) need to be increased by EUR 9.2 million to adjust the ISWM system as proposed above and inclusion of the costs for dumpsites closure. This includes an increase in contingencies up to 12% due to supply chain uncertainties that are accumulating in the economy and are likely to persist into the implementation period.

It is important to notice that some access roads to the planned MSW facilities need to be improved to insure good functioning of the MSW management system. The costs for the improvement of the access roads shall be covered from the national sources. Details on the access roads improvement needs are described in Appendix 7.

Table 7 Priority investments according to the FS and proposed adjustments

#	Investment cost item	FS, GIZ 2015 (1,000 EUR no VAT)	Adjusted, COWI 2022 (1,000 EUR no VAT)
1	Construction Works and Buildings	7,555	7,700
2	Plants Equipment	1,329	2,782
3	Waste Collection Equipment	5,861	10,499
4	Closure of all dumpsites	0	2,808
5	Contingency (approx. 10% of items 1, 2 and 4); approx. 12% according to proposed adjustments)	1,475	1,590
	Total:	16,220	25,379
	Additional investments not part of PIP:		
6	Technical assistance contract to support implementation and Supervision	749	800
7	Technical assistance in corporate development, setting of user charges, implementation of ESAP, SEP, public awareness	675	300
	Grand Total:	17,644	26,479

2.2.4 Operation and Maintenance Cost (OPEX)

The operation and maintenance costs (OPEX) for the waste management system increased from the ones presented in the FS (Section 10.3, pages 178-180), as some components of the system changed. The OPEX for the first year of operation, according to the FS and proposed adjustments to the ISWM system are presented in Table 8. Compared to the FS (GIZ, 2015), the OPEX increased by EUR 1.44 million (74%) because of ISWM system adjustments (as described above). It should be noted that the OPEX mentioned here does not include depreciation or any other costs related to financial costs or losses for uncollected bills, nor any income from selling of recyclables.

Table 8 The annual OPEX according to the FS and proposed adjustments

#	OPEX item	FS, GIZ 2015 (1,000 EUR/year no VAT)	Adjusted, COWI 2022 (1,000 EUR/year no VAT)
1	Residual waste collection from households*	1,346	1,338
2	Residual waste collection from legal entities	-	202
3	Green waste collection	-	131
4	Bulky waste collection	-	63
5	Street cleaning waste collection	-	113
6	Recyclables collection	231	183
7	Transfer station Cania, Cantemir	68	67
8	Transfer station Taraclia	89	134
9	Transfer station Comrat	-	123

#	OPEX item	FS, GIZ 2015 (1,000 EUR/year no VAT)	Adjusted, COWI 2022 (1,000 EUR/year no VAT)
10	Landfill and facilities at Cahul*	223	973
11	Administrative costs of IDA/RDA (JSC)**	-	55
12	Awareness campaign costs (for home composting)	-	19
	Total	1,957	3,401

Notes:

* Includes the costs for the collection of waste from households and legal entities for FS, GIZ 1015.

** Administrative costs represent the costs for the JSC (regional operator) for the adjusted system.

The OPEX increased for the items dealing with waste collection (when all MSW streams are included) - 29% increase, managing of landfill and other facilities at Cahul - 336% increase, and waste transfer - 106% increase. The increase relates to upgraded waste collection system, mainly by inclusion of Comrat District of ATUG (with a new TS at Comrat) into the system, implementation of door-to-door collection in 25% of rural households, and update of the SWM equipment (including updated prices for many items) used as described in sections 2.2.2 and 2.2.3.

The significant increase in OPEX is related to the upgraded SWM system as described in Section 2.2.1, Section 2.2.2, as well as Section 2.2.3 above. Much of the OPEX increase is mainly related to increase in the CAPEX for the upgraded waste collection system, which includes more containers/bins, extra infrastructure/equipment such as prefabricated slabs for 1.1 m³ containers and a waste collection monitoring system, extra TS in Comrat, extra long-distance trucks at Comrat TS. Furthermore, the 1.1 m³ metal containers to be used for the collection of recyclables in the upgraded waste collection system are more expensive than the containers proposed originally by the FS. The OPEX related to the collection process (driving of trucks for waste collection) did not change very much since the collection frequency for recyclables in the areas with door-to-door collection system was changed from once a week to once in two weeks. Significant increase in the operation of the regional landfill and treatment facilities at Cahul are related to the increased costs for the operated equipment and operation processes at the facilities.

The operation costs for the upgraded SWM system in WMZ-1 are comparable to the operation costs for the upgraded SWM systems in WMZ-5 and WMZ-8. For WMZ-1, the costs for collection, transfer, and landfilling/treatment are respectively: 35, 10, and 17 per ton of managed waste. In comparison the costs for collection, transfer, and landfilling/treatment are respectively 37, 8, and 15 per ton of managed waste in WMZ-5 and 31, 8, and 20 per ton of managed waste in WMZ-8.

2.2.5 Collection trucks and switch to greener energy sources

The revised Clean Vehicles Directive (EU Directive 2019/1161) promotes clean mobility solutions in public procurement tenders, providing a solid boost to the demand and further deployment of low- and zero-emission vehicles. The new Directive defines "clean vehicles" and sets national targets for their public procurement. For IFI's, like EBRD, that topic has become very sensitive as well.

Traditionally vehicles and machinery used in the waste industry are powered by diesel engines. However, these have a negative impact on the environment because of the exhaust fumes they produce. Improvements in engine technology and introduction of AdBlue, a liquid sprayed into the exhaust system to reduce the nitrous oxide emission, have resulted in lower impacts but alternatives such as vehicles powered by batteries, hydrogen or compressed natural gas (CNG) could result in

even lower emission levels. It should be noted however, that the introduction of these alternative fuels is a slow process that even in countries with relatively advanced infrastructure for these fuels has not yet resulted in a significant proportions of waste collection and transfer vehicles being of a non-diesel type of propulsion. Electric vehicles are a rather new technology in Moldova and there is limited knowledge about operation and maintenance of electric vehicles. The CNG truck market is less mature than diesel, while diesel technology is a well-established technology and there is experience in its use.

The FS of 2015 recommended the procurement of collection trucks with diesel engines. In several European Union countries more and more diesel driven collection trucks are replaced by electric trucks (if financially supported by the Government) or by trucks using CNG or biogas. The old diesel trucks are very often sold to Eastern European countries. The main reason is, that for example in a country like Moldova, the infrastructure for electric cars/trucks or CNG is not readily available. Even for CNG there are no filling stations in WMZ-1. This could change in the future if the infrastructure for CNG will get better. However, for electric trucks it will take much longer, even in Germany only a very small percentage of collections trucks are electric driven.

Arguments against the use of CNG include:

- > CNG trucks costs 30-50% more than a similar diesel truck, for battery powered vehicles the gap is even bigger.
- > Realisation of CNG filling stations for waste collection and transfer vehicles is a costly issue. A small station suitable for 5 to 10 waste vehicles would require an investment of between EUR 250,000 and EUR 500,000 while a larger stations suitable for up to 40 vehicles could costs in excess of EUR 850,000 (source: US Department of Energy). Filling stations bear a risk of permitting issues and safety considerations both for personnel at the maintenance bay and for the public in case they are close to residential areas.
- > The use of CNG trucks in waste collection is more experimental than common practice in the region.
- > It's probably better to discuss the use of CNG trucks for waste collection in future, when all the waste collection trucks will have to be replaced.

Arguments against the use of electric vehicles (EVs) include:

- > Use of large waste collection trucks with electric battery power is not feasible. The weight of the battery package would significantly reduce the amount of waste that such vehicle could carry. With an approximate weight of 1,000 kg or more, a battery would reduce the carrying capacity of a 12 m³ waste collection vehicle by at least 10%. Moreover, battery powered trucks are very expensive and may not be available in Moldova because of battery shortages. Besides, electric vehicles (EV) with such characteristics are not readily available on the market. The needed fleet for such EVs is too small to attract large suppliers, which can offer the needed vehicles at reasonable prices and ensure access to specialised service shops in Moldova. EVs with very large capacity batteries need fast charging infrastructure, which is not available in WMZ-1. The battery charging infrastructure may need local upgrade to the electricity grid - in addition, electricity black-outs may affect operation.

- > Service for large electric trucks is not available in Moldova. In addition, there is no experience in Moldova regarding operation and maintenance of electric trucks, the reason which would create problems in day-by-day use of such EVs.
- > Furthermore, although the lifetime of modern batteries is about 10 years and no battery replacement would be needed within the examined period, the issue of replacement after ten years may be a concern to the operator, as far as funding, sourcing of new batteries and recycling the old ones are concerned.

Fuel cell technology may in future be suitable for trucks. However, both the technology and the infrastructure are not yet available in Moldova. By the time vehicles to be procured for the Project will have to be replaced, this might have changed. Reconsidering alternative fuels at that time could result in a different outcome.

Taking into consideration the above arguments, it is proposed to procure diesel trucks with EURO6 engines, which will reduce exhaust emissions significantly compared to the current fleet of trucks. The available diesel (mainly imported from Romania) in Moldova is suitable for trucks with EURO6 engines. Trucks with EURO6 engines are used in Moldova at the moment. Also, the service of such trucks is readily available in Moldova.

All trucks for the new SWM system in WMZ-1 will be new (EURO6). Currently, there are 26 compaction trucks (EURO4 and lower) and 16 tractors (EURO2 or lower) used for waste collection in WMZ-1. All these trucks will be replaced, except for 2 compaction trucks (EURO4 or lower), one 7 m³ GAZ truck from 2019 and another 9 m³ GUZ truck from 2020 in Cahul Town, will be used as reserve trucks in the new SWM system. Other 4 units of compaction trucks, 2 units of 10 m³ MAZ trucks from 2018 in Comrat Town and 2 units of 16 m³ MAZ trucks from 2017 in Congaz village (Comrat district of ATUG), could be used as reserve trucks for 1-2 years after the planned services start on the new regional SWM system. All of these trucks are based on old technology and could not be efficiently used for the new regional SWM system.

According to Ecoinvent database version 3.8 accessed in April 2022, the emissions from EURO4 truck with capacity of 3.5-7.5 tons (type of existing trucks) are estimated 0.509 kg CO₂-equivalent per tkm (transportation a tonne for a distance of 1 km), while the emissions from EURO6 truck with capacity of 16-32 tons (type of new trucks) are estimated 0.163 kg CO₂e per tkm. Thus, if all waste which is currently transported by EURO4 trucks will be transported for the same distance by EURO6 trucks, this replacement will allow to reduce emissions related to transportation of each ton of waste about three times.

Within the current SWM system in WMZ-1 about 58% of all generated waste is collected and transported to adjacent disposal sites by vehicles. The average transportation distances are rather short (estimated 10 km). The new system will assume collection of practically all generated waste and its transportation to the regional SWM facilities directly or via transfer stations (for estimated average distance of 50 km). As more waste will be collected, and the transportation distances will be longer, the overall number of tkm driven for transportation of waste will increase. However, the transportation will be carried out by vehicles with lower emissions. The emission reduction analysis related to waste transportation in GET context is included in section 8.1 and in Appendix 4.

2.3 Funding and user charges for SWM

2.3.1 Gap analysis – Paying for and funding of ISWM System

According to the questionnaires collected from LPAs (56 of 105 LPAs completed the questionnaire), the mechanism for paying for waste management services is mixed (based either on a tariff or local tax). Local councils approve both tariffs and local taxes. The SWM system operator charges a tariff directly to customers (households and businesses/institutions), whilst in the case of a local tax, the LPA charges the tax to residents and then pays the SWM service provider. Another difference is the VAT: in the case of the local tax, the LPA being a legal entity should pay VAT (20%) for services, whereas the tariff the operator charges to households/individuals is VAT exempted.

In the cities of Cantemir, Cahul and Taraclia the payment system is based on tariff, while in Ceadir-Lunga, Comrat and Vulcanesti it is based on a local tax. The level of tariff/local tax varies from 9-12 MDL/person/month for citizens living in apartments and 9-15 MDL/person/month in households. In case of Cantemir and Taraclia cities, the tariff varies from 30-33 MDL/household/month/. The tariff for legal entities (companies and institutions) varies from 143.60 to 217.96 MDL/m³, including VAT. Water supply is the main activity in the case of the Cantemir and Taraclia municipal enterprises. Waste management services are the main activity of the operator in Cahul, Comrat and Vulcanesti. In Ceadir-Lunga city, the WMS is provided by the Department of public works and sanitation within mayoralty. The following table presents detailed information on current user charges in urban areas of WMZ-1.

Table 9 Current user charge level in urban areas

LPA	Operator	Approved user charges for:			Type of payment mechanism
		Apartments	Households	Legal entities ³	
Cahul	IM Gospodaria Comunal- Locativa Cahul	11 MDL/ person/month	15 MDL/ person/month	182.15 MDL/m ³	Tariff
Cantemir	IM Apa- Canal Cantemir	12 MDL/ person/month	33 MDL/ household/month	171.12 MDL/m ³	Tariff
Taraclia	IM Apa- Canal Taraclia	20 MDL/ apartment/month	30 MDL/ household /month	217.96 MDL/m ³	Tariff
Comrat	IM Gospodaria Locativ- Comunala Comrat	10 MDL/ person/month	10 MDL/ person/month	4 MDL/m ² of legal entities surface	Local tax
Ceadir-Lunga	Primaria mun. Ceadir-Lunga, Department of Public Works and Sanitation.	10 MDL/ person/month	10 MDL/ person/month	198 MDL/m ³	Local tax

³ In case of legal entities (companies and institutions) the tariff includes VAT (20%) and the service is provided on demand. In order to calculate the existing tariff for the financial model (in EUR/t), the midpoint tariff was used: 180 MDL/m³; next, using a (compacted) waste density of 0.4 t/m³ yields 450 MDL/t, which converts to 22.50 EUR/t.

Vulcanesti	IM Gospodaria Locativ- Comunala Vulcanesti	9 MDL/ person/month	9 MDL/ person/month	143.6 MDL/m ³ and 1.65 MDL/m ² of industrial entities surface and 3 MDL/m ² of commercial entities surface	Local tax

Source: Data collected from LPAs by questionnaires and State register of local documents www.actelocale.gov.md

According to the collected questionnaires from LPAs, SWM services are provided in 33 of 52 rural communities that responded. In the case of 20 LPAs services are provided by local municipal enterprises, the main activity of which is water supply. In the case of 13 LPAs the services are provided by the mayoralty using its own personnel and means. The level of the tax/tariff differs greatly from 1 MDL/person/month to 10 MDL/person/month. In several LPAs the tax/tariff is established per household (apartment)/month and varies from 15 to 25 MDL/month.

Companies and institutions pay tariffs for similar-to-household waste by different methods as:

- > Fixed equal monthly payment for each legal entity (21 LPAs) which varies from 15 to 150 MDL/month.
- > Tariff established per m³ (6 LPAs) which varies from 50 to 131 MDL/m³.
- > Tariff established per m² of legal entity's surface (1 LPAs) which is 1 MDL/m²/month.
- > No tariffs established (5 LPAs).

In the main urban centres of WMZ-1, the size of the tariff/tax is insufficient for proper maintenance, let alone the expansion of SWM services. The following information shows the situation for each operator:

- > For IM Gospodaria Comunal-Locativa Cahul, the collected revenues only cover operating costs. No reinvestment cost or depreciation of fixed assets have been included in calculation of tariffs. Nevertheless, according to financial statements for 2020, operator registered a profit of MDL 237,700. The LPA does not allocate any subsidies to the operator but can still allocate resources for the procurement of waste collection equipment as a supporting measure.
- > In case of IM Apa-Canal Cantemir, the collected revenues are not sufficient to cover the operating costs for waste management services; losses are covered from other provided services (mainly water supply and sanitation). According to financial statements for 2020, operator registered a loss of MDL 603,300. The LPA does not allocate any subsidies to the operator but can still allocate resources for the procurement of waste collection equipment as a supporting measure.
- > For IM Apa-Canal Taraclia, the collected revenues are not sufficient to cover the operating costs for waste management services; losses are covered from other provided services (mainly water supply and sanitation). The LPA does not allocate any subsidies to the operator but can still allocate resources for the procurement of waste collection equipment as a supporting measure.
- > IM Gospodaria Locativ-Comunala Comrat, the collected revenues only cover operating costs. No reinvestment cost or depreciation of fixed assets have been included in calculation of tariffs. According to financial statements for 2020, operator registered a loss of MDL 392,400. The LPA does not allocate any subsidies to the operator but can still allocate resources for the procurement of waste collection equipment as a supporting measure.

- > In Ceadir-Lunga city, the WMS is provided by a specialized department (Public works and sanitation) within the mayoralty. The revenues are collected in local budget (from local tax on sanitation) and are not sufficient to cover the operating costs for waste management services, the difference is subsidised by local budget means. At the same time, the LPA can allocate resources for the procurement of waste collection equipment.
- > For IM Gospodaria Locativ-Comunala Vulcanesti, the collected revenues do not cover the operating costs of waste management services, and losses are mostly covered from other revenues streams (water supply and sanitation). Nevertheless in 2020, the operator registered a profit of around MDL 283,600. The LPA does not allocate any subsidies to the operator but can still allocate resources for the procurement of waste collection equipment as a supporting measure.

2.3.2 Gap analysis – Waste User Charges Setting

SWM services in Moldova are financed based on user charges (taxes or tariffs) and are approved by local authorities at the request of SWM operators. In general, tariffs are regulated by local governments and increasing tariffs to cost recovery levels can be subjected to political constraints.

In the future system, however, user charges must be calculated with the aim to achieve full-cost recovery. Compared to the current situation, in which user charges are in essence set by “intuition” and may incidentally cover operating and maintenance costs, full-cost recovery tariffs include provisions for uncollected debt and capital costs (depreciation, debt service, and loan repayments in excess of depreciation). Against this aim stands household affordability. The financial model accompanying this report balances these two factors with the objective that the SWM system should achieve full-cost recovery by 2026. Such a system would be self-financing, and any loan required to finance investments would be fully repaid and serviced from user charges. At the same time, support will be needed for vulnerable household customers to pay for full-cost SWM services.

2.4 Investment Programme

2.4.1 Long-term investment programme (LTIP)

Based on a review of the FS and its update from 2020, the analysis of the market and demand for SWM services (refer to Chapter 2.1), as well as the requirements of the National Waste Management Strategy 2013-2027, the Consultant confirms the scope and costs of the long-term investment programme (LTIP) are herein updated. No technology risks are expected. Affordability risks are assessed in the financial model (refer to Chapter 4).

The LTIP is distinguished from the Priority Investment Programme (PIP – see below) in that it covers replacement and rehabilitation costs of equipment and infrastructure throughout its duration. Thus, it is a continuation of investments of the PIP rather than a set of distinct and different investments. In addition, the LTIP includes the construction of cells 2 and 3 and closure of cells 1 and 2 of the regional landfill. The closure of the cell 3 is also included but may occur after the LTIP period.

The LTIP covers the period from 2028-2046 and includes the following components:

Waste collection and transfer:

- > Purchase and deployment of 1.1 m³ metal containers for residual waste and recyclables, 120 l bins for residual waste and recyclables, 9.8 m³ roll-on containers for Construction & Demolition Waste, see-through 1.1 m³ metal containers for collection of recyclables, 16 m³, 10 m³, and 6 m³ compaction trucks, long-distance trucks with trailers for waste transfer, and supervisors vehicles to collect, transport and transfer the MSW from Cahul Rayon, Taraclia Rayon, Cahul Rayon, and all districts of ATUG (i.e., Comrat, Ceadir-Lunga, Vulcanesti) in WMZ-1, to ensure collection services are provided to 100% of the population and collect an annual average of 53,500 tons of MSW.

In the LTIP, this involves the regular purchase of new waste collection vehicles and equipment to ensure expansion of service coverage and replacement of depreciated waste collection assets.

Solid waste disposal and treatment infrastructure:

- > *Solid waste disposal and treatment facilities at Cahul Town, Cahul Rayon:* extending (construction of new cells) and closure of filled cells of the regional landfill in Cahul, scheduled replacement of machinery and equipment (M&E) assets at regional sanitary landfill, sorting plant, and composting plant at Cahul.

In the LTIP, this involves periodic investments to rehabilitate and replace depreciated M&E assets, expand capacity of the sanitary landfill, open subsequent landfill cells. In 2032 and 2039, this includes landfill extension, cell 2 and cell 3, respectively. This also includes final closure of the landfill (estimated in 2047).

- > *Solid waste management facility, Cania transfer station in Cantemir Rayon (capacity: 8,000 tons/year):* scheduled replacement of depreciated M&E assets at transfer station.

In the LTIP, this involves periodic investments to rehabilitate and replace depreciated M&E assets at the transfer station during the period 2036-2046.

- > *Solid waste management facility, Taraclia transfer station in Taraclia Rayon (capacity: 15,000 tons/year):* scheduled replacement of depreciated M&E assets at transfer station.

In the LTIP, this includes periodic investments to rehabilitate and replace depreciated M&E assets at the transfer station during the period 2036-2046.

- > *Solid waste management facility, Comrat transfer station in Comrat District of ATUG (capacity: 12,000 tons/year):* scheduled replacement of depreciated M&E assets at transfer station.

In the LTIP, this includes periodic investments to rehabilitate and replace depreciated M&E assets at the transfer station during the period 2036-2046.

- > *Regional sanitary landfill closure in Cahul Town, Cahul Rayon:* closure of the regional landfill cells.

In the LTIP, this includes the closure of cells 1, 2, and 3 of the regional sanitary landfill at Cahul, respectively, in 2032, 2039, and 2047.

The total cost of the LTIP from 2026-2047 is estimated at EUR 31.36 million.

The following Table 10 provides a summary of the investments, including description, cost, time-period, and purpose.

Collection of full cost recovery user charges is the key enabler for the Regional Operator to make timely periodic rehabilitation and expansion investments. However, this collection will be constrained by the users' ability to pay. The constraint can be addressed via the periodic subsidy support to certain segments of household users to enable them to pay the required user charges. The subsidy

level will depend on the ceiling imposed on household user charges caused by the defined 1% / 1.1% / 1.2% affordability threshold (see sections below).

At the same time, if good operating and maintenance practices are ensured, this may delay the foreseen rehabilitation investments and, therefore, reduce the need to financially support HH users to pay for full-cost recovery user charges. Alternatively, the Regional Operator may also seek additional debt financing, investment grants, or other sources of funding to enable these investments, while not excluding that the Regional Operator may also be entitled to approach its founders (LPAs) for such support as may occasionally be required. The magnitude of this support will depend on the actual timing of future rehabilitation and expansion investments, the increase in average household income per capita, assumptions on affordability limits. Total investment costs in previous iterations of the present project would only change the magnitude of this support, which would be required regardless of the investment cost scenario.

Table 10 Long-term Investment Programme (LTIP), 2026-2047, WMZ-1

Long-term Investment Programme (LTIP) for WMZ-1

No.	Investment Programme (LTIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
Waste Management for WMZ-1, Republic of Moldova							
A	Solid waste disposal and treatment facilities at Cahul, Cahul Rayon						
1	Extending, rehabilitation and M&E replacement at the regional landfill in Cahul, sorting plant, and composting plant - 1	Construction works and equipment	-	1,100	1,100	2032	Extending, rehabilitation, and replacement investments of M&E at waste treatment facilities enabling the continued treatment and landfilling of solid waste in WMZ 1. Building of landfill cell 2 in 2032. Building of landfill cell 3 in 2039.
2	Extending, rehabilitation and M&E replacement at landfill, sorting plant, and composting plant - 2	Construction works and equipment	1,700	1,600	3,300	2036-2037; 2039	
3	Extending, rehabilitation and M&E replacement at landfill, sorting plant, and composting plant - 3	Construction works and equipment	1,700		1,700	2046	
B	Solid waste collection and transport, Cahul Waste Collection Catchment						
1	Waste collection: containers, bins, RFID tags, concrete slabs for waste collection points	Purchase and deployment of containers, bins, RFID tags, and concrete slabs	4,587	-	4,587	2034-2045	Regular purchase of new waste collection vehicles and equipment to ensure full service coverage and

[illegible]

[illegible]

No.	Investment Programme (LTIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
1	RFID tags for containers, GPS units, fuel sensors for trucks	Purchase of collection system monitoring equipment (included in equipment above)	0	0	0	2034-2046	Reduction of container losses, optimisation of truck use.
J	Dumpsite and landfill closures						
1	Closure of Cahul Cell 1	Construction works and buildings	-	400	400	2032	Closure of Cahul Cell 1
2	Closure of Cahul Cell 2	Construction works and buildings	-	400	400	2039	Closure of Cahul Cell 2
3	Closure of Cahul Cell 3	Construction works and buildings	-	1,000	1,000	2047	Closure of Cahul Cell 3
.	TOTAL for WMZ-1						
	Waste treatment and disposal facilities	Waste treatment facilities	5,564	2,700	8,264	2028-2047	
	Waste collection and transport	Vehicles, containers, and bins	18,614	-	18,614	2028-2047	
	Dumpsite and landfill closures		-	1,800	1,800	2028-2047	
	Contingencies	12% contingencies for construction works, buildings, machinery and equipment	665	538	1,204	2028-2047	
T		TOTAL for LTIP, WMZ-1	24,843	5,038	29,882	2028-2047	

2.4.2 Priority investment programme (PIP)

Based on a review of the FS (GIZ, 2017), the analysis of the market and demand for SWM services (refer to Chapter 2.1), maps, locations, proposed capacities, and staging of components, as well as the requirements of national legislation, international commitments, and the National Waste Management Strategy 2013-2027, the Consultant confirms the scope and costs of the priority investment programme (PIP). The technologies proposed in the FS and its update are in line with current practice and are cost-effective based on the option analysis. Moreover, the proposed PIP is within the technical capability of local experts to oversee project implementation and maintain the facilities post-completion, provided the recommended Technical Assistance (TA) is applied.

The bankability of the proposed scenario (PIP) and its components is confirmed, in particular given that the Project financing is expected to include on-granting from the national government and therefore system operators will not be required to include debt service and principal repayments in waste management charges. The updated charges calculation includes the option to include debt service (e.g. based on a selection of no DSCR, a DSCR of 1.0, 1.1, or 1.2%) to be able to understand the possible impact on tariffs should any portion of the debt become repayable by the regional operator (see Chapter 4).

While operators are expected to have the required capacity to implement the project in the existing regulatory framework, provided the TA programme is implemented, a foreseeable obstacle to long-term sustainability could be the availability and cost of repair and maintenance contractors if required. This may be mitigated as Moldova begins to upgrade its SWM infrastructure, in compliance with its national obligations, and demand for maintenance contractors increases.

The main existing waste disposal sites (the current landfill in Cahul, located on the site designated for the new regional sanitary landfill and sorting and composting facilities) and the other smaller dumpsites in WMZ-1 are included in the PIP. It is recommended that the closure of the many, smaller dumpsites in each rayon follow immediately after the construction of the regional landfill in Cahul in order to ensure that the new infrastructure will be used at its design capacity. This will reduce enforcement pressure on environmental inspectorates. A large-scale dumpsite closure programme will likely need to be implemented over a 1-2 year period. This has been assumed in the PIP. The closure of about 100 dumpsites cannot start before the construction of the Regional landfill.

The PIP implementation covers the period from 2024-2028. This corresponds to the physical implementation period, the commencement of technical assistance, and the timespan required to full disburse project financing. The PIP includes the following components:

Waste collection and transfer:

- Purchase and deployment of 1.1 m³ metal containers for residual waste (4,350 units), 120 l bins for residual waste and recyclables (70,800 units), 9.8 m³ roll-on containers for C&D waste (16 units), see-through 1.1 m³ metal containers for collection of recyclables (5,030 units), 16 m³, 10 m³, and 6 m³ compaction trucks (38 units), long-distance trucks with trailers for waste transfer (5 units), pick-up trucks (3 units), supervisors vehicles (4 units), and all the components of the waste collection monitoring system needed to collect, transport, and transfer the MSW, including C&D waste in Cahul Rayon, Cantemir Rayon, Taraclia Rayon, and all districts of ATUG (i.e., Comrat, Vulcanesti, and Ceadir-Lunga) of WMZ-1, to ensure SWM

collection services are provided to 100% of the population in WMZ-1 and an estimated average annual amount of 53,500 tonnes of MSW is collected.

Solid waste disposal and treatment infrastructure:

- > *Solid waste disposal and treatment facilities at Cahul Town, Cahul Rayon:* construction of sanitary landfill 2025-2026 (total capacity: 1,083,000 m³, capacity of cell 1: 289,000 m³), sorting plant (2025-2026, capacity 6,000 tons/year), and composting plant (2026, open windrow composting, capacity 1,600 tons/year). The regional landfill at Cahul will serve all municipalities in WMZ-1. The design criteria and the conceptual design of the regional sanitary landfill are described in the FS document, pp. 138-166. The design criteria and the conceptual design of the treatment facilities (sorting station and composting plant) are described in the FS document, pp. 132-137. Closure and re-cultivation of the existing landfill in Cahul (on the site of the planned new regional sanitary landfill) is described in the FS document, pp. 166-169.
- > *Solid waste management facility, Cania transfer station, Cantemir Rayon:* construction of Cania transfer station (2025-2026, capacity 8,000 tons/year). The design criteria and the conceptual design of the transfer station are described in the FS document, pp. 143-147. The criteria for the closure of the dumpsite are described in the original FS document, pp. 122-132.
- > *Solid waste management facility, Taraclia transfer station in Taraclia Rayon:* construction of transfer station (2025-2026, capacity 15,000 tons/year). The design criteria and the conceptual design of the transfer station are described in the FS document, pp. 122-132.
- > *Solid waste management facility, Comrat transfer station in Comrat District of ATUG:* construction of transfer station (2025-2026, capacity 12,000 tons/year). The design criteria and the conceptual design of the transfer station are described in the FS document, pp. 122-132.
- > *Closure of dumpsites in WMZ-1:* closure of dumpsites within the LPAs of WMZ-1 with the start of operation of the regional sanitary landfill. This includes the closure of dumpsites (2026-2028) in Cahul Rayon, Cantemir Rayon, Taraclia Rayon, and all districts of ATUG (i.e., Comrat, Vulcanesti, and Ceadir-Lunga). The procedures for tender and selection of contractors for the closure of the dumpsites shall be organised in 2025, while the construction works for the closing of the dumpsites shall be carried out during 2026-2028. The criteria for the closure of the dumpsites in WMZ-1 are described in the FS document, pp. 108-115.
- > *Contingencies:* 12% of investment costs, excluding collection equipment.

The total cost of the PIP from 2025-2028 is estimated at EUR 25.379 million. Note: the adjusted totals include an increased contingency budget to allow for the unpredictability and volatility of investment costs given the investment horizon stretches over four years.

In addition, EUR 1.1 million will be required in technical assistance and supervision services of which EUR 900 thousand (technical assistance and supervision of works) will be grant financed and EUR 200 thousand (supervision of small dumpsite closures) will be loan financed. This is detailed in chapter 4.5. This brings the total expenditures to be financed to an estimated EUR 26.479 million.

Table 10 provides a summary of the investments, including description, cost, time period, and purpose. Table 12 and

Table 13, on the other hand, show the required expenditures according to the procurement plan (PP) and financing plan (FP), respectively.

The following modifications to the PIP may occur during the implementation period:

- > *Modification of PIP timing.* At the present stage of discussion and considering the time required to prepare and announce international tenders for works, supplies, and services, it is expected that the PIP will be implemented from 2025-2028. In addition to the PIP, the technical assistance (detailed designs, assistance in procurement, and corporate development) is planned to start in 2024. Thus, loan disbursements should take place from 2025-2028 to include final takeover of completed works.
- > *Cost overruns.* Under the expectation that the implementation of the physical investments of the PIP will begin in 2025, the actual construction investment costs may change. Any cost overruns above contingencies would need to be covered from the national budget.
- > *Potential post-COVID boom.* Expectations of a post-pandemic boom are increasing. In practical terms, this can be expected to lead to a surge in demand for works, supply, and technical assistance contracts which would put upward pressure on investment costs.
- > *Post-war conditions.* Moldova will be adversely affected by the war in Ukraine. In the near term, the possibility for an economic downturn may delay the start of important infrastructure investments. In the longer term, a surge in demand for works, supply, and technical assistance contracts – in particular in reconstruction of post-war Ukraine – which would put upward pressure on investment costs.

Should the magnitude of the PIP be reduced, in an attempt to address tariff affordability, such a reduction will not guarantee to become a viable solution, because it would trigger the following consequences that would make the project's feasibility highly questionable:

- > *Failure to meet SWM targets:* if the system were reduced to only finance waste collection and disposal related investment, then waste reduction targets of the national SWM Strategy will not be met.
- > *Increase in dumping in (or highly probable continued use of) non-compliant dumpsites and facilities:* the project's PIP includes closure of all non-compliant dumpsites. If the scope of the collection system were reduced to save on investment costs, the use of non-compliant dumpsites would continue or return.
- > *SWM system running below capacity:* the project's PIP could be reduced by delaying closure of existing, non-compliant dumpsites. This would run the risk, however, of continuing to use those dumpsites and diverting waste away from the new, compliant landfill. This will have the effect of perpetuating existing negative environmental impacts, as well as increasing unit operating costs of the landfill.

Many other impacts of reducing the PIP may be devised and costed. However, as seen in previous versions of the PIP (see the original Feasibility Study, 2017), affordability would still be an issue under a full cost recovery assumption in all scenarios/versions (while OPEX coverage, thus ensuring the continuity of SWM operations as such is achievable in all scenarios).

Table 11 Priority Investment Programme (PIP), 2025-2028, WMZ-1

Priority Investment Programme (PIP) for WMZ-1

No.	Investment Programme (PIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
Waste Management for WMZ-1, Republic of Moldova							
A	Solid waste treatment facility at Cahul Town, Cahul Rayon						
1	Construction of landfill	Construction works and equipment	700	4,800	5,500	2025-2026	Regional landfill serving all municipalities in WMZ 1.
2	Construction of sorting plant	Construction works and equipment	650	500	1,150	2025-2026	Post-sorting of source-separated recyclables.
3	Construction of composting plant	Construction works and equipment	350	150	500	2025-2026	Green waste treated in open windrow composting. Reduction of green waste/biodegradable fraction that is landfilled.
4	Closure and re-cultivation of existing landfill at the site for the planned regional sanitary landfill	Construction works and buildings	-	800	800	2026	Closure of existing noncompliant landfill to ensure the waste is directed to new treatment facilities/landfill.
B	Solid waste collection and transport, Cahul Waste Collection Catchment						

No.	Investment Programme (PIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
1	Waste collection: containers, bins, RFID tags, concrete slabs for waste collection points	Purchase and deployment of containers, bins, RFID tags, and concrete slabs	2,293	452	2,745	2026	Collection of residual waste, recyclables, and other waste fractions in Cahul Waste Collection Catchment.
2	Waste collection: waste collection vehicles, supervisors' vehicles (including GPS units and other sensors)	Purchase and deployment of vehicles	1,406	-	1,406	2026	Collection of residual waste, recyclables, and other waste fractions in Cahul Waste Collection Catchment.
C	Solid waste management facility, Cania transfer infrastructure in Cantemir Rayon						
1	Construction of Cania transfer station	Construction works and equipment	245	470	715	2025-2026	Transfer of collected MSW in Cantemir Waste Collection Catchment to regional landfill and treatment facilities in Cahul.
D	Solid waste collection and transport, Cantemir Waste Collection Catchment						
1	Waste collection: containers, bins, RFID tags, concrete slabs for waste collection points	Purchase and deployment of containers, bins, RFID tags, and concrete slabs	680	153	834	2026	Collection of residual waste, recyclables, and other waste fractions in Cantemir Waste Collection Catchment.

No.	Investment Programme (PIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
2	Waste collection: waste collection vehicles, supervisors' vehicles (including GPS units and other sensors)	Purchase and deployment of vehicles	529	-	529	2026	Collection of residual waste, recyclables, and other waste fractions in Cantemir Waste Collection Catchment.
E	Solid waste management facility, Taraclia transfer infrastructure in Taraclia Rayon						
1	Construction of Taraclia transfer station	Construction works and equipment	418	490	908	2025-2026	Transfer of collected MSW in Taraclia Waste Collection Catchment to regional landfill and treatment facilities in Cahul.
F	Solid waste collection and transport, Taraclia Waste Collection Catchment						
1	Waste collection: containers, bins, RFID tags, concrete slabs for waste collection points	Purchase and deployment of containers, bins, RFID tags, and concrete slabs	1,588	332	1,920	2026	Collection of residual waste, recyclables, and other waste fractions in Taraclia Waste Collection Catchment.
2	Waste collection: waste collection vehicles, supervisors' vehicles (including GPS units and other sensors)	Purchase and deployment of vehicles	819	-	819	2026	Collection of residual waste, recyclables, and other waste fractions in Taraclia Waste Collection Catchment.

No.	Investment Programme (PIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
1	RFID tags for containers, GPS units, fuel sensors for trucks, optimisation of software, first year service	Purchase of collection system monitoring equipment (included in equipment above)	0	0	0	2026	Reduction of container losses, optimisation of truck use.
J	Closure of Dumpsites in WMZ-1						
1	Closure of dumpsites in Cahul Rayon	Construction works and buildings	-	751	751	2026-2028	Closure of dumpsites in Cahul Rayon to ensure waste is directed to treated facilities/landfill.
2	Closure of dumpsites in Cantemir Rayon	Construction works and buildings	-	415	415	2025-2028	Closure of dumpsites in Cantemir Rayon to ensure waste is directed to treated facilities/landfill.
3	Closure of dumpsites in Taraclia Rayon	Construction works and buildings	-	480	480	2025-2028	Closure of dumpsites in Taraclia Rayon to ensure waste is directed to treated facilities/landfill.
4	Closure of dumpsites in ATUG (Comrat, Ceadir-Lunga, and Vulcanesti districts of ATUG)	Construction works and buildings	-	1,162	1,162	2025-2028	Closure of dumpsites in ATUG (Comrat, Ceadir-Lunga, and Vulcanesti districts) to ensure waste

No.	Investment Programme (PIP)	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of Civil Works in '000 EUR	Total Cost in '000 EUR	Timing	Description of Expected Effect
1	Technical assistance	1. Technical implementation and supervision support.			800	2025-2028	
2	Technical assistance	2. Corporate development: setting user charges, implementation of ESAP, SEP, public awareness.			300	2025-2028	
T		TOTAL for PIP and TA, WMZ-1	-	-	26,479	2025-2028	

Table 12 Priority Investment Programme (PIP) and other expenditures, 2025-2028, WMZ-1 – Public Procurement Plan

Investment Item		Amount (MEUR)
A.1	SWM Facilities: Landfill, sorting plant and composting plant in Cahul City (Cahul Rayon); Transfer station Cania (Cantemir Rayon); Transfer station Taraclia Town (Taraclia Rayon); Transfer station Comrat Town (ATUG); Closure of all dumpsites in WMZ-1	
1	Construction of SWM Facilities for WMZ 1: Lot 1: Landfill, sorting plant and composting plant in Cahul City, Cahul Rayon, Closure of dumpsite at landfill site in Cahul City Lot 2: Transfer station Cania, Cantemir Rayon, Transfer station Taraclia Town, Taraclia Rayon, and transfer station Comrat Town, ATUG	7.700
2	Equipment for waste treatment and disposal facilities and transfer stations for WMZ 1: Lot 1: Equipment / goods for waste treatment and disposal facilities in Cahul Lot 2: Equipment / goods for the transfer stations in Cania, Taraclia, and Comrat	2.782
3	Closure of all dumpsites in WMZ-1	2.808
A.2	Waste Collection Equipment	
4	Containers and bins, RFID tags, Concrete slabs for waste collection points for WMZ 1 Lot 1: Containers/bins and RFID tags Lot 2: Concrete slabs for waste collection points	6.476
5	Waste collection trucks and supervisors vehicles for WMZ-1 Lot 1: Waste compaction trucks Lot 2: Supervisors vehicles	3.506
6	Waste collection monitoring system for WMZ-1	0.517
A.3	Project Contingencies	
	Contingencies for WMZ-1	1.590
	TOTAL – PIP according to presentation in Procurement Plan	25.379

Table 13 *Priority Investment Programme (PIP) and other expenditures, 2025-2028, WMZ-1 – Financing Plan*

Investment Item	Amount (MEUR)
SWM Facilities: Work Contract - Yellow FIDIC Lot 1: Landfill, sorting plant and composting plant in Cahul City, Cahul Rayon, Closure of dumpsite at landfill site in Cahul City Lot 2: Transfer station Cania, Cantemir Rayon, Transfer station Taraclia Town, Taraclia Rayon, and transfer station Comrat Town, ATUG	7.700
SWM Facilities: Equipment / goods Lot 1: Equipment / goods for waste treatment and disposal facilities in Cahul Lot 2: Equipment / goods for the transfer stations in Cania, Taraclia, and Comrat	2.782
Closure of all dumpsites in WMZ-1: Work Contract - Yellow FIDIC Lot 1: Closure all dumpsites in WMZ-1	2.808
Waste Collection: Containers and bins, RFID tags, Concrete slabs for waste collection points Lot 1: Containers/bins and RFID tags Lot 2: Concrete slabs for waste collection points	6.476
Waste Collection: waste collection trucks and supervisors vehicles Lot 1: Waste compaction trucks Lot 2: Supervisors vehicles	3.506
Waste collection monitoring system	0.517
Contingencies for WMZ-1	1.590
Construction Supervision of the multiple minor dumpsite closures for WMZ-1	0.20
TOTAL – PIP according to presentation in Financing Plan	25.579

2.5 Capital and Operating Cost

As discussed in Chapter 2.4, the Consultant reviewed the existing capital cost estimates – including replacement costs over the lifetime of the Project, which are included in the LTIP – and found that they accurately reflect the needs for waste management services in WMZ-1. The operating costs estimates of the Project are also evaluated as adequate.

In Chapter 2.4, the Consultant also discussed adjustments to investment costs (CAPEX) in the final version, including: increase in waste collection system investment costs, re-evaluation of timing of

dumpsite closure, modification of PIP timing, and updating of prices due to the expected investment start in 2025.

The main risk of CAPEX overrun comes with the expected opening up of the European and world economies after the COVID-19 pandemic. The increase in available financing, as governments seek to stimulate economic growth and recovery, will lead to increased investment and increased competition for skilled companies with technical and financial capacity to perform construction works, supply equipment, and provide services. Construction booms in transition economies, such as Poland, have occurred when a large increase in foreign (primarily EU-financed) led to temporary shortages in capacity. A countervailing factor is now the ongoing war in Ukraine and the potential for an economic downturn that is widely expected in 2022/2023. In the short-term, this will have dampening effects on costs and economic activity. In the longer term, reconstruction investment in post-war Ukraine may pull resources and investment from other countries and put upward pressure on costs. This risk is covered under the 12% contingency.

Risks covered under financial contingencies are considered low, taking into account the proposed on-granting of financing provided to the Government of Moldova from the EBRD and EIB.

The final CAPEX estimates will also include an evaluation of the total estimated costs for the closure and remediation of existing disposal sites in the WMZ-1.

With respect to operating costs (OPEX), an important adjustment to the OPEX in the updated feasibility study:

- > *Increase in collection system operating costs.* The updated waste collection system and increase in door-to-door collection in some areas will mean an increase in vehicle-km travelled, and thus increased personnel, fuel, and maintenance costs. These modifications, however, will also decrease collection infrastructure CAPEX with decreased construction of container sites. The final modelling and the costing of the modified collection system is reflected in the financial model (refer to Chapter 4).

2.6 Economic evaluation

As indicated in the updated FS for the project, one of the main adjustments for the economic evaluation is the conversion of labour costs into a shadow price of labour. That applies to the labour costs embedded in project investment costs, replacement costs, and operating and maintenance costs. This uses a conversion factor to exclude transfer and social security payments. The conversion factor $(1-u)*(1-t)$ was applied for all costs with a labour component for each year of the evaluation period. In this way, the updated FS contains an estimate of taxes and transfers on labour components at about 39.37% of labour cost, while the unemployment rate in the South Development Region of Moldova is 3.0%. This yields a shadow price of labour of 58.8%. In order to transfer financial cost into economic cost the labour cost components have to be multiplied by a factor of 0.588. At the request of the EBRD, however, this conversion factor was set to 1.0. In other words, it does not impact the economic evaluation.

The update of the economic analysis considers the main project economic benefits specified in the FS, including:

- > *Resource cost savings:* recovery of recyclable materials as a proxy for resource cost savings, production of compost, energy recovery from landfill gas, and extension of landfill life. The

updated FS significantly modified downward the re-use and recovery of recyclables, in keeping with changes in the recyclables market – both domestically and worldwide – since the original FS was prepared. Some re-use of compost will be considered. No energy recovery from landfill gas is planned; the FS found that this recovery would not be economical. The decrease in total waste reaching the existing and new landfill will mean that their useful lives will be extended beyond the “without project” case⁴.

- > *Reduction of visual disamenities, odours, and direct health risks:* this includes the elimination of uncontrolled dumpsites and proper collection and treatment of landfill leachate. This was expressed in the FS in increased land values and avoided clean-up costs.
- > *Reduction of greenhouse gas emissions:* as presented in GET analysis (see Chapter 8.1 and Appendix 4) implementation of the proposed investment project, will, due to regular collection and efficient transportation of waste to regional EU compliant landfill and other SWM facilities, allow to avoid emissions related to waste dumping and open burning, as well as to divert more recyclables from the waste stream going to landfill.

Table 14 Average annual GHG emissions for the baseline scenario and with the project scenario

Average annual GHG emissions, tCO ₂ e/year						
Scenario	From diversion of recyclables	From waste collection and transport	From dumpsites and open burnings	From EU compliant landfill	From composting station	Total
Baseline (without the project)	0	1,639	492,095	0	0	493,734
With the project implementation	-632	1,369	0	319,403	82	321,295
Average annual reduction of GHG emissions due to the project implementation, tCO ₂ e/year						172,439

The economic analysis has been integrated into the updated Financial Model. The final outputs of the economic analysis – including the project’s EIRR, the Internal Rate of Return (IRR), the ENPV and the Benefit-Cost Ratio (BCR) are discussed in Chapter 4. The updated economic analysis also considers EBRD’s shadow carbon price methodology.

⁴ The default scenario is that some revenues will be recovered from the use / re-use and sale of s compost and recyclables.

2.7 Affordability analysis

As per the EBRD methodology, “*affordability is defined as a share of monthly household income/expenditure, which is spent on utility bills. It is the actual financial ability of households to pay for utility services.*” EBRD methodology stipulates a pre-set threshold of 1% of monthly average household income, above which SWM services are deemed unaffordable. In Annex 6 of the ToR, “utility bills are ‘unaffordable’ when they exceed the present threshold.” The EBRD’s affordability threshold for SWM is 1%, above which SWM bills are “unaffordable”.

It is worth emphasising, however, that the statement that SWM bills are “unaffordable” does not mean that the SWM system cannot be implemented or would not be viable. Instead, it means that when the user charge for households that is required to cover the full cost of providing the SWM service is higher than the affordability threshold, some customers may undertake measures to reduce the impact of this user charge on their monthly household budget. These coping mechanisms may include illegal dumping of waste. In order to avoid this practice, it may be necessary to provide support to households with lower incomes. The level of support is calculated in chapter 4.4.4.

Further, the EBRD methodology sets out three possible options for assessment of affordability of charges for solid waste management to household customers:

- > *Option 1:* average household income based on current and forecast consumption of SWM services.
- > *Option 2:* focused on consumer groups by expenditure/income decline, in particular on the lowest income decile or quintile, based on current and forecast consumption of SWM services.
- > *Option 3:* focused on vulnerable groups – pensioners, unemployed, social benefit recipients, or households on the poverty line, based on standardised consumption.

There are no existing sociological or socio-economic studies in Moldova to support the use of willingness to pay for SWM services of different groups, in particular vulnerable ones. Of the three options for the affordability assessment, only Option 1 has sufficient data to support it. Option 2 (income quintiles; data by decile are not normally reported in official statistics) would be highly speculative given that such data are not broken down by region or municipality. Option 3 (vulnerable groups) also has insufficient data to support it as no income data are available on vulnerable groups, apart from income quintiles for the country as a whole. Thus, the only defensible method is Option 1, based on average household income.

In Moldova, average household income (HHI) per capita is available at the development region level (north, centre, south, and for Chisinau). HHI can be broken down into urban and rural, as well as into quintiles, but these data are only available at the national level. HHI data are not available at the regional or municipal level.

While official statistics do not cover household income by sex or vulnerable groups, monthly gross average earnings by sex and by municipality is provided. As seen in the following table, in 2021, men were paid an average of 16% more than women in the country overall. In Chisinau, this difference reached 22%. In the South Development Region, this difference was only 1% in favour of men, while in ATU Gagauzia the difference was 3% in favour of women. In Cantemir and Taraclia, women earned on average 4% and 1% more than men, whilst in Cahul, men earned 0.3% more than women. Available statistics are insufficiently detailed to discern the main causes of the gender pay gap.

Table 15 Monthly gross average earnings, MDL/month

Territorial Unit	2019		2020		2021	
	Women	Men	Women	Men	Women	Men
Moldova	6,709.8	7,808.0	7,387.2	8,558.5	8,353.1	9,672.6
Chisinau	7,913.6	9,460.8	8,650.7	10,487.3	9,898.3	12,026.5
South Development Region	5,443.0	5,725.1	6,089.3	6,225.8	6,803.7	6,887.4
Cahul	5,845.2	6,338.7	6,538.0	6,998.9	7,413.6	7,436.1
Cantemir	5,460.0	5,285.0	6,207.8	6,044.5	7,014.2	6,741.1
Taraclia	4,988.7	5,482.2	5,917.9	5,917.9	6,542.6	6,506.4
ATU Gagauzia Development Region⁵	5,548.9	5,561.9	6,180.9	6,118.8	7,088.5	6,904.8

Source: statbank.statistica.md. Monthly gross average earnings by Rayons/Regions, Years and Sexes. PxWeb (statistica.md)

According to national statistics, the structure of households in the South Development Region indicates that from 2014-2021, the share of single-person households increased from 25.7% to 29.7%. Over the same period, the share of family couples without children increased from 19.9% to 31.3% and the share of other households without children fell from 17.9% to 9.8%. The share of family couples with children increased from 15.9% to 16.6%. Single parent households with children were 1.2% of all households in 2014 and 1.0% in 2021. Finally, "other households with children" fell from 19.4% in 2014 to 11.6% in 2021. Thus, households typically considered vulnerable – in particular single parent households with children – decreased as an overall percentage of total households.

According to the 2019 Household Budget Survey, as cited in a UNICEF and National Office of Statistics Joint Study⁶, households with children under the age of 18 represented 31.6% of the total number of households in Moldova. Of these, nearly half (47.1%) had one child, whilst 39.5% had two children and 13.4% had three or more children. Households with many children were characteristic for rural areas, whilst households with one child were typical for urban areas.

As cited in the 2019 Household Budget Survey, as the number of children in the household increases, the average income per household member decreases. Per the survey, the average income per person in households with one child was 1.7 times higher than the average income per person in the households with 3 and more children. By area of residence, the most vulnerable families were

⁵ Including Comrat, Ceadir-Lunga and Vulcanesti rayons

⁶ Children of Moldova, Statistical Publication, 2020.

those from rural area, where the average disposable income per person represented 67.2% of the average disposable income of urban households. The distribution of households with children by quintiles, highlights the discrepancies between more and less wealthy households. The monthly average income per person of households in the first quintile (20% of least wealthy) was 1.7 times lower compared to average income of total households with children, while the monthly average income per person of households from the fifth quintile (20% most wealthy) was 1.8 times higher⁷.

The same household budget survey reviewed the self-assessment of welfare, noting that about 68.3% of households with children assessed their living standards as satisfactory, 27.1% as good or very good, and the remainder assessed their level of wellbeing as unsatisfactory. At the same time, about 84% of households with children considered that, in 2019, no changes occurred in their living conditions compared to the previous year, 9.1% mentioned that they live better, and 6.7% considered that the situation has worsened⁸. No data are available for 2021 with which to assess how these self-assessments may have changed as a result of economic upheavals during the Covid pandemic.

Based on national data, the lowest income quintile was estimated to account for approximately 54.5% of the average household income in the region. The following figures depict the household income growth used in the financial model, as assumed for the region as a whole, as well as urban and rural populations. For each figure, the estimate for the lowest household income quintile is also provided.

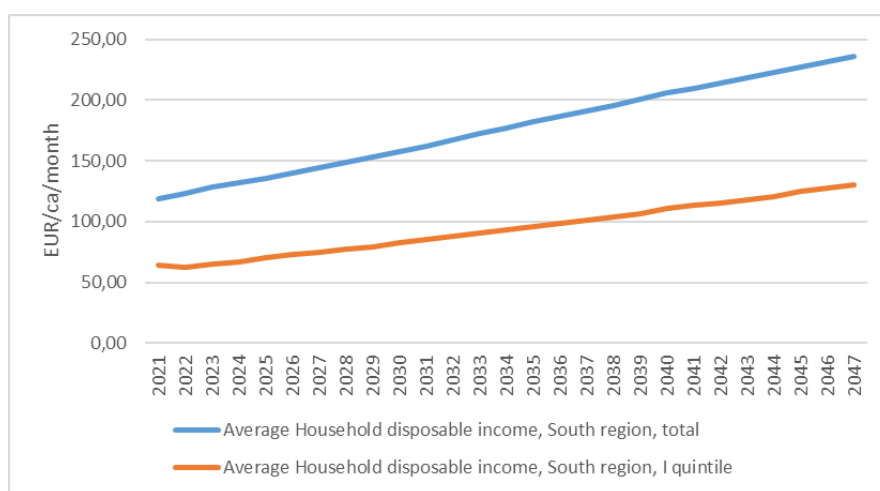


Figure 8 Household income forecast – average HH income vs HH income of I quintile

⁷ Ibid.

⁸ Ibid.

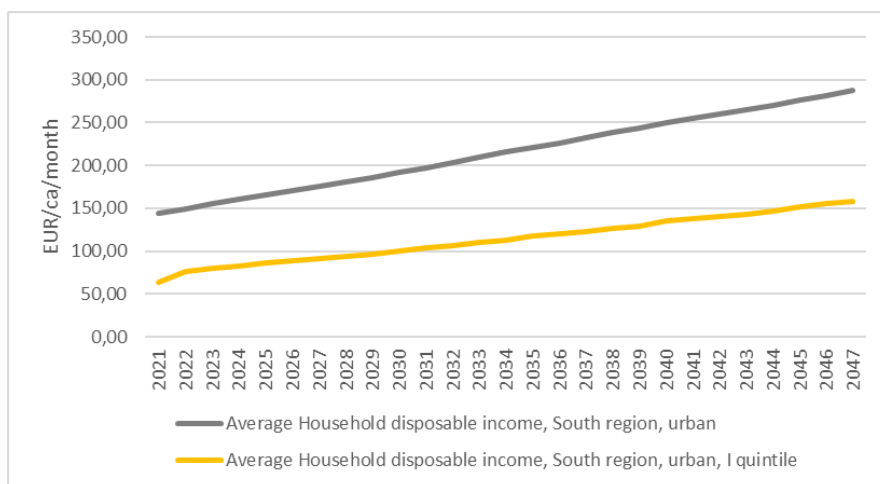


Figure 9 Average HH income of urban population vs HH income of I quintile of urban population

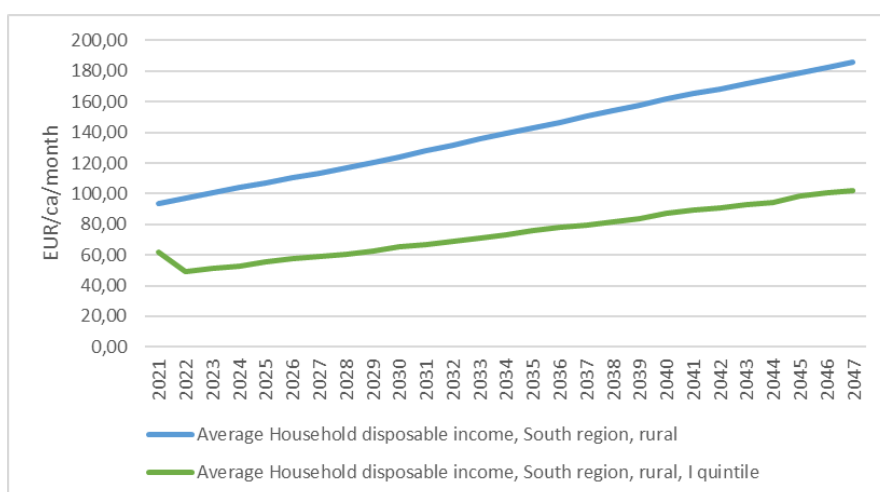


Figure 10 Average HH income of rural population vs HH income of I quintile of rural population

Other measures of affordability

No comprehensive studies of affordability of solid waste user charges for household or other users have been conducted for Moldova. Likewise, no studies have been conducted for the sector related to the willingness to pay of household or other customers for improved SWM service. No studies have considered the ability or willingness to pay of any vulnerable group. Implementing the cost recovery user charges will require significant political will at the local level.

Household income (HHI) at the regional level is broken down into components of income. Data on vulnerable groups cannot be correlated to average HHI per capita. Based on officially available data, however, the only possible option for the affordability analysis in EBRD terminology is Option 1 – using average HHI and comparing it to current actual consumption and future consumption of SWM services.

In 2021, current SWM charges in WMZ-1 are at 0.45% of average household disposable income per capita and that this would gradually increase up to 1%. These assumptions were tested in the updated financial model (see Chapter 4).

It is important to emphasise that, for a more conservative definition of the HHI and affordability calculation, the Consultant has adjusted average disposable HHI by removing remittances from consideration in affordability. Remittances can vary widely from year to year, depending on the overall global economic situation and the specific economic conditions in countries where Moldavans are working abroad and sending money home. In addition, the Consultant has estimated the distribution of average disposable HHI into urban and rural areas.

Actual affordability will vary from the estimates presented herein and used in the financial model for the following reasons:

- > *Actual waste generation:* by necessity, the model uses the average waste generation and therefore affordability is calculated based on this average. Thus, poorer households may also compensate for high user charges by producing less waste; waste generation is highly positively correlated with household income. The actual payments poorer households make may be within their ability to pay.
- > *Location:* rural households tend to generate less waste per capita in addition to having lower household income. The actual payments rural households make may be within their ability to pay.

Table 16 Assumptions used in the affordability analysis in the financial model, average disposal HHI, less remittances

Territorial Unit	2020 (MDL/capita/month)	2021 (MDL/capita/month)
Moldova	2,696	3,070
Urban	3,346	3,900
Rural	2,268	2,524
South Development Region	2,059	2,426
Urban	2,555	3,081
Rural	1,732	1,995

Source: for Moldova as a whole, urban, and rural population, as well as South Development Region overall for 2020-2021: statbank.statistica.md. For South Development Region 2020-2021, as well as for urban and rural breakdown: Consultant estimate.

These estimates have been forecasted for the LTIP period and affordability has been estimated based on actual consumption (waste production) in urban and rural areas in each of the rayons. Because affordability estimates rely on actual consumption, affordability is further considered in the section concerning the financial model.

In summary, the affordability approach presented in this report and the financial model represents a conservative approach for the following reasons:

- > *Remittances:* Remittances can vary widely from year to year, depending on the overall global economic situation and the specific economic conditions in countries where Moldavans are working abroad and sending money home. Inclusion of the international remittances into household income would increase the HHI and therefore reduce the pressure of affordability constraints.
- > *Actual waste generation:* waste generation in lower income and rural households will be lower than in higher income and urban households. Applying a 1% threshold on average across all users may underestimate the ability of lower income and rural households to pay for SWM services.

3 Institutional set-up

3.1 Background

Pursuant to the laws of Moldova, the SWM infrastructure to be delivered by the Project may be either state owned or LPA owned. The state or the local public authorities (LPAs) would transfer the right of use of the assets to the beneficiaries, i.e. to the joint stock companies (JSC) that may be either state-owned or owned jointly by several LPAs (inter-municipal).

On 14 May 2021 a discussion was held with MARDE (now MoEnv) and EBRD of two institutional set-up models, comprising the state-owned joint stock company (SOJSC) acting as a single beneficiary for the entire country and the inter-municipal joint stock company (IMJSC) established in each WMZ by the LPAs and acting as a beneficiary in each WMZ. The model with the SOJSC was rejected due to the complexity of implementation, required amendments to the laws, complicated procedures applicable to the establishment of state-owned companies and bad experience related to their operation.

In the Interim Report, the institutional set-up models for final choice of the preferred model were proposed, based on the inter-municipal ownership of the IMJSC as the beneficiary. A great number of small LPAs involved as the shareholders of the IMJSC would complicate the management of the beneficiary and impede sustainable development of the future regional SWM systems. Therefore, as recommended by the Consultant, at the discussion on 14 May 2021, it was decided to limit the number of the shareholder to the largest LPAs, i.e. the administrative centres of the territorial units of second tier composing the respective WMZs, who are the current owners of the largest operators. In WMZ-1 these LPAs are the following: the LPA of Cahul Town (referred to as LPA Ch), LPA of Cantemir Town (referred to as LPA Cn), LPA of Comrat Town (referred to as LPA Cm) and the LPA of Taraclia Town (referred to as LPA T).

The potential implementation of the territorial administrative reform in the future would result in the creation of larger LPAs and would require the transfer of assets thereto, signing of new inter-municipal cooperation agreements, redistribution of shares, issuance of new registration documents of the IMJSCs and other related arrangements that may impede the sustainability of the future SWM system development. The proposed shareholding by four largest LPAs would reduce the risk that the future reform may impede the management of the IMJSC and affect the sustainability of the future regional SWM system development, whereas the large LPAs are the least likely to be considerably affected by the reform. However, the other LPAs of the zone will be involved and will have a say in the establishment of the system and in the oversight on the quality of the provided service through the IMCA and the PSCs that they will sign with the IMJSC.

According to the law in Moldova, in all cases, public assets belonging to the communal services' systems are owned by public authorities (national or local).⁹ To enable the beneficiaries (operators) to oversee the public assets, the public authorities transfer the right of use of the assets to the beneficiaries. Currently, the public assets in WMZ-1 are in the ownership of the LPAs. The existing operators were given the right of use of the assets by the LPAs. The ownership of the current assets will not change and will stay public. The right of use of the assets will be transferred to the operators

⁹ See Article 4, para (2) of Law 1402/2002 on communal services, Article 11, para (2), 1) of Law 29/2018 on the delimitation of public property, Article 3, b) of Law 523/1999 on the public ownership of LPAs, Article 39, para (4) of Law 1134/1997 on JSCs.

according to their roles in the institutional set-up (see the institutional set-up models below). A number of meetings were held in September 2022 between MoEnv, the LPAs and the Consultant (all relevant MoM's presented in Appendix 1) where the preferred institutional model was presented and discussed with the LLPAs of WMZ-1. In addition to other features of the proposed institutional model, the LLPAs were also informed of the need to transfer the ownership of the land plots, on which the regional infrastructure will be built, from the LPAs (Cahul, Comrat, Taraclia and Cania) to the State. This would minimise the risks of new mayors and local councillors revoking the decisions on authorizing the construction of the landfill or other regional infrastructure on the respective land, or denying the access to dispose the waste. At the same time, the new infrastructure (immovable goods) would remain in the ownership of the State and only the right of use of the assets will be transferred to the regional operator (the IMJSC). The other assets, such as trucks, bins, and other equipment will be transferred in the ownership of the largest LPAs as initially planned. The right of use of these assets will also be transferred to the IMJSC. The meaning of the right of use of the public assets and the implications thereof related to on-granting are explained in a separate section below. The LLPAs representatives agreed with the proposed institutional model, including the transfer of the ownership of land plots for the construction of the regional infrastructure to the state.

The following alternative institutional set-up models were presented in the Interim Report and at the meetings with the key stakeholders for the purpose of comparison and selection of the preferred model:

- > Model 1 - Beneficiary is the IMJSC in charge of the regional infrastructure and MSW collection.
- > Model 2 - Beneficiary is the IMJSC in charge of the regional infrastructure and the existing largest operators of the four LLPAs are in charge of MSW collection.
- > Model 3 – Beneficiaries are the largest operators of the LLPAs in charge of the regional infrastructure and MSW collection.

A number of selection criteria (the total of 12) enabled a fair comparison of the proposed models and showed Model 1 as providing the greatest number of advantages. As part of the selection process, the models were presented to the LPAs. Comments and proposals received from the key stakeholders (the LPAs, MoEnv, EBRD, EIB) were taken into consideration while finalizing the preferred model and developing the roadmap of its implementation.¹⁰

The selection process, the description of the preferred institutional set-up model and the roadmap for its implementation are presented in Chapter 3.5 below.

3.2 Transfer of the right of use of assets for the purpose of on-granting

As mentioned above, the IMJSC will be provided the right of use of the assets that will be procured or constructed as a result of the future Project. The ownership of these assets will be public, namely, the plots of land and the future regional infrastructure will be owned by the state, represented by the Public Property Agency of the Republic of Moldova, and other assets (waste collection equipment)

¹⁰ Following consultant's recommendation, MoEnv and EPIU support the idea of a uniform approach regarding the institutional model in all WMZs, therefore the discussions held in the process of elaboration and selection of the institutional model in the WMZ-5 that preceded the other zones are highly relevant.

will be owned by the LPAs, the shareholders of the IMJSC. This ownership structure is well regulated by the laws, which prescribe transparent procedures for the transfer of the ownership and of the right of use.

Under the laws, the ownership of the IMJSC by LPAs and the public ownership of assets does not deprive the joint stock company of any rights and obligations that are prescribed thereto by the Company Law. The public ownership of assets (in this case, the ownership of the plots of land and regional infrastructure by the state and the ownership of the collection equipment by the LPAs) only means that the key decisions related to these assets should be approved by the owners. Such a decision could be, for example, borrowing for the purpose of development of the public assets. Although the right of use of the assets would enable the IMJSC to borrow, the borrowing would require the approval of the shareholders as the owners of these assets.

The right of use to the public assets transferred by the public authorities to a publicly owned company (the IMJSC in this case) enables the company to manage and operate the public assets in the way as the owners (the LPAs in this case) would manage and operate. Maintaining public ownership of the LPAs ensures the safety of the public assets and enables more stringent control over the management and operation of the assets by public authorities.¹¹

The rights and obligations of the service providers (the IMJSC in this case) related to the management and operation of the public assets are defined in the Agreement on the Delegation of the Public Service Management (also referred to as the Public Service Contract or the PSC). The PSCs are concluded between the public authorities and the service providers to ensure, inter alia, proper management and operation of the public assets and to exercise control over the financial and operational performance of the service providers.

For the purposes of the future Project, the funds designated for the Project implementation will be borrowed by the state from the IFIs and on-granted (as an assumption, in comparison to on-lending) in the form of the assets resulting from the works, goods and services. The ownership structure and the right of use of these assets will be the following: (1) Regional installations will be state-owned (the state will be represented by the Public Property Agency) with the right of use of the IMJSC (ref. MoM of September 2022 on presentation of the institutional model and the transfer of ownership of the land plots from the LPAs to the state); (2) MSW collection equipment will be owned by the LPAs of Cahul Town, Cantemir Town, Comrat Town and Taraclia Town of WMZ-1 with the right of use of the IMJSC.

Unlike for the projects funded by Regional Development Agencies from the Regional and Local Development Fund, where a special simplified procedure exists for the transfer of the assets (investments costs) resulting from the implemented projects to the beneficiary LPAs (Government Decision 1235/2016), in case of the projects implemented by the Environmental Projects Implementation Unit (EPIU, now National Office for Implementation Environment of Projects

¹¹ Article 4, para (2) of the Law on communal services no. 1402 from 2002, provides that (2) "the public systems of communal household, including the afferent lands, being of public use, interest or public utility, belong, by their nature or according to the law, to the public domain of the administrative-territorial units. Article 2 of the same Law defines communal household public systems as a set of constructions, technological installations, functional equipment, and specific endowments, through which the administration, the maintenance in good functioning conditions, and the efficiency of all the components of the housing-communal field are ensured. So, the Law attributes all the assets (not only the immovables) related to the communal services to the public domain of the LPA.

(NOIEP)), the general procedure will apply to the transfer of the ownership and to the transfer of the right of use defined in the country laws¹². For the purposes of the future Project, the funding will be provided by the state for the development of the regional SWM system in WMZ-1 in the form of the assets created as a result of the Project. Until the procedure for the transfer of assets resulting from projects implemented by the EPIU is approved (similarly to the one adopted for regional development projects), the on-granting will be conducted through the transfer of assets as provided by the Government Decision 901/2015 and the subsequent transfer of the right of use to the IMJSC. The following procedure shall apply:

1. Decision of the Government to transfer the ownership of assets to four largest LPAs of WMZ-1.
2. Decisions of the concerned LPAs to accept the transferred assets.
3. Establishment of the hand-over commission composed of the representatives of the Government (in particular, of the Public Property Agency) and of the recipient LPAs.
4. Issuing and signing of the hand-over act by the members of the hand-over commission and of the related financial documents.
5. Registration of the change to the ownership of the assets at the Agency for Public Services, if required due to the type of assets.
6. Transfer of the right of use to the IMJSC and signing of the Public Service Contract between the owners of the assets and the IMJSC.

The obligations of the state (represented by the MoF or the MoEnv), of the LPAs and of the IMJSC related to the implementation of the above procedure and to the resulting on-granting of the public assets will be included in the On-Granting Agreement.

3.3 User charges¹³

The SWM services will be funded by the user charges calculated according to the calculation methodology which is currently under development with the support of the USAID-funded program "Comunitatea Mea". It is anticipated that the calculation methodology for user charges will be completed and adopted on the national level. In the process of the regional SWM planning, the SWM data will be collected, measures for the future development will be determined for the purpose of achieving the targets of the national strategy and the investment and operating costs of the future regional SWM system will be calculated to form a basis for the calculation of the SWM charges. The size of the charges will be approved by the councils of each LPA. The billing systems will be decided and established by the LPAs. User charges may be collected either by the LPAs or by the providers of the SWM services, depending on the council decisions. The introduction of the uniform system for

¹² Government Decision No. 901/2015 On the approval of the Regulation on the transfer of public ownership goods.

¹³ It is recommended to use the term "a user charge" or "a charge", instead of the term "a tariff". There is experience that in the Republic of Moldova the term "tariff" is understood as the payment collected by service providers, as opposed to taxes collected by LPAs. However, by definition, a tariff is a tax on imported goods. In some studies, "a tariff" still refers to a payment for public services. Yet, in the English language it should be replaced by a correct term, such as "a charge" defined as a price asked for goods and services.

collection of user charges in all LPAs would be an advantage. The development of requirements for the implementation of the appropriate billing system is included in the Corporate Development and Stakeholder Participation Program (hereinafter referred to as the CDSPP).

According to the laws, the LPAs are the only authorities for adopting of SWM user charges. Reportedly, the creation of the national regulator for the SWM user charges is considered on the national level.

In practice, the user charges will have to be of the level that ensures the payment of the fees for the SWM services. The fees for the services of the inter-municipal joint stock company (IMJSC) will be calculated by the IMJSC to ensure the cost-recovery of the regional SWM system operated by the IMJSC and will be specified in the Public Service Contracts (PSCs) between the LPAs and the IMJSC. The PSCs will be developed as part of the Corporate Development and Stakeholder Participation Program (CDSPP). The IMJSC will make the calculations of user charges and submit the applications to the LPAs who will adopt the user charges. In case the national regulator for SWM services is established, it may become either the institution that, among other functions, checks and endorses the operator's calculations of the user charges before the request for adoption is sent to the concerned LPAs, or it may be the body that directly adopts them (for instance in cases where the operator works in conditions of loan agreements guaranteed by the Government as it is the case now in the water sector). Those LPAs who might refrain from entering into the PSCs with the IMJSC would have to sign PSCs with other operators for collection and delivery of the MSW to the regional installations and pay the gate fee.

As described in Section 3.7 below, PSCs shall be awarded on the basis of the public procurement rules set forth in applicable laws¹⁴. The only exception are the publicly owned companies of the water supply sector (WSS). The laws allow direct award of PSCs to the public WSS companies with the majority of public capital. In practice, PSCs for public utility services, such as waste management are also directly awarded to publicly owned companies, however, this is against public procurement rules.

For the purpose of direct delegation of services (award of PSCs free of public tendering) to the IMJSC, the amendment to the Law on Public Communal Services (1402/2002) is required to exempt inter-municipal (regional) companies established in the waste management zones from the public procurement rules. According to the information received from the MoEnv, such draft amendment was elaborated and is under consideration by the national authorities.

The decisions of LPAs to adopt adjusted user charges would be best facilitated by the closure/elimination of the dumpsites on the territory of WMZ-1 to the date of opening the regional installations. This would leave the regional installations as the only option for MSW acceptance and would require the payment of the fees for the services of the IMJSC as defined in the PSCs and included in the schedule to the Intermunicipal Cooperation Agreement (the IMCA) (see below). The availability of dumpsites would, on the contrary, provide incentives to small LPAs to refrain from signing the IMCA and the PSCs with the IMJSC. The Inspectorate for Environmental Protection subordinated to the MoEnv shall ensure the control over and the elimination of illegal dumping on the territory of WMZ-1. Even if the closure/elimination of all illegal dumpsites is impossible before the commissioning of the regional installations, the MoEnv and the Inspectorate for Environmental Protection shall put the ban on and shall exercise control over further illegal dumping as soon as the

¹⁴ Art. 21 of Law 1402/2002 on public communal services.

regional installations are available. The ban on non-compliant landfills follows from Part 3 of Article 16 of the Law on Waste No.209/2016, which states that the design, construction and operation of landfills shall be carried out in accordance with the rules of construction and environmental permits. Also, pursuant to Part 3 of Article 154 of the Contravention Code No. 218/2008, sanctions apply to natural and legal persons for waste disposal in prohibited places.

The IMCA is viewed as one of the instruments that will enable achieving the cost recovery through user charges by all or the majority of the LPAs who will be co-signatories to the IMCA. The user charges will be calculated¹⁵ and the IMCA will be developed as part of the CDSPP. The IMCA will include the schedule for the adjustment of user charges. The LPAs, co-signatories to the IMCA, will thus commit to adopting the user charges according to this schedule. It is also anticipated that even those LPAs who refrain from signing the IMCA will have to adopt the user charges that enable paying the gate fee for the acceptance of the MSW at the regional installations.

Further details on the PSA and the IMCA, including the recommended covenants are presented in Chapter 3.6.

Low financial capacities of the LPAs and affordability constraints may impede the cost coverage of the regional SWM systems (for example, the operational cost of the regional landfill according to the environmental standards, development cost, such as the construction of new landfill cells in the future, maintenance, repairs etc.). If the affordability of the population (the capacity to pay for the services) is too low, the charges of the required level may not be set by the LPAs, and the collected revenue may not be sufficient for proper operation and development (see Section 4.4.1 on tariffs, sustainability and affordability).

In such cases municipal subsidies may apply. However, if the financial capacities of the LPAs are too low, the sources for municipal subsidies will be insufficient. In this case state budget allocations will be required. It is recommended to include in the loan covenants a commitment of the national government to provide subsidies to cover the difference between the required funding and the revenue from the SWM charges if the revenue is insufficient due to affordability constraints and low financial capacities of LPAs. As it is mentioned above, the state subsidies would only be sought in case of affordability constraints of the population to pay full cost recovery charges and of the lack of capacity of the municipal budgets to provide the necessary subsidies, and not in cases when local councils may refuse to adjust the charges for political or other reasons. Affordability calculations are presented in Section 4.4.1.

Deficiencies of local governance in the field of SWM (the lack of local and regional planning and regulation) may impede the sustainability of the future SWM system development.

It is recommended to close these gaps (calculation of user charges and cost recovery, billing system, SWM planning and regulation) through the CDSPP (see Section 6.2.3 for further reference).

¹⁵ It would be an advantage to have user charges calculated according to the official methodology, which would decrease the incidence of counterarguments and could thus facilitate the process of adopting the adjusted user charges. In the period of the report preparation, the methodology for calculation of user charges was developed with the support of the USAID-funded program "Comunitatea Mea". The methodology was to be adopted by the Government decision, which means that it would only have advisory character to the LPAs. Only if adopted as a law, the methodology for calculation of user charges would be mandatory to LPAs.

Considering the above, the following clauses are recommended for the Loan Agreement to ensure the cost recovery through user charges of the regional SWM system:

- > Upon elimination/closure of illegal dumpsites on the territory of WMZ-1, the MoEnv, shall ensure that thereafter, the Inspectorate of Environmental Protection exercises control over and applies administrative sanctions to prevent and ban any reappearance of illegal dumpsites on the territory of WMZ-1.
- > The MoEnv shall initiate adopting the amendment to the Law on Public Communal Services and/or other relevant laws to exempt from the public procurement rules the inter-municipal (regional) companies established in the waste management zones and to enable the LPAs to award PSCs to inter-municipal companies free of tendering.
- > If the affordability calculations show that the SWM services are not affordable to the population and the user charges calculated to ensure the cost recovery cannot be adopted by the LPAs, while the local budgets lack necessary resources to provide the subsidies to the operator, the MoF shall ensure the provision of state subsidies to cover for the deficit.

The following clauses are recommended for the On-Granting Agreement to ensure the cost recovery through user charges of the regional SWM system:

- > Upon commissioning of the regional SWM installations, the LPAs of Cahul, Cantemir, Comrat and Taraclia shall adopt user charges to a cost recovery level, calculated according to the best available international practices and the calculations model proposed by the CDSPP consultant and/or the methodology in force at that moment for calculation of user charges.
- > Upon elimination/closure of illegal dumpsites for the purpose of preventing any reappearance thereof on the territory of WMZ-1, the LPAs of Cahul, Cantemir, Comrat and Taraclia shall ensure proper local SWM governance through local rules and regulations, control and administrative sanctions to ban/prevent any reappearance of illegal dumpsites.
- > Upon commissioning of the regional SWM installations, the LPAs of Cahul, Cantemir, Comrat and Taraclia shall enter into PSCs with the IMJSC to direct the MSW collected on their administrative territories to the regional installations operated by the IMJSC and to ensure proper operation of the regional installations.

3.4 Key stakeholders

The following key stakeholders were identified as the main actors of the institutional set-up models:

- > The international financing institutions (IFI), namely, the EBRD and the EIB, as well as the international donors providing soft loans and grants to the Project implementation.
- > The Ministry of Finance (MoF) and the Ministry of Environment (MoEnv) of the Republic of Moldova, one of whom will sign the Loan Agreement.
- > The Environmental Projects Implementation Unit (EPIU) of the MoEnv will be in charge of the management of projects implemented in all WMZs and will act as the Contracting Authority for the works, goods and services.

- > The IMJSC will be established by four largest LPAs of WMZ-1, comprising Cahul Town, Cantemir Town, Comrat Town and Taraclia Town, and will act as the beneficiary for the Project implementation and the cosignatory to the contracts for the works, goods and services. The IMJSC will have the staff to share Project implementation responsibilities with the EPIU (MoEnv). The IMJSC will take over the right of use of the regional assets from the State and LPAs and undertake the operation of the regional infrastructure.
- > The LLPAs of Cahul, Cantemir, Comrat and Taraclia will enter into the Project Support Agreement (PSA) and the Inter-Municipal Cooperation Agreement (IMCA) and establish the IMJSC.
- > The LPA of Cania (Cantemir Rayon) will also sign the PSA to commit to providing the land and permits and any other contributions as required for the project implementation¹⁶.
- > Other LPAs, depending on the decisions of municipal councils, will join the IMCA and enter into PSCs with the IMJSC or at least with other service providers of WMZ-1.

The responsibilities of each stakeholder are described in detail in relation to the preferred institutional set-up models below.

3.5 Preferred institutional set-up model

The selection process, the description of the preferred institutional set-up model and the roadmap for its implementation are presented below.

3.5.1 The selection process of the preferred model

In WMZ-1, the selection process of the institutional set-up model was conducted similarly to WMZ-5 and WMZ-8. Presentations to the key stakeholders (the LPAs) were made at a meeting arranged by the EPIU (MoEnv) and the local consultants in Cahul on 9 September 2022 and in several online meetings with the LPAs that were not able to attend that live meeting. The MoM's of the meetings are presented in Appendix 1.

In these meetings and follow up discussions, the implementation of the same preferred model as selected in WMZ-5 and WMZ-8 was proposed to the main LPAs of WMZ-1. As a result, the representatives of the LLPAs (Cahul, Cantemir, Comrat and Taraclia) accepted Model 1 as the preferred institutional set-up model, including the transfer to the state ownership of the plots of land required for the regional installations. The LPA of Cania expressed no objection to its plot of land to be allocated for the regional installations and thus to be transferred to the state ownership. Upon completion of the gap analysis by the Consultant and before signing the respective Tranche of the Loan Agreement, the decisions by the municipal / local councils should be adopted as to confirm their commitment and interest to participate in the project according to the Feasibility Study and the gap analysis. The commitment to transfer the waste management service (including waste collection and transportation) from the current operators to the regional operator once the regional landfill is operational shall also be confirmed by these decisions.

¹⁶ Signing the PSA by Cania will not be required, if at the moment of signing the plot of land for the regional installations will have been transferred to the State ownership.

The description of Model 1 (the preferred model), is presented below.

3.5.2 Description of the preferred institutional set-up model (Model 1)

Model 1 was accepted by the LLPAs of WMZ-5 and WMZ 8 and is also highly recommended for WMZ-1¹⁷, as from the financing IFI's perspective it is important that all the WMZs participating in the Project follow a similar institutional set-up and Project implementation approach in order to simplify and optimize Project implementation and streamline the tasks for the envisaged project implementation support Technical Assistance (as further detailed in Section 2.2). The condition agreed with the LLPAs was that the IMJSC as beneficiary should be established as a new legal entity by the LLPAs¹⁸. Under this institutional model, the IMJSC will be responsible for the operation of the regional MSW facilities and for the waste collection and transportation. However, the IMJSC may only start the operational activities upon commissioning of the new regional installations. For the start of the operations by the IMJSC, the SWM related assets will be transferred to the IMJSC from the existing operators.

The newly established IMJSC (also referred to as the Regional Operator or the RO) will be responsible for the project implementation and for the extension of the waste collection, transportation, transfer and disposal services to all LPAs of WMZ-1 (see point 4 below). Specifically, after the respective Public Service Contract(s) or PSCs are signed between the IMJSC and the LPAs, the IMJSC, depending on the conclusions of the CDSPP Consultant regarding the applicable billing system, will sign contracts with the service users (households, institutions, businesses, etc.) and will start providing the SWM services.

The IMJSC will sign the PSCs with the LPAs and will start the delivery of services as soon as the regional infrastructure, in particular, the regional landfill is commissioned. According to the MoEnv, current dumpsites may not be transferred to the IMJSC due to non-compliance of the dumpsites to the environmental protection requirements. Before the regional landfill is constructed and starts to operate, the existing operators will continue to provide SWM services in the areas that they currently cover.

In addition to the SWM services, some of the existing operators of largest LPAs also provide other types of communal services, such as street cleaning, road maintenance etc. Therefore, after the SWM activities are taken over by the IMJSC they will continue to operate in their other fields of activity, and/or will be entrusted with the delivery of other types of public services (on demand). When transferring the SWM activities to the IMJSC, only the SWM related assets and resources of the existing operators will be transferred to the IMJSC (beneficiary) for operation (use).

The commitment of the LPAs to delegate the SWM services to the IMJSC once the regional landfill is commissioned will be part of the Project Support Agreement and will constitute a Condition Precedent

¹⁷ As mentioned above, at the meeting held on 9 September 2022 in Cahul and the following online meetings the institutional models were presented to the key LPAs from the WMZ-1, including the comparison and the preferred model (no 1), which was accepted and supported by the mayors/deputy mayors. The ultimate confirmation of the acceptance of the key LLPAs to participate in the project according to the proposed institutional model and other details of the Gap analysis will be subject to the approvals of the municipal councils once the gap analysis is finalized.

¹⁸ Initially, Model 1 included the creation of the IMJSC by merger of the current operators of the largest LPAs.

for the first disbursement. The LPA of Cania who will contribute the plot of land for the regional installations will also sign the Project Support Agreement¹⁹.

Other smaller LPAs in WMZ-1 that decide not to transfer the waste collection and transportation services from the existing operators to the regional operator will have to pay the gate fee for the use of the regional infrastructure until they decide in favour of such transfer of services.

The key stakeholders will have the following responsibilities:

1. The **IFIs**:

- a. Provide the investments in the form of sovereign loans designated as payments to the suppliers of works, goods and services for the regional MSW infrastructure and for the MSW collection;
- b. Mobilize(s) investment grants (from donors to be identified by the IFI(s)) and technical assistance funds designated for the project implementation support and corporate development offer(s) respective grant agreements to the MoF or MoEnv.

2. The **MoF or MoEnv**:

- a. Committing the respective Tranche of the EBRD Loan Agreement (i.e. Tranche III in relation to WMZ 1)²⁰ and the On-Granting (or On-Lending, if the MoF decides so) Agreement relative to the transfer of the right of use of the assets resulting from the on-granted funds to the Beneficiary (the IMJSC) so that the loan is repaid from the state budget. The transfer of the right of use of assets related to on-granting is described in Section 3.2 above;
- b. Ensures the portion of the grant funds – if available - to be contributed from the national budget etc. (other than the investment grant component to be mobilized by the IFIs, per point 1 (b) above);
- c. Signs the grant agreements for the project implementation support and corporate development, offered by the IFIs, per point 1 (b) above.

3. The **EPIU (which is subordinated to the MoEnv)** is in charge of the following:

- a. Acts as the Contracting Authority for the works, goods and services, launches open international tenders, awards contracts to the suppliers of works, goods and services²¹;
- b. Selects and co-signs contracts with qualified providers of works, goods and services, performing under the following contracts: PIU/Implementation Support, Construction Works and Supplies, Construction Supervision (also referred to as "supervision"), as well as the Corporate Development and Stakeholder Participation Programme (CDSPP), and involves the IMJSC and representatives of the LPAs in the tender commission;
- c. Undertakes general and financial Project management, procurement and reporting, coordinates the implementation of Projects in all regions;

¹⁹ Signing the PSA by Cania will not be required, if at the moment of signing the plot of land for the regional installations will have been transferred to the State ownership.

²⁰ In anticipation that the EBRD Loan Agreement (between EBRD and Republic of Moldova) for the full loan amount of EUR 25 million (for investments in all three WMZs) would be signed before the end of 2022; in relation to the Tranche related to investments in WMZ 1 (i.e. Tranche III of EBRD loan) only the Conditions Precedent for the Commitment of this Tranche should be fulfilled (including the condition that the Final Report hereto has been accepted/approved by the MoEnv and the Key LPAs and after the Moldovan authorities have provided EBRD with a commitment request in this respect).

²¹ These competencies are awarded to the EPIU by Decision of the Government of Moldova No. 1249 of 19/12/2018 on organization and performance of the EPIU.

- d. Prepares and submits to the IFIs the disbursement requests for the Project implementation so that the payments to the suppliers of works, goods and services are transferred in a timely manner;
 - e. Administers the contracts, reports to the IFI according to the agreed procedure, involves the Beneficiary in the reporting process, so that the information and data related to the Project implementation is collected from the regions and presented in a timely manner;
 - f. Conducts Project monitoring, maintains procedures, records and accounts adequate to monitor Project implementation progress according to the implementation schedules;
 - g. Cooperates with the Beneficiary on all Project-related matters to ensure that the quality and speed of Project implementation is satisfactory to the IFIs;
 - h. Procures all Project deliverables (assets) to the LPAs' and State ownership, undertakes all actions necessary so that the right of use of the deliverables (assets) is transferred to the Beneficiary;
 - i. Undertakes all actions necessary so that the user charges of the required level are calculated and adopted by each LPA on time;
 - j. Undertakes all actions necessary so that all Public Service Contracts are entered between the LPAs and the Beneficiary to ensure the delivery of services of the required quality;
 - k. Undertakes all actions necessary so that the LPAs adopt SWM plans and rules to ensure the required service coverage, the diversion of MSW from the former dumpsites to the regional installations and the required behaviour of the MSW generators (delivery of the MSW to the designated locations, payment for the SWM services).
4. The **IMJSC** is established by four LPAs of Cahul Town, Cantemir Town, Comrat Town and Taraclia Town as a new legal entity to be in charge of the following:
- a. Signs the PSA to commit to the below described responsibilities;
 - b. Signs the On-granting Agreement referred to in 2a;
 - c. Takes part in the tender commission and acts as the co-signatory to the Contracting Authority as per 3a and 3b above.
 - d. Acts as the Beneficiary for Project implementation, cooperates with the EPIU on all Project related matters, such as the selection of suppliers of works, goods and services, to ensure that the quality and speed of Project implementation is satisfactory to the IFIs, delivers to the EPIU the information and data related to the Project implementation and required for the reporting in a timely manner, according to the implementation schedules;
 - e. Co-signs the contracts referred to in 3b above and cooperates with the providers of works, goods and services awarded these contracts, in particular, with the CDSPP consultant, implements recommendations thereof, including the implementation of the ESAP;
 - f. Undertakes gradual scheduled acceptance by the right of use and operation of the Project deliverables (assets) designated for the regional SWM infrastructure, MSW collection and transportation to the regional installations;
 - g. Enters into Public Service Contracts with LPAs, calculates the Gate Fees, calculates the user charges for the LPAs, drafts plans, regulations, undertakes other tasks assigned by the LPAs.
5. The four largest **LPAs (LLPAs)** of Cahul Town, Cantemir Town, Comrat Town and Taraclia Town undertake the following responsibilities:
- a. Sign the PSA to commit to the below described responsibilities;
 - b. Sign the On-granting Agreement referred to in 2a relative to the ownership and the transfer of the right of use of the assets resulting from the on-granted funds to the Beneficiary (the IMJSC). The transfer of the right of use of assets related to on-granting is described in Section 3.2 above;

- c. Enter into the inter-municipal cooperation agreement (IMCA), with a possibility for other LPAs to join in;
 - d. Establish the IMJSC, as a new legal entity, as the Beneficiary for Project implementation, to be in charge of the regional infrastructure, the MSW collection and transportation; for this purpose, form the authorised capital of at least 600,000 MDL (or any other additional amount that may be required for the purpose of completing the establishing of the IMJSC), divided among 4 founders, form the management bodies, employ the staff required for the management under the laws and for the purposes of project implementation, provide approvals to the development into a sustainable fully operational regional company providing the SWM services to the LPAs of WMZ-1;
 - e. Finance the activities of the IMJSC listed under point 4, before the start of its envisaged operational activities once the project financed infrastructure is available;
 - f. Co-sign the contract for the CDSPP and cooperate with the CDSPP consultant, implement recommendations thereof;
 - g. Accept the Project deliverables (assets) designated for the regional infrastructure and the MSW collection/transportation;
 - h. Upon commissioning of the regional installations, terminate their PSCs for SWM services with their current SWM operators and enter into Public Service Contracts with the IMJSC, make payments accordingly;
 - i. Develop, adopt and implement the local SWM plans and rules to ensure the required service coverage, the diversion of MSW from the former dumpsites to the regional installations and the required behaviour of the MSW generators;
 - j. Adopt user charges to a cost recovery level, calculated according to the best available international practices and the calculations model used by the CDSPP consultant and/or according to the methodology²² in force at that moment for calculation of user charges;
 - k. Arrange for the collection of the user charges, set the required billing systems, enter into agreements for administration and collection of charges.
6. **Other LPAs** undertake the following:
- a. Cania from Cantemir Rayon sign the PSA to commit to providing the land and permits and any other contributions as required for the project implementation²³;
 - b. Enter into the IMCA, based on the local council's decisions;
 - c. Enter into Public Service Contracts with the IMJSC, regardless of participation in the IMCA (those LPAs who maintain their MSW collection and transportation services and refrain from the IMCA, sign the PSCs for MSW acceptance at regional installations);
 - d. Adopt user charges of the level required to settle payments for the SWM services according to the PSCs (based on the decision of the shareholders, the gate fee may be higher for the LPAs who refrain from the IMCA);
 - e. Arrange for the collection of user charges.

²² In the period of the report preparation, the methodology for calculation of user charges was developed with the support of the USAID-funded program "Comunitatea Mea". The methodology was to be adopted by the Government decision, but the date was not clear.

²³ Signing the PSA by Cania will not be required, if at the moment of signing the plot of land for the regional installations will have been transferred to the State ownership.

Table 17 List of contracts to be signed and their signatories

No.	Title of the contract/document	Signatories
1.	Loan Agreements	> IFIs > MoEnv or MoF
2.	On-Granting Agreement (Assuming no On-Lending in this Project)	> MoEnv or MoF > LLPAs > IMJSC
3.	Project Support Agreement	> EBRD > LLPAs (Cahul, Cantemir, Comrat, Taraclia) > Cania LPA (if the land has not been transferred to the state ownership at the moment of signing the PSA) > IMJSC
4.	CAPEX Grant Agreement (if mobilized by IFIs)	> EBRD > MoEnv or MoF
5.	Grant Agreement for PIU/Implementation Support and Construction Supervision	> EBRD > MoEnv or MoF
6.	Grant Agreement for Corporate Development and Stakeholder Participation Programme (CDSPP)	> EBRD > MoEnv or MoF
7.	PIU/implementation Support consultancy contract	> EPIU (MoEnv) > IMJSC > Provider of services / Consultant
8.	Corporate Development and Stakeholder Participation Programme (CDSPP) consultancy contract	> EPIU (MoEnv) > IMJSC > LLPAs > Provider of services/Consultant
9.	Works, goods and services contracts	> EPIU > IMJSC > Provider(s) of works, goods and services
10.	Inter-municipal Cooperation Agreement	> LPAs
11.	Public Service Contracts between the IMJSC and LPAs (as soon as the regional infrastructure is commissioned)	> IMJSC > LPAs

The institutional set-up for Model 1 is presented in Figure 11 overleaf.

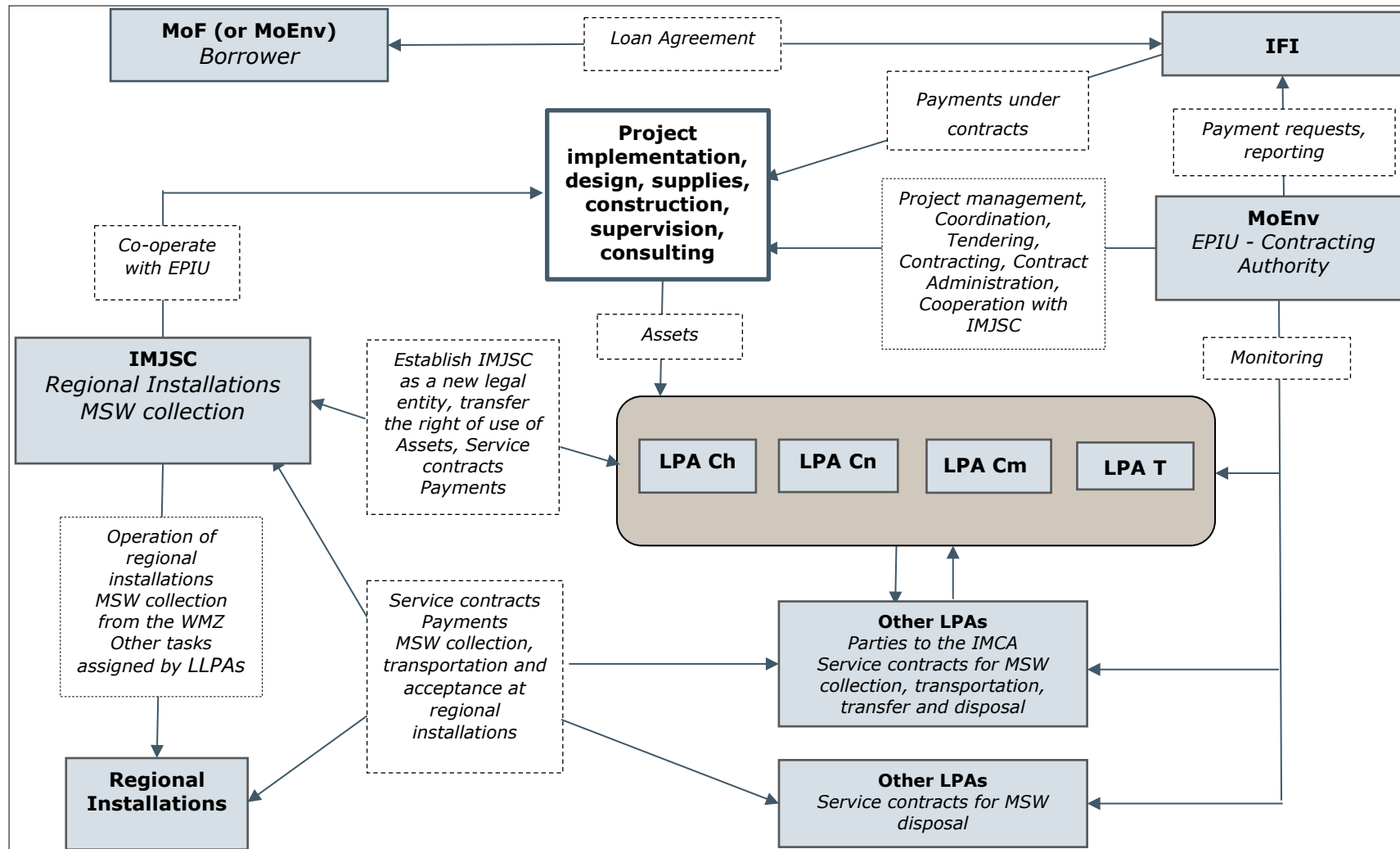


Figure 11 Institutional set-up Model 1

3.5.3 Roadmap for implementation of institutional set-up Model 1

The roadmap for implementation of the preferred institutional set-up Model 1 is presented in Table 18 below.

Table 18 Roadmap for implementation of the preferred institutional set-up model

No	Activity/steps	Timeline	Responsible
1.	Finalisation of the GAP analysis	According to the contract	COWI
2.	Decisions of LPAs to participate in the project as outlined in the FS, the updated FS, and the GAP analysis including the following: > The package of documents sent to the LPAs and follow-up by the MoEnv (EPIU); > Mayors arrange the municipal councils' sessions with the topic on the agenda and send the council decisions back to the MoEnv.	4-6 weeks	> MoEnv (EPIU) > LLPAs
3.	Establishment of the IMJSC (regional operator): > Developing the draft founding documents (statute, contract among founders) by the lawyers and/or external consultants of the LPAs, as the founders; > Arrangement for the council meetings with the establishment of the IMJSC on the agenda; > Approval by the municipal councils of the LPAs (founders) of the decision to establish the IMJSC, including the founding documents and the contribution to the capital of the IMJSC, as well as the authorization to one representative (LPA) to deal with the formalities required for the registration; > Registration of the IMJSC at ASP (Agency for Public Service); > Other administrative operations (opening accounts, seal, making contributions to the authorized capital etc).	4-6 months	> LLPAs
4.	Transfer of the plots of land for the regional installations to the State ownership	2 months	> LPAs of Cahul, Cantemir, Comrat, Taraclia and Cania
5.	Existing operators continue to provide SWM services as usual until the regional infrastructure is commissioned	Until the regional infrastructure is commissioned	> LLPAs > Existing operators
6.	Committing the respective Tranche of the EBRD Loan Agreement (i.e. Tranche III in relation to WMZ 1)	In anticipation that the EBRD Loan Agreement (between EBRD and Republic	> EBRD > MoEnv or MoF

No	Activity/steps	Timeline	Responsible
		of Moldova) for the full loan amount of EUR 25 million (for investments in all three WMZs) would be signed before the end of 2022; in relation to the Tranche related to investments in WMZ 1 (i.e. Tranche III of EBRD loan) only the Conditions Precedent for the Commitment of this Tranche should be fulfilled (including the condition that the Final Report hereto has been accepted/approved by the MoEnv and the Key LPAs and after the Moldovan authorities have provided EBRD with a commitment request in this respect).	
7.	Signing of the Project Support Agreement (PSA)	Upon signing of the Loan Agreement	> EBRD > LLPAs (Cahul, Cantemir, Comrat, Taraclia) > Cania LPA²⁴ > IMJSC
8.	Signing of the On-Granting Agreement (based on the assumption that on-lending will not apply)	Upon signing of the Loan Agreement	> MoEnv or MoF > LLPAs > IMJSC
9.	Signing of the CAPEX Grant Agreement (if mobilized by IFIs)	Upon signing of the Loan Agreement	> EBRD > MoEnv or MoF >
10.	Signing of the TC Grant Agreement for PIU/Implementation Support and Construction Supervision	Upon signing of the Loan Agreement	> EBRD > MoEnv or MoF > IMJSC
11.	Signing of the TC Grant Agreement for the CDSPP	Upon signing of the Loan Agreement	> EBRD > MoEnv or MoF > IMJSC
12.	Tendering and contract award for PIU/Implementation Support and Construction Supervision	4-6 months	> EPIU (MoEnv) > IMJSC > Provider of services
13.	Tendering and contract award for CDSPP	4-6 months	> EPIU (MoEnv) > IMJSC

²⁴ Signing the PSA by Cania will not be required, if at the moment of signing the plot of land for the regional installations will have been transferred to the State ownership

No	Activity/steps	Timeline	Responsible
			> LLPAs > Provider of services
14.	Tendering and contract award for construction works	6-8 months	> EPIU (MoEnv) > IMJSC > LLPAs > Provider of works
15.	Tendering and contract award for procurement of goods	4 months	> EPIU (MoEnv) > IMJSC > LLPAs > Provider of goods
16.	Implementation of the contracts listed in 12-15 above	The timeline is indicated in the Ref. the PIP (Section 2.4.2.)	> MoEnv (EPIU) > IMJSC > Providers of works, goods and services > LPAs (approvals and similar input)
17.	Signing of the Inter-municipal Cooperation Agreement (IMCA), including the schedule for adjustment of user charges, by the LPAs of WMZ-1: > Completing the draft IMCA (based on commitments listed in Section 3.5 below); > Meetings with the LPAs of WMZ, to promote the IMCA; > Approval of the IMCA by the local councils; > Signing of the IMCA by all or the majority of the LPAs.	6-12 months (as part of the CDSPP)	> CDSPP Consultant > LPAs > IMJSC (calculations, development of the schedule)
18.	Commissioning of the regional infrastructure	1 month upon completion of construction works	> Contractor > IMJSC
19.	Decisions and regulations/enforcement required to interdict the use of dumpsites in all LPAs: > Circular/decision/information letter from the MoEnv; > Local regulations adopted by the local councils; > Enforcement and inspections from the relevant state agencies to ensure that the waste is not disposed at the existing dumpsites.	Enforce once the regional infrastructure is commissioned	> MoEnv > LPAs > Relevant deconcentrated state agencies²⁵

²⁵ According to the public administration system of Moldova, the deconcentrated services or deconcentrated agencies are specialized institutions of the central public administration located in the territory, subordinated to ministries and other central public authorities (see also Article 31 of Law No. 98/2012 on central specialized public administration). In this case, several deconcentrated services may have a role, such as the territorial offices of the State Chancellery in providing the necessary methodological support, the Environment Protection Inspectorate in controlling and enforcing decisions etc.

No	Activity/steps	Timeline	Responsible
20.	Development and approval of the Public Service Contracts (PSCs) and calculation of user charges: > Developing draft PSCs > Discussion of PSCs with relevant LPAs to achieve approvals of municipal councils > The earliest possible decisions of municipal councils regarding the PSCs	6-12 months from the moment the CDSPP consultant is contracted	> CDSPP consultant > LPAs > IMJSC
21.	Signing of the PSCs and transfer of assets: > The SWM services provided by the existing operators of 3 LPAs²⁶ are automatically transferred to the regional operator (IMJSC) and PSCs between the LPAs and the IMJSC are signed. > Municipal council decisions of other relevant LPAs regarding the PSCs with the IMJSC, signing PSCs with the IMJSC and transfer of SWM related assets thereto. > The right of use of other regional infrastructure, such as the landfills, transfer and sorting station owned by the state (represented by the Public Property Agency) will be transferred to the IMJSC.	Two months upon commissioning of the regional infrastructure	> LPAs > Other LPAs interested in using the services of the IMJSC > IMJSC > Existing operators > CDSPP consultant
22.	Other LPAs who maintain their MSW collection and transportation services sign the PSCs with the IMJSC for MSW acceptance at the regional installations.	Two months upon commissioning of the regional infrastructure	> LPAs²⁷

3.6 The PSA and the IMCA

As described above, the key documents that should include the obligations and commitments of the LPAs should be signed by the relevant LPAs are the Project Support Agreement (PSA) and the Inter-municipal Cooperation Agreement (IMCA).

The PSA is a prerequisite for the loan disbursement and will be signed between the EBRD and the key stakeholders listed above, namely, the LLPAs and the IMJSC (if the IMJSC is established before signing the PSA). In general terms, the responsibilities of the key stakeholders listed above will form the basis for the covenants of the PSA. The PSA will be co-signed by the LPAs (LPAs of Cahul Town, Cantemir Town, Comrat Town and Taraclia Town) who will establish the IMJSC to undertake Project implementation and operation of the future regional SWM system. Some of the regional installations will be located on the territory of the LPA of Cania, so this LPA will also sign the PSA to ensure the availability of the land plot for the future regional installations and to commit to transfer the ownership of the land plots to the state. Signing the PSA by Cania will not be required, if at the moment of signing the plot of land for the regional installations will have been transferred to the State ownership. The key commitment of the LPAs will be the transfer of the SWM related assets from the current operators to the IMJSC, as soon as the regional SWM installations are commissioned, as a result of the Project.

²⁶ The operators whose SWM related services and assets are taken over by the IMJSC, continue their activities in the fields other than SWM (road maintenance, street lighting, etc.).

²⁷ Those LPAs that continue providing waste collection and transportation services through their existing operators, use the MSW disposal services of the IMJSC and pay the gate fee.

The IMCA is recommended for the purposes of involving as many LPAs as possible in the regional SWM system and committing the LPAs to adopt the user charges of the required level to achieve the cost recovery. Smaller LPAs will have to use the regional SWM installations and upon commissioning thereof should sign the IMCA, make their input in the regional SWM system and use the services of the IMJSC only. Those LPAs who will still maintain their MSW collection services will have to cope with considerably longer MSW transportation distances and will pay the gate fee for waste acceptance at the regional installations. The recommendations on setting the user charges and respective loan covenants are presented in Chapter 3.3 above.

The recommended obligations and commitments of the concerned LPAs under the PSA and the IMCA are summarized in Table 19.

Table 19 Recommended obligations and commitments of the concerned LPAs under the PSA and the IMCA

#	Obligations and commitments of LPAs	PSA: obligations of largest LPAs	PSA: obligations of LPA of Cania	IMCA for as many LPAs as possible
1	Implement the future Project, accept the right of use of the deliverables (assets) designated for the regional SWM system	✓		✓ (LLPAs)
2	Establish the IMJSC for the purposes of the project implementation and the operation of the regional SWM system	✓		✓ (LLPAs)
3	Transfer from the current operators to the IMJSC the right of use of the SWM related assets upon commissioning of the SWM infrastructure	✓		✓ (LLPAs)
4	Use the regional SWM system and the services of the IMJSC based on the Public Service Contracts upon commissioning of the SWM infrastructure	✓	✓	✓ (All)
5	Mutually provide assets, including land ²⁸ , human resources and knowledge to the joint implementation of the regional SWM system, including MSW collection, transportation and recovery on the administrative territories of the LPAs	✓	✓	✓ (All)
6	Not establish or operate any other SWM systems or related services on the administrative territories of the LPAs, if	✓	✓	✓ (All)

²⁸ Specifically, the agreements should include the commitment of the LPA of Cania to provide the plot of land for the regional installations, except for the earlier transfer of the plots of land to the State ownership.

#	Obligations and commitments of LPAs	PSA: obligations of largest LPAs	PSA: obligations of LPA of Cania	IMCA for as many LPAs as possible
	these services are provided by the IMJSC			
7	Adopt the SWM charges calculated to cover the costs of the regional SWM system according to the adopted methodology and/or best available practices, as assisted by the CDSPP Consultant (the schedule for the adjustment of user charges will be attached to the IMCA)	✓	✓	✓ (All)
8	Delegate to the IMJSC the responsibility to draft and implement the regional SWM plans and calculate the SWM charges to cover the costs of the regional SWM system according to the adopted methodology and/or best available practices, as assisted by the CDSPP Consultant			✓ (All)
9	Establish the required billing systems or delegate the billing to the IMJSC based on service agreements	✓	✓	✓ (All)
10	Ensure the required level of regulation and enforcement of the SWM system on the LPAs' territories and the availability of the SWM services to all citizen	✓	✓	✓ (All)
11	Establish the inter-municipal working group to coordinate and support the regional SWM planning, the calculation and setting of charges, seeing to it that the LPAs meet their commitments etc.			✓ (All)
12	Join forces to seek and acquire grants, soft loans and other funds to ensure the sustainable system development			✓ (All)

The final wording of the obligations and commitments of the LPAs will be elaborated and included in the agreements as applicable. The covenants of the PSA will be proposed by the EBRD.

The final version of the IMCA will be developed on the basis of the above listed obligations of LPAs and offered for signing to all LPAs of WMZ-1 with the assistance of the CDSPP Consultant. As many LPAs as

possible will be provided an opportunity to join the IMCA and use the services of the IMJSC for a reduced fee²⁹.

3.7 Public Service Contracts

Under the country laws, Public Service Contracts (PSCs) apply for the delegation of public service management to public and/or private operators by national or local authorities. The PSCs shall be awarded on the basis of the public procurement rules set forth in applicable laws³⁰. The only exception are the publicly owned companies of the water supply sector (WSS). The laws allow direct award of PSCs to the public WSS companies with the majority of public capital. In practice, PSCs are also awarded to other publicly owned companies, however, this is against public procurement rules.

For the purpose of direct delegation of services (award of PSCs free of public tendering) to the IMJSC, the amendment to the Law on Public Communal Services is required to exempt inter-municipal (regional) companies established in the waste management zones from the public procurement rules. According to the information received from the MoEnv, such draft amendment is elaborated and is under consideration by the national authorities. The fees defined in the PSCs will be calculated to ensure the cost-recovery of the IMJSC's operation.

The following PSC undertakings will be required:

- > To ensure that the regional installations are operated according to proper operational and environmental standards – the PSC between the Public Property Agency representing the state as the owner of the regional installations and the IMJSC for MSW disposal and operation of regional installations according to environmental and technical standards and requirements, rules of MSW acceptance at the regional installations, payment details, penalties, other responsibilities and obligations of the parties.
- > To ensure the required quality standards of the MSW collection services and the operation of the delivered containers and vehicles – the PSC between all LPAs and the IMJSC for MSW collection and transportation defining the service area, the collection routes, designated regional installations, specification of services, collection frequency, collection hours, type of equipment, payment details, penalties, other responsibilities and obligations of the parties.

The future Corporate Development and Stakeholder Participation Programme (CDSPP) should include the development of the template PSCs applicable to the above services, including the billing for these services.

3.8 Capacity Building

The capacity building relevant to the project implementation and management/operation of the regional SWM infrastructure will be provided for the IMJSC, the EPIU (ME) and the LPAs. Two technical assistance projects will be launched for this purpose: (1) PIU/Implementation Support and Construction Supervision (also referred to as PIU Support) and (2) Corporate Development and Stakeholder Participation Programme (CDSPP). The scope of these projects is presented in Section 6.2.3.

²⁹ In case of paying a gate fee, the VAT applies, while the user charges collected directly by the regional operator are VAT exempted.

³⁰ Art. 21 of Law 1402/2002 on public communal services.

The EPIU (MoEnv) has the experience and tools (compatible software and hardware etc.) required for the tendering and general project management. Tendering will be handled via the EBRD's procurement portal ([EBRD Client E-Procurement Portal - w](#)). Due to the project related workload, the need for the following additional staff of the EPIU is anticipated: (1) Project Manager, (2) Procurement Expert.

The beneficiary (IMJSC) will be established before any disbursements from the Loan Agreements are made and the project is initiated. In addition to the executive staff required under the company laws (e.g. the Director), the IMJSC will have to recruit the staff whose competencies will enable the cooperation with the EPIU (MoEnv) on the tasks related to the implementation of the project (ref. table below). For the project implementation period it is recommended to recruit the staff qualified and experienced to conduct both, the administrative tasks and the project related tasks. For the start of the project related activities, the following staffing needs of the Beneficiary are anticipated: (1) Project Manager, (2) Civil Engineer.

The project related tasks to be undertaken by the staff of the EPIU and the IMJSC are described in Table 20 and are recommended as the basis for the future job descriptions.

Table 20 Draft task descriptions of the project related staff of the EPIU (MoEnv) and the Beneficiary (IMJSC) for WMZ-1 for Project implementation.

Entity	Position	Job descriptions
EPIU (MoEnv) Contracting Authority	Project Manager (EPIU)	> Represent the EPIU as the Contracting Authority in the process of planning, execution, monitoring, control and closure of the Project, act as liaison with the Beneficiary and with the suppliers of works, goods and services. > On behalf of the Contracting Authority, take part in the tender evaluation process and selection of the best offer as a member of the evaluation commission, as well as in the negotiations, if any, and in the contracting process. > Involve the representatives of the IMJSC and of the LPAs in the tender evaluation and contracting process. > Issue disbursement requests pursuant to the requirements of the IFIs. > Cooperate with the IMJSC and with the suppliers of works, goods and services, take part in the preparation of relevant Project documents, discussions, meetings, training events and similar activities. > Conduct financial monitoring of the Project for the purpose of fund allocation in a sound and economical manner, including the requirements of the IFIs. > Issue payment orders for the works completed and services provided under the contracts for Project implementation (in cooperation with the Project Manager (IMJSC), Procurement Expert and Civil Engineer). > In cooperation with the Construction and Procurement Expert and the IMJSC, develop and submit to the IFIs the required reports and information, including physical progress accomplished in the implementation of the Project to the date of the report and during the reporting period, actual and expected difficulties or delays in the implementation of the Project,

Entity	Position	Job descriptions
		matters that may affect the cost of the project, any other matters required by the IFIs.
	Procurement Expert	> On behalf of the Contracting Authority, manage all aspects of the procurement processes for the selection of the suppliers of works, goods and consultancy services required for the Project implementation. > In cooperation with the Civil Engineer and external consultants, develop technical specifications and tender documents for the supplies and construction works, monitor due implementation of the procurement plan to ensure contracting according to the schedule required for smooth Project implementation. > In cooperation with the external consultants, develop Terms of Reference and Request for proposal for the consultancy services required under the Project, monitor due implementation of the procurement plan to ensure contracting according to the schedule required for smooth Project implementation. > Monitor and see to it that the tender documents and request for proposal meet the requirements of the laws of Moldova and the Procurement Policies and Rules of the Lead IFIs. > On behalf of the Contracting Authority, take part in the tender evaluation process and selection of the best offer as a member of the evaluation commission, as well as in the negotiations, if any, and in the contracting process. > Monitor and check on behalf of the Contracting Authority that the providers of works, goods and consultancy services delivered under the Project meet the requirements defined in their contracts. > Administrate all the contracts financed under the project. > Make relevant input in the reports to the IFIs issued by the Project Manager (EPIU) on the project progress.
IMJSC Beneficiary	Project Manager (IMJSC)	> Represent the Company as the Project Beneficiary in the process of planning, execution, monitoring, control and closure of the Project, act as liaison with the EPIU (MoEnv) and with the suppliers of works, goods and services. > Liaison with the approving, permitting and any other relevant authorities to facilitate the process of approval, permitting and decision making, if required for the purpose of smooth Project implementation. > Liaison with the external consultant in relation to inter-municipal cooperation, be proactive in the process of development of the IMCA, presentations of the draft IMCA to the LPAs of the region to achieve the involvement and signing of the IMCA by all or as many LPAs as possible. > On behalf of the IMJSC, take part in the tender evaluation process and selection of the best offer as a member of the evaluation commission, as well as in the negotiations, if any, and in the contracting process. > Cooperate with the EPIU and with the suppliers of works, goods and services, take part in the preparation of relevant Project

Entity	Position	Job descriptions
		documents, discussions, meetings, training events and similar activities, provide all documents, materials and other information of the IMJSC relevant to their work. > Follow up on the delivery of Project outputs according to the implementation schedules of suppliers of works, goods and services. > Accept/comment on related reports, issue official letters and other relevant documents as required for successful implementation of the Project, arrange for proper filing and access of Project documents. > Initiate the calculation of user charges according to the calculation methodology, planning and implementation of improvements in the billing system, involve the LPAs in the process. > Make relevant input in the reports to the IFIs issued by the Project Manager (EPIU) on the project progress.
	Civil Engineer	> Liaison with the Contracting Authority (EPIU) for the purpose of development of technical specifications and tender documents for the supplies and construction works, monitor due implementation of the procurement plan to ensure contracting according to the schedule required for smooth Project implementation. > On behalf of the IMJSC, take part in the tender evaluation process and selection of the best offer as a member of the evaluation commission, as well as in the negotiations, if any, and in the contracting process. > Monitor and check on behalf of the IMJSC that the works, goods and services under the contracts meet the requirements defined in technical specifications / contracts. > Liaison with the external Technical Supervision Engineer in the matters related to the construction supervision, monitor the performance of the construction works on behalf of the IMJSC and check the quality and compliance to the contract/technical specifications and the laws and standards of Moldova. > Make relevant input in the reports to the IFIs issued by the Project Manager (EPIU) on the project progress.

Based on the best available practice from the implementation of similar projects in other countries, the above staffing (one full-time staff per each position) is deemed sufficient for project implementation over the entire duration of the project in WMZ-1. Overstaffing is not recommended. It is anticipated that the above-proposed staff, regardless of the employment in the EPIU or in the IMJSC, will cooperate and share the above-described responsibilities. Under certain circumstances (e.g., scarce supply of required expertise on the labour market), the above tasks may be reallocated among some part-time staff. The key objective is to have the staff sufficiently qualified to cover all the above tasks.

It is anticipated that the staff of the EPIU will be employed by the time the first tasks should be implemented, namely, the tendering and award of consultancy contracts for the (1) PIU/Implementation Support and Construction Supervision and (2) Corporate Development and Stakeholder Participation Programme (CDSPP). Standard Terms of Reference (ToR) for these consulting contracts will be provided

by the EBRD. The Project Manager (EPIU), as overall responsible for the project management on behalf of the EPIU and the Procurement Expert (EPIU) responsible for all procurement related processes and monitoring should be available at the EPIU to launch the above tenders and to award the contracts.

The IMJSC will be a co-signatory of the above contracts (PIU support and CDSPP), as well as of other contracts required for Project implementation (see the responsibility descriptions in 3.5.2 above). Therefore, the earliest involvement of the above defined PM of the IMJSC is also required. The Civil Engineer (IMJSC) will be involved so that he/she is available to take part in the development of technical specifications and tender documents for the supplies and construction works.

The PIU Support Consultant will provide professional project management and implementation assistance to the project management/implementation staff of the EPIU and of the IMJSC, namely, to the tasks described in Table 19 above. Specific tasks of the Consultant will be defined in the ToR and in the Contract for PIU/Implementation Support and Construction Supervision. The project management/implementation staff will closely cooperate with the PIU Support Consultant.

The CDSPP Consultant will not deal with project implementation. In cooperation with the available staff of the IMJSC and with the representatives of the LLPAs, the CDSPP Consultant will, inter alia, elaborate and implement the organizational structure and the staffing plan of the IMJSC to ensure smooth start of the operational activities upon commissioning of the regional installations and the delivery of equipment. Upon establishment, the IMJSC will have the management bodies, including the Director. For the purpose of project implementation, it is recommended to have the Director's responsibilities combined with the responsibilities of the Project Manager described in the table above. Undertaking of the above-described tasks of the Project Manager (IMJSC) by the Director would facilitate approvals, decision-making, liaison with the key stakeholders required for smooth project implementation.

The above-mentioned staffing plan to be developed by the CDSPP Consultant will provide basis for the scheduled employment of the staff to be involved in the future operational activities of the IMJSC. It is anticipated that the employment of the above-described staff will be followed by that of the Social and Environmental Expert who will cooperate with the CDSPP Consultant in the development and implementation of the Environmental and Social Action Plan (ESAP). The Social and Environmental Expert will be the potential future Environmental Manager of the IMJSC who will monitor the environmental compliance of the operations. Similarly, based on the recommendations of the CDSPP Consultant, the financial staff will be employed and measures will be implemented for the accounting, budgeting, financial management, tariff calculations, revenue collection etc. The CDSPP will include all other aspects of operation of the IMJSC, such as corporate development, operational efficiency, public and customer relations, capacity building etc.

More details on the scope of the PIU Support and the CDSPP are presented in Section 6.2.3.

4 Financial analysis

4.1 Update and adaptation of the financial model

The available financial models were not prepared in accordance with the recommended FAST methodology. To that end, the financial model was updated under this Project in order to test the assumptions in those models in a transparent format. The updated financial model contains the following sheets, organised by type:

- > Introduction sheets – tabs marked in green, including:
 - o Cover: showing a guide of all tabs and cell colour codes;
 - o Dash: main dashboard to select inflation scenario and view main results.
- > Input sheets – tabs marked in yellow, including:
 - o Input-Con: input of the constants used in the model;
 - o Input_S_Demand: input of data series for demand for waste management services, including: population, waste generation (the same for both the “with” and “without” project scenarios), waste collection (different for the “with” and “without” project scenarios), average disposable income per capita, and emissions from the GET analysis. Series input data cover 2020-2047;
 - o Input_S_CAPEX: input of data series for capital expenditures for 2020-2045 for both the both the “with” and “without” project scenarios. The priority investment programme (PIP) is specified in this sheet;
 - o Input_S_OPEX: input of data series for operating expenditures for 2020-2045 for both the both the “with” and “without” project scenarios;
 - o Input_S_Rev&Fin State: input for the data series for the financial statements. Here, the current data are input, which in turn are used as a starting point for the future SWM system.
- > Intermediate or calculation sheets – tabs without colour. These sheets provide a clear presentation of important information used to follow the logic of the financial model, including:
 - o Waste flow – summary presentation of waste flows by municipality and facility;
 - o Waste flow 2027 – schematic of waste flows by municipality and facility;
 - o Waste flow 20 years – schematic of waste flows by municipality and facility, 20-year averages;
 - o Depreciation – calculation of gross value, depreciation, and net value of SWM system assets;
 - o OPEX – a concise presentation of the operating costs of the resulting SWM system;
 - o Financing – presenting the four proposed financing sources: Government of Moldova, EBRD, EIB, and an international capital grant;
 - o Concessionality – presenting the life-cycle costs of CO₂ reductions.
- > Output sheets – tables marked in blue, including:
 - o Results – showing the main project results;
 - o Summary – showing summary of project results in EBRD format;

- o Financial Analysis Summary – Result sheet for EBRD: operator financial statements, DSCR, financial ratios - in EBRD format;
- o Financial Analysis Summary 2 – Result sheet for EBRD: key drivers, financial statements, ratio analysis - in EBRD format;
- o Project – showing the charges for the proposed solid waste management system;
- o Without project – showing the charges and revenues for the SWM system without the proposed project;
- o Affordability - Calculation and result sheet showing the charges calculation and affordability. Revenues required to cover the costs of service provision. Includes graph showing affordability and sustainability of charges. Includes gate fee for LPAs not immediately participating in SWM system;
- o Fin ratios – showing the calculation of the financial project effectiveness indicators. This includes:
 - ☐ Funding gap (minimum grant financing required, calculated by comparing the incremental costs and revenues of the ""with"" and ""without"" project scenarios;
 - ☐ NPV: net present value of the project, including all financing;
 - ☐ IRR: internal rate of return of the project, including all financing.
- o EIRR – showing the calculation of the economic (social) project effectiveness indicators: This includes:
 - ☐ ENPV: economic (social) net present value of the project;
 - ☐ EIRR: economic (social) rate of return of the project;
 - ☐ BCR: benefit-cost ratio.
- o S – showing the sensitivity analysis. The analysis tests the outcomes of the financial and economic project effectiveness indicators in response to changes in critical variables.
- o Risk analysis FNPV - Using a Monte Carlo simulation, finds the probability distribution that FNPV will be higher than zero (0) - and thus how likely it is that the project will be financially sustainable, with revenues exceeding costs. NOTE: a negative FNPV does not necessarily indicate that a project is not sustainable.
- o Risk analysis ENPV – Using a Monte Carlo simulation, finds the probability distribution that ENPV will be higher than zero (0) - and thus how likely it is that the project will be socially sustainable with societal benefits exceeding societal costs.

4.2 Model inputs

The model inputs include the following, with explanations:

- > *Model constants.* This includes among others discount rates, depreciation rates, and financing terms.
- > *Demand.* This includes a population forecast and forecast of waste generation. Data on projected solid waste collection together with a forecast of average disposable household income per capita are also included in these inputs.

- > **Investment costs (CAPEX).** The investment costs are as detailed in the LTIP and PIP (see Chapter 2.4).
- > **Operating costs (OPEX).** The starting point for the operating costs were those costs available in the existing financial model and as in Chapter 2.4. OPEX are presented in the sheet "OPEX," which shows operating costs for 2020-2045. In 2027, operating costs increase significantly (from about EUR 885,000 annually to just over EUR 3.3 million per year for the following reasons:
 - o Increase in waste collection service coverage. In the original model, and in accordance with the project assumptions, waste collection coverage should increase from about 58% of total waste generated in WMZ-1 to about 97% once the regional waste management system is operational;
 - o Increase in door-to-door waste collection. As recommended and agreed with the EIB, door-to-door waste collection should be implemented and more widespread compared to the original waste collection system. This is in contrast to a common approach in Moldova using centralised or neighbourhood bins to which individual households bring waste.
- > **Financial statements.** The past financial statements of the existing SWM service providers serve as the starting point for the regional company.

4.3 Assumptions discussed and agreed with stakeholders

The following table presents model assumptions of interest to stakeholders.

Table 21 Financial model assumptions presented and agreed with stakeholders

Assumption category	Location in financial model	Responsible stakeholders
Waste generation volume	"Input_S_Demand" Tab, row 75	6 LLPAs, JSC regional SWM company, Min of Environment
Waste collection volume	"Project" Tab, row 20	6 LLPAs, JSC regional SWM company, Min of Environment
Recyclables collection volume	"Project" Tab, rows 21-25	6 LLPAs, JSC regional SWM company, Min of Environment
Recyclables sales volume	"Project" Tab, rows 31-36	6 LLPAs, JSC regional SWM company, Min of Environment
Recyclables sales price	"Input_Con" Tab, rows 32-36	6 LLPAs, JSC regional SWM company, Min of Environment
Population	"Input_S_Demand" Tab, row 20	6 LLPAs, JSC regional SWM company, Min of Environment
OPEX, total	"OPEX" Tab, row 60 shows the total system costs	6 LLPAs, JSC regional SWM company
OPEX costs of transition from Model 1 to Model 2	"OPEX" Tab, row 58	JSC regional SWM company
Historical financial information on LLPA SWM operators	"Input_S_Rev&Fin State" Tab, starting at row 16; "Summary" Tab	6 LLPAs, JSC regional SWM company
Revenue collection rates	"Input_S_Rev&Fin State" Tab, row 12	6 LLPAs, JSC regional SWM company

The following table presents cost assumptions for transition to regional SWM JSC company.

Table 22 Financial model assumptions to agree with stakeholders

No.	Costs for the LLPAs	Amount, EUR	Notes:
1	Registration of JSC in 2021 (Distribution of shares between the shareholders of JSC according to population in each Rayon the LLPAs are located: Cahul LPA - 32%; Cantemir LPA - 14%; Taraclia LPA - 11%; C. Lunga LPA - 16%; Vulcanesti LPA - 6%; Comrat LPA - 21%)	-	The LLPAs register the JSC using their own staff or hire a lawyer/legal company and pay for such service. PIU shall assist them in this process.
2	Social capital at the registration of the JSC, year 2023 (LLPAs allocate funds according to shares held)	29,000 (Cahul LPA = 9,280 EUR; Cantemir LPA = 4,060 EUR; Taraclia LPA = 3,190 EUR; C. Lunga LPA = 4,640 EUR; Vulcanesti LPA = 1,740 EUR; Comrat LPA = 6,090 EUR)	According to the legal requirements, 600,000 MDL (about 29,000 EUR) shall be used as social capital for the new registered JSC.
3	Expenses for staff and other related costs (office rental, phone, etc.), year 2023 (LLPAs allocate funds according to shares held)	21,000 (Cahul LPA = 6,720 EUR; Cantemir LPA = 2,940 EUR; Taraclia LPA = 2,310 EUR; C. Lunga LPA = 3,360 EUR; Vulcanesti LPA = 1,260 EUR; Comrat LPA = 4,410 EUR)	In addition, 21,000 EUR, the funds from the social capital (i.e., 29,000 EUR) shall be used to cover these expenses. The funds shall be allocated by the respective LLPAs at the beginning of the year 2023.
4	Expenses for staff and other related costs (office rental, phone, etc.), year 2024 (LLPAs allocate funds according to shares held)	70,000 (Cahul LPA = 22,400 EUR; Cantemir LPA = 9,800 EUR; Taraclia LPA = 7,700 EUR; C. Lunga LPA = 11,200 EUR; Vulcanesti LPA = 4,000 EUR; Comrat LPA = 14,700 EUR)	The funds shall be allocated by the respective LLPAs at the beginning of the year 2024.
5	Expenses for staff and other related costs (office rental, phone, etc.), year 2025 (LLPAs allocate funds according to shares held)	70,000 (Cahul LPA = 22,400 EUR; Cantemir LPA = 9,800 EUR; Taraclia LPA = 7,700 EUR; C. Lunga LPA = 11,200 EUR; Vulcanesti LPA =	The funds shall be allocated by the respective LLPAs at the beginning of the year 2025.

		4,000 EUR; Comrat LPA = 14,700 EUR	
6	Expenses for staff and other related costs (office rental, phone, etc.), year 2026 (LLPAs allocate funds according to shares held)	71,750 (Cahul LPA = 22,960 EUR; Cantemir LPA = 10,045 EUR; Taraclia LPA = 7,893 EUR; C. Lunga LPA = 11,480 EUR; Vulcanesti LPA = 4,305 EUR; Comrat LPA = 15,068 EUR)	The funds shall be allocated by the respective LLPAs at the beginning of the year 2026.
7	Expenses for staff and other related costs (office rental, phone, etc.), year 2027 (LLPAs allocate funds according to shares held)	73,544 (Cahul LPA = 23,534 EUR; Cantemir LPA = 10,296 EUR; Taraclia LPA = 8,090 EUR; C. Lunga LPA = 11,767 EUR; Vulcanesti LPA = 4,413 EUR; Comrat LPA = 15,444 EUR)	The funds shall be allocated by the respective LLPAs at the beginning of the year 2027.

4.4 Project revenues – user charges and gate fee

The financial model³¹ calculates the required revenues to cover SWM system costs, including:

- > Operating and maintenance costs (OPEX). Over time, there is a small downward pressure on operating costs due to falling waste amounts (declining population).
- > Provision for uncollected bills³². This is expected to peak in 2027 at around EUR 340,000 and thereafter decline as revenue collection rates increase (in part due to reforms initiated under technical assistance as well as due to better enforcement of SWM laws prohibiting dumping of waste in non-compliant facilities). The effect over time will be a downward pressure on necessary income when revenue collection improves. The amount of necessary income from provision for uncollected bills decline.
- > Depreciation.
- > Financial costs. Although the on-granting of loans to the GoM has been confirmed, financial costs of EBRD and EIB loans are calculated in the charges.
- > Recyclables. Revenues from recyclables are subtracted from the required revenues.

The model calculates two charges and a gate fee. Household charges are calculated as EUR/person/month whilst the business charges is calculated as EUR/ton of waste. The gate fee – which

³¹ See financial model tabs “Project” and “Affordability”.

³² Currently, there is no such legal provision in Moldova. According to best practice in tariff calculations, however, everyone pays for the delinquent payers. This provision was introduced in the financial model as the standard for tariff calculation under the assumption that it will be implemented by the time the regional provider begins operating the SWM system.

applies to waste coming from local governments that have not yet joined the integrated regional system
– is also calculated as EUR/ton.

4.4.1 Comparison of system costs – current and future

The new SWM system will require a significant increase in operating costs. The following table summarises the expected increased according to type of expenditure.

Table 23 Comparison of SWM system costs – current and future SWM system, EUR/year

Cost category	2021 expense (old system)	2027 expense (new system)	Increase	Comments
Fuel and consumables	149,883	1,145,785	995,902	Increase in waste collection service coverage. Waste collection coverage expected to increase from 58% to 97% once the regional waste management system is operational.
Maintenance	20,799	767,983	747,184	Increase in the number of waste treatment facilities and vehicles associated with the increased service coverage rate.
Administration	139,522	391,874	252,352	Establishment regional service operator and its continued operation.
Salaries and benefits	536,763	727,172	190,410	Increase in waste collect service coverage and associated increase in employment.
Other	-	132,194	132,194	Insurance and taxes
Total	846,966	3,165,008	2,318,042	
Depreciation	80,386	1,640,955	1,560,569	Increase in the number of value of fixed assets associated with the expansion of service coverage.

4.4.2 Charges, sustainability, and affordability

The following figure shows the evolution of the household (HH) charges and business charges³³.

³³ The "affordability" worksheet in the financial model includes three key measures in rows 37, 38, and 40. Row 37 shows the calculation of the necessary user charge (tariff). Row 38 shows the threshold of the affordable user charge (1% of disposable household income). Row 40 shows the applied user charge.

The applied tariff is also based on the "smoothing function" that was agreed over time with the EBRD in order to speed the introduction of a full-cost recovery tariff.

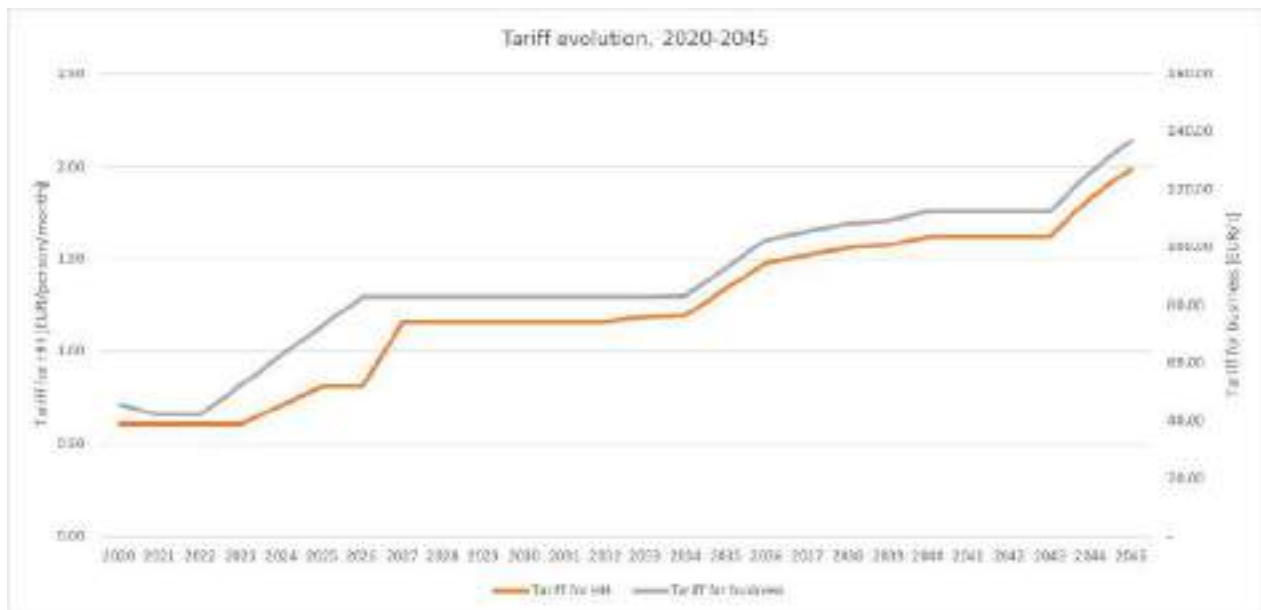


Figure 12 Household charges and business charges, 2020-2045

It is vital that the beneficiaries are aware that it will be necessary to raise charges for waste collection and treatment for household and non-household customers. The regional waste management company will need to calculate and implement user charges in accordance with the loan covenants. For example, current charges for household customers range from 11 MDL per person per month (in multi-unit dwellings) to 25 MDL per person per month for single-family units, for an assumed average of 0.61 EUR/person/month. Companies and institutions currently pay 180 MDL/m³. Assuming a density of waste after compaction of 0.2 tonnes per m³, the current charge is equivalent to 42.06 EUR/tonne.

Thus, the household charges will need to increase from 0.61 EUR/person/month to 1.11 EUR/person/month by 2028 when the integrated solid waste management system is fully operational. Charges to non-household customers will need to increase from an average of 42.06 EUR/tonne up to nearly 83 EUR/tonne by 2028.

Depreciation is a major component of the charges calculations and is depicted in the following figure.

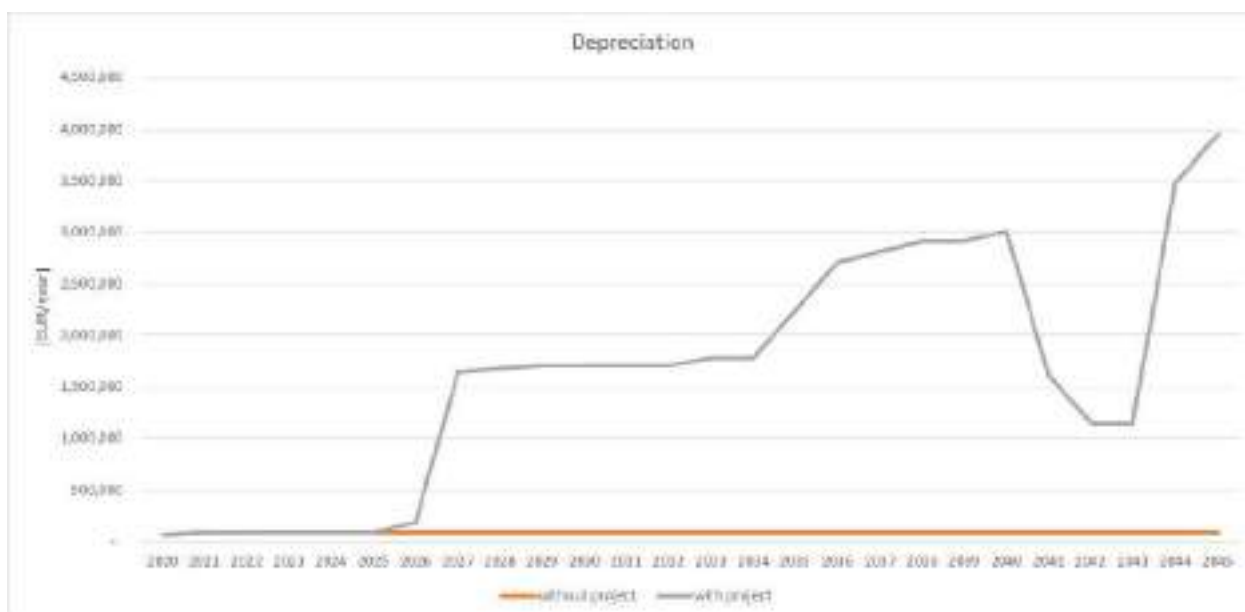


Figure 13 Depreciation, 2020-2045

The calculated household charge reaches 80% of the affordability threshold³⁴ in 2028 and thereafter achieves no higher than 80% of the threshold for the entire period of analysis. Based on the estimates of household income per capita and projections for system CAPEX and OPEX, the implemented user charge for households should not need to exceed 1% of average household disposable income per capita. Should it be necessary to increase the tariff beyond this threshold, support will be required to make up the difference between the applied household user charge and the maximum affordable user charge. Cost recovery levels for the applied household user charges remains at or above 100% from 2027 onward.³⁵ If, however, it should be necessary to increase the tariff beyond the affordability threshold, the LPAs and/or GoM will need to provide assistance to certain household customer segments (or, alternatively, directly to the Regional Operator) to ensure that when full-cost recovery user charges cannot be charged because they exceed affordability thresholds, the Regional Operator will be able to finance required rehabilitation and expansion investments (such as replacement of equipment and construction of future landfill cells. A 1% affordability threshold is advisable because the system achieves self-financing by 2027 and insufficient data are available on vulnerable population segments at the regional and LPA level³⁶.

³⁴ Calculated as 1% of average household disposable income per capita.

³⁵ A full-cost recovery charges cover the following elements: OPEX, provision for uncollected debt, depreciation, financing costs (interest payments), principal repayments above depreciation, and profit (if any).

³⁶ In the "Project" tab in the financial model, row 125 shows the support required for future investments (expansion and rehabilitation) to be financed from all sources. The regional waste management company will need an injection of funds to finance re-investments during this period. This can come from any external source - loan (including commercial), grant, own sources, etc.

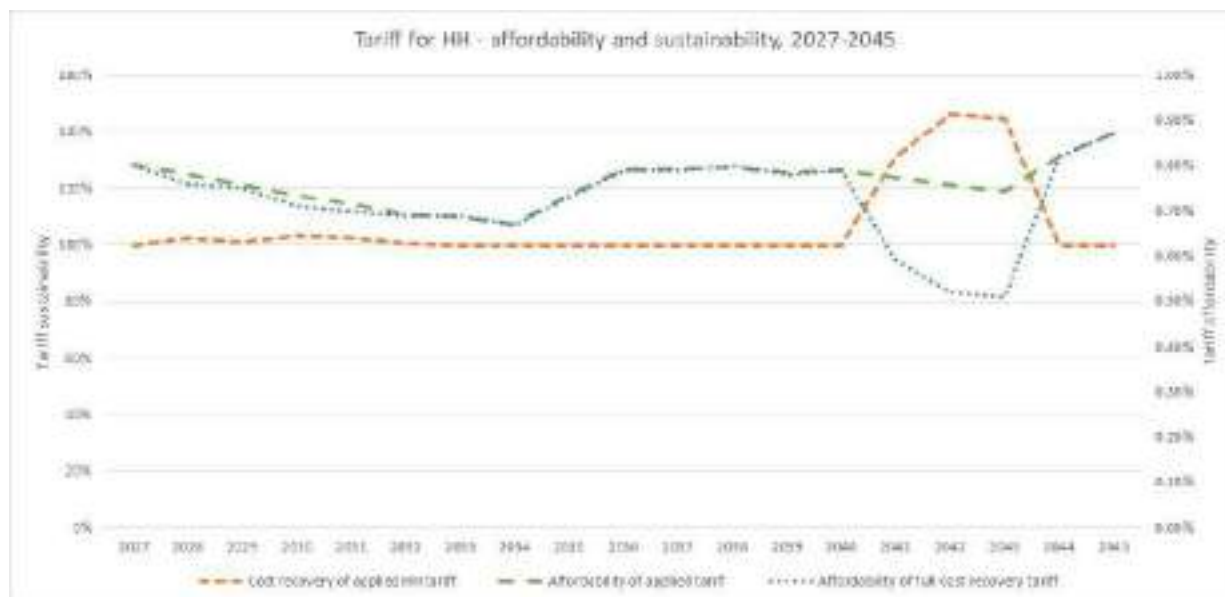


Figure 14 Household charges, sustainability, and affordability, 2027-2045

System sustainability is maintained soon after the integrated SWM system becomes fully operational. The minimum OPEX coverage ratio, defined using the benchmark of 105% of OPEX is expected to be exceeded in 2027. If income from recyclables fails to materialise, this threshold is still expected to be reached also by 2027. Full cost recovery, defined using the illustrative benchmark of 150% of OPEX, at or above which the SWM system should be self-financing, is estimated to be likewise possible to achieve by 2027, regardless of revenues from sale of recyclables.

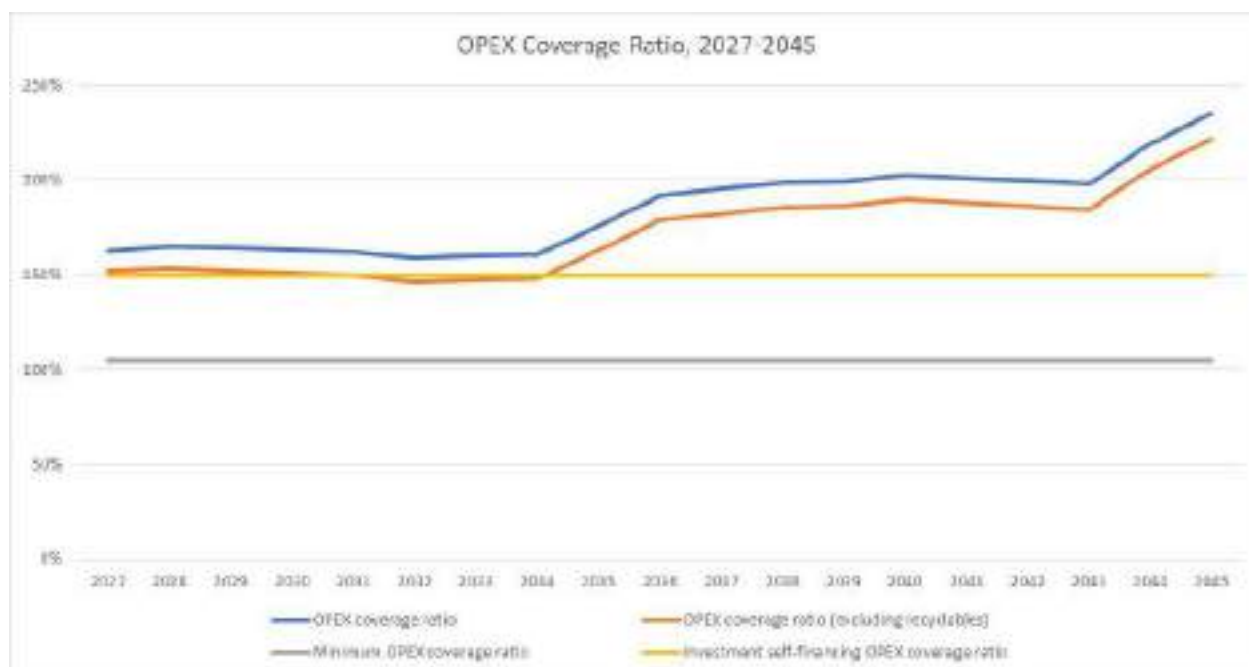


Figure 15 System sustainability – OPEX coverage ratio

4.4.3 Gate fee

A gate fee was calculated based on the operating costs of the new treatment facilities (transfer, sorting, composting, and landfills), depreciation of those facilities, share of financing costs (calculated based on the share of treatment facility CAPEX to total CAPEX of the project, about 55%), and share of unpaid bills (about 55%).

The gate fee may be charged to those local governments not participating in the integrated SWM system until such time that they join the system and their residents become customers of the regional SWM company.

The gate fee for 2027-2045 is depicted in the following figure.

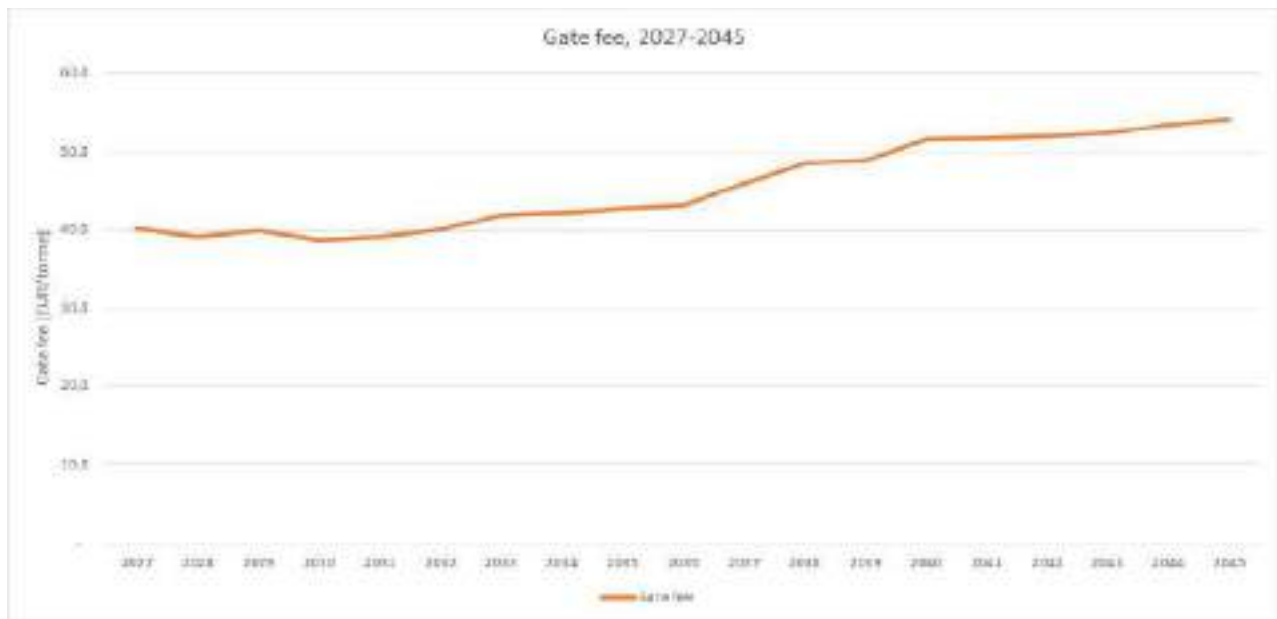


Figure 16 Gate fee, EUR/t, 2027-2045

The financial model, however, assumes all local governments will join the system. Deviations from this assumption are covered under the sensitivity analysis.

4.4.4 User charge support³⁷

Due to the household affordability constraints discussed in Chapter 2.7, support to household customers may periodically be needed during the 2027-2045 period. This is due to the need for the Regional Operator to increase user charges up to the level of full-cost recovery³⁸ in order to meet the demand for rehabilitation of assets and expansion of services during the period of analysis. At the same time, the affordability threshold prevents increasing household user charges up to the required level. The LPAs and/or the Moldovan Government will need to ensure and implement a scheme to support poorer income customers in order to provide them with the means by which to pay the required user charges.

³⁷ See financial model tab "Results".

³⁸ Covering OPEX, depreciation on all assets apart from closure of existing dumpsites, and the provision for unpaid bills. Revenues from the sale of recyclables are subtracted from this total to arrive at the required revenue per ton of collected waste.

The financial model calculates the support required by year of analysis. This was done for three scenarios, corresponding to affordability thresholds:

- > Baseline scenario: 1%
- > Increased affordability scenario: 1.1%
- > Maximum affordability scenario: 1.2%.

In the baseline scenario (1% affordability threshold), no support is estimated to be required during the period of analysis, based on a forecast of household disposable income, required CAPEX, and system OPEX. Therefore, expanded affordability estimates (1.1% and 1.2%) were not tested.

4.4.5 Future investment financing and DSCR³⁹

The MoEnv has confirmed the intent of the Government of Moldova for the loans for this Project to be on-granted by the MoF to the SWM system operator. The financial model is programmed to permit calculation of a DSCR of 1.0, 1.1, and 1.2. At the same time, the financial model allows for the financing costs to be included in the charges. The default setting, however, is that the financing costs are not covered in the required revenues used to calculate user charges⁴⁰.

When investment needs are intensified, however, investment support (low interest loans, grants, subsidies, etc.) may be required. Therefore, investment support was calculated for the SWM system operator that will be necessary if the SWM charges are insufficient to cover those investments. This is shown in the following table. The result is that if the required user charges are implemented, no additional financing will be required. Regardless of the DSCR, periodic subsidies will be required when it is not possible to increase charges to cover additional investments due to household affordability constraints.

Table 24 Future investment financing (no DSCR), EUR, 2031-2036

	2031	2032	2033	2034	2035	2036	Total
Investment support required (in EUR)	0	0	0	0	0	0	0

4.4.6 Loan covenants on user charges

The requirement to achieve full-cost recovery tariffs should be covenanted in the loan agreement. To this end, the following language is suggested to use / adapt to the loan agreement.

"The borrower commits to developing and adopting a tariff-setting methodology to achieve full-cost recovery levels, subject to affordability constraints".

"The borrower commits to supporting the implementation of full-cost recovery tariffs for household customers beginning no later than in 2027 (or the year in which the Regional Operator undertakes full operation of the SWM system) and to providing financial support to the Regional Operator (beneficiary) to cover the difference between the applied household tariff and the maximum affordable tariff and/or ensuring the LPAs provide support to vulnerable population segments in order that they may pay for the full-cost recovery tariff. Similarly, the borrower commits to supporting the implementation of full-

³⁹ See financial model tab "Project".

⁴⁰ The model also permits this to be switched off.

cost recovery tariffs for commercial (non-household) customers beginning no later than in 2026 and to providing financial support to the Regional Operator (beneficiary) to cover the difference between the applied commercial tariff and the need gradually to implement those tariffs".

"The beneficiary commits to calculating full-cost recovery tariffs and implementing them as soon as practicable, subject to affordability constraints".

Failing to implement a full-cost recovery tariff, the beneficiary shall indicate the source(s) of financing of the difference between the applied tariff and the full-cost recovery tariff.

A full-cost recovery tariff is defined as:

- **For household tariffs:** user charges covering the full cost of providing SWM services (including intermediate storage, collection, transfer, and final treatment), subject to affordability constraints.
- **For non-household tariffs** (commercial, institutional, etc.): user charges covering the full cost of providing SWM services (including intermediate storage, collection, transfer, and final treatment). The calculation of non-household tariff is to be calculated based on the dynamic prime cost.

The following formula for calculation of full-cost recovery tariffs shall be used:

$$FCRT = \frac{RR}{SW}$$

where:

FCRT = full-cost recovery tariff, in EUR / tonne

RR = required revenues, in EUR (or MDL)

SW = amount of solid waste collected, in tonnes

Required revenues (RR) include the following components:

- **ADD: Operating and maintenance costs** (OPEX): all operating and maintenance costs associated with providing solid waste management services (including intermediate storage, collection, transfer, and final treatment) – both fixed and variable.
- **ADD: Capital costs**, which include:
 - o depreciation of fixed assets, excluding depreciation of closure of existing, non-compliant dumpsites.
 - o financial costs: costs of debt service (interest on loans) of the loans that the beneficiary is contractually obligated to repay.
 - o financial costs: principal repayments in excess of depreciation, if applicable. The difference between the loan principal repayment and depreciation is included. This applies only to the loans that the beneficiary is contractually obligated to repay.
- **LESS: Revenues from the sale of recyclables** or other by-products of waste treatment.
- **ADD: Provision for unpaid bills:** Calculated as 100% - revenue collection rate for the given year (in percent). This involves checking whether customers have paid all bills (based on OPEX and capital costs, less revenues from recyclables). If all customers bills pay their bills within the given year, no provision is necessary for that year.

Affordability of household tariffs is calculated by dividing the total amount spent per capita per month on SWM services by the average monthly household income per capita. An affordable household tariff is one that does not exceed 1%. The following formula for calculation of dynamic prime cost (DPC) shall be used:

$$DPC = \frac{\sum_{t=0}^{t=n} \frac{RR_t}{(1+i)^t}}{\sum_{t=0}^{t=n} \frac{TW_t}{(1+i)^t}}$$

Where:

RR_t = required revenues from non-household customers in year *n*

TW_t = total waste collected from non-household customers in year *n*

i = discount rate (5%)

t = year

4.5 Project financing⁴¹

4.5.1 PIP financing structure

The following table shows the financing structure for the PIP. In total, the EBRD and EIB loans will be used to finance 40.3% and 42.6%, respectively, of the total cost of the PIP (25.379 million EUR), for a total of 82.9%. The remainder – 17.1% - is envisaged to be financed with an investment grant, which the EBRD intends to attract from an international donor (currently unspecified), and will be at the discretion of such donor(s).

Table 25 Proposed financing structure

Indicative Sources	Description (see procurement plan for additional details – section 6.3)	Amount (million EUR)	Percent of total
EBRD loan	Waste treatment infrastructure (33.4%); SWM equipment (50%); waste collection and other vehicles (50%)	10,219	40.3%
Potential international capital grant	Waste treatment infrastructure (29.2%)	4,340	17.1%
EIB loan	Waste treatment infrastructure (37.5%); SWM equipment (50%); waste collection and other vehicles (50%)	10,819	42.6%
Total	PIP	25,379	100%
Technical Assistance (grants) envisaged to be mobilized by the EBRD	Technical assistance (including corporate development and supervision)	900	
Technical Assistance (EBRD and EIB loans)	Technical assistance (supervision of small dumpsite closures) – EBRD	200	

⁴¹ See financial model tab “Financing”.

	loan (50%) and EIB loan (50%)		
Grand Total	PIP and Technical Assistance	26,479	100%

Table 26 Total financing structure – PIP and Technical Assistance

Indicative Sources	Amount (million EUR)	Percent of total
<i>EBRD loan (including share supervision of small dumpsite closures as part of technical assistance)</i>	10.319	38.97%
<i>Potential international capital grant</i>	4.340	16.39%
<i>EIB loan (including share supervision of small dumpsite closures as part of technical assistance)</i>	10.919	41.23%
Additional TA grant to be mobilised by EBRD	900	3.39%
Total	26,479	100%

4.5.2 Concessionality⁴²

The proposed use of a grant from an international donor, as well as debt financing on favourable terms from the EBRD and EIB, require justification of the use of concessional finance. The proposed project meets two of the three situations in which concessionality can be justified:

- > Presence of significant externalities – the SWM management market has not correctly valued the benefits of proper SWM. Only about 57% of waste generated in WMZ 1 is collected and disposed of at a landfill or dumpsite, while the remainder is left uncollected and disposed of in a manner that creates public health and environmental risks.
- > Affordability constraints – SWM charges cannot be quickly raised to full-cost recovery levels and operating/investment subsidies will be required during the operating period from 2026-2045. Concessional financing will ease this burden on the SWM system.

The externalities can be expressed in terms of the life-cycle cost of CO₂ reduction. As per E5P guidelines (used here as a proxy for international donor requirements), CO₂ reduction calculation is based on a life cycle of 15 years and at a discount rate of 10%. The CO₂ emission reductions were calculated based on the CO₂ emission factors from the GET analysis compared to the waste flow for the with and without project (baseline) scenarios. The value of the CO₂ reduction was calculated by multiplying the unit of reduction (tonne) by the shadow price per unit of CO₂ reduction, starting at 46 EUR/ton and increasing gradually to 80 EUR/ton by 2050.⁴³

⁴² See financial model tab "Concessionality".

⁴³ Methodology for the economic assessment of EBRD projects with high greenhouse gas emissions. Technical note. Lowest price used. Subject to sensitivity analysis.

Table 27 *CO₂ reduction and life-cycle cost*

Measure	Unit	NPV (2027-2041)
CO ₂ emission reduction	NPV of t CO ₂	588,124
Value of CO ₂ reduction	NPV of EUR	36,271,193
CAPEX (excluding TA)	NPV of EUR	19,009,201
OPEX	NPV of EUR	17,672,349
Lifecycle cost per ton of CO ₂ reduction	EUR / t CO ₂	62.37
Lifecycle cost per value of CO ₂ reduction	EUR / EUR-t CO ₂	1.01

With respect to affordability, regardless of the level of internal capital grant, the full-cost recovery user charge (tariff) will not be possible to apply in 2027 and thereafter. Throughout the period, the affordability threshold of 1% will limit tariff increases up to that maximum. The Regional Operator will need to be compensated for the difference between the applied (affordability constrained) tariff and the full-cost recovery tariff.

At the same time, the financial model has been developed to guide the SWM system operator toward a market-oriented service. Technical cooperation, linked to the PIP, will assist the SWM system operator to make this transition. The financial model is further based on the assumption that the SWM system will become economically viable and sustainable over time. Accordingly, over time the SWM system operator should become increasingly able to finance its own operations through charges, including rehabilitation investments as well as investments enabling the expansion of services (subject to the tariff and investment support indicated in sections 4.4.4 and 4.4.5, respectively).

The following principles for concessional finance are also reviewed:

- > Market subsidiarity – the SWM market in Moldova has not managed to secure the introduction of a compliant SWM system, thus requiring concessional finance to transition to a compliant system.
- > Transition leverage – concessional finance is needed to leverage the systemic change required by Moldavian SWM sectoral policy.
- > Economic viability – in the long-term, the project is viable without subsidies. The economic rate of return (EIRR) is higher than the financial rate of return (see sections 4.7 and 4.8). Thus, the project exhibits economic viability, as represented by a robust EIRR.
- > Sustainability – in the long-term, the support will be required to implement the full-cost recovery tariff compensate for the difference between the applied (affordability constrained) and the tariff required for full-cost recovery. This will require direct support to vulnerable households or to the operator from the Government of Moldova and/or the LPAs comprising WMZ 1.

The project involves investments in the environmental infrastructure sector. To justify concessional finance, the gap in environmental standards and associated total project costs compared to the without project counterfactual. The SWM service providers in WMZ 1 have undertaken minimal investment, if any. As the project demonstrates, EUR 26.5 million are required to bring the SWM services into compliance with national policy aims and EU directives. Thus, on the basis of standards, “the difference in project costs between these two scenarios would be the maximum level of grant that could be

potentially justified.” Domestic sources are insufficient to meet this demand. In the past, the main source of financing for SWM projects in Moldova was the national Ecological Fund, which had a 2021 budget of MDL 500 million (about EUR 23 million) for all sectors. A new entity has been established to take over the funds and responsibilities.

Full cost recovery user charges (tariff) that are required for the higher standards are much higher than the full-cost recovery charges that would be required for the baseline, “without” project scenario. The EU Funding Gap method⁴⁴ was used to compare the incremental costs and benefits from each of these scenarios. This is done by taking the difference between the discounted investment costs (CAPEX in the PIP less contingencies) and the discounted net revenues (revenues due to the project less revenues in the “without project” scenario) and dividing by the discounted investment costs. The result is the funding gap.

$$R = (DIC - DNR) / DIC$$

where:

R = funding gap, %

DIC = discounted investment costs

DNR = discounted net revenue

The funding gap was calculated as 17.36%, meaning that 17% of eligible costs would require grant financing according to the methodology. This low funding gap is due to the immediate introduction of full-cost recovery user charges. This tariff regime will require support to vulnerable household customers from LPAs.

In conclusion, an international grant of 17.1% is justified of project investment costs (CAPEX, excluding TA) ⁴⁵.

The following checklists summarise and expand on these arguments.

Table 28 Concessionality Checklist – Environmental Infrastructure

Co-investment grant amount (A)	4.340 MEUR
EBRD investment	10.219 MEUR
EIB investment	10.819 MEUR
Total Investment (B), including concessional finance and excluding TC grants	25.379 MEUR
Grant intensity A/B (in %)	17.1%
Other grants	None
Country context (CEB, SEMED, ETC, etc.)	n/a

⁴⁴ see "Fin ratios" tab in the Financial Model

⁴⁵ For example, the maximum allowable E5P grant is calculated at 35% of the total financing and no more than half of the total loan financing.

Use of grant proceeds	Financing of SWM facilities (works), including 12% contingencies: landfill, sorting plant and composting plant in Cahul, Cahul rayon; Transfer station at Cania, Cantemir rayon; Transfer station in Taraclia, Taraclia rayon; Transfer station in Comrat, Comrat district (ATUG); Closure / re-cultivation of existing landfill in Cahul Financing of SWM facilities (equipment), including 12% contingencies: Equipment / goods for waste treatment and disposal facilities in Cahul; Equipment / goods for the transfer stations; Closure of minor and municipal, non-compliant dumpsites throughout WMZ 1.
Standards - Does the project achieve higher environmental standards (e.g. EU environmental standards or local, should they be higher)?	Yes. The project enables the achievement of EU standards for SWM collection and treatment, in particular a EU standard compliant regional SWM landfill.
Cost justification - Is the cost difference between the higher standards targeted under EBRD financing and the counterfactual greater than the amount of concessional finance in NPV terms?	Yes
Tariff reform - Does the project achieve full cost recovery? - Are targeted tariff increases covenanted?	Full-cost recovery tariffs are calculated and implemented in 2027, as per proposed loan covenants. Based on available information and affordability constraints (1% of average disposable household income), support will not be required to compensate for the difference between the full-cost recovery tariff and the affordability constrained applied tariff. Should this prove otherwise, this support should be provided by LPAs to vulnerable households or the regional operator. Yes, increases of user charges will be covenanted.
Affordability - Would affordability breaches arise without concessional financing?	No, unless recommended tariffs are not implemented.
Economic analysis - Is the project justified by a robust economic rate of return?	The EIRR is estimated at 36% (compared to the applied social discount rate of 6%).
Transition Impact - What are the sources of TI and how do they link to the rationale presented above? - What is the ETI rating?	Transition Impact occurs when the LLPAs, regional SWM system operator, and GoM commit to full-cost recovery charges in SWM, payment for services, SWM charges payment support for low-income households, and closure and enforcement of non-compliant dumpsites.
Conclusion / Concessional finance justification Are concessional finance justified? On what grounds?	Yes, based on market failures and affordability constraints.

Table 29 Concessionality Checklist – Sustainability Resource Investment (for GET financing)

Non TC grant amount (A)		4.340 MEUR
EBRD investment		10.219 MEUR 10.819 MEUR
Total Investment (B), including concessional finance and excluding TC grants		25.379 MEUR
Grant intensity A/B (in %)		17.1%
Other grants		None
Country context (CEB, SEMED, ETC, etc.)		NA
Use of grant proceeds	Financing of SWM facilities (works), including 12% contingencies: landfill, sorting plant and composting plant in Cahul, Cahul rayon; Transfer station at Cania, Cantemir rayon; Transfer station in Taraclia, Taraclia rayon; Transfer station in Comrat, Comrat district (ATUG); Closure / re-cultivation of existing landfill in Cahul Financing of SWM facilities (equipment), including 12% contingencies: Equipment / goods for waste treatment and disposal facilities in Cahul; Equipment / goods for the transfer stations; Closure of minor and municipal, non-compliant dumpsites throughout WMZ 1.	
Energy/ Environmental Standards - Does the project go beyond the local regulatory standards? - How innovative is the product? Compare with previous similar projects carried out by the EBRD or by other public or private institutions	Yes. The project enables the achievement of EU standards for SWM collection and treatment, in particular a EU standard compliant regional SWM landfill. The project is conventional in its approach to modern SWM management.	
Justification - What market failures, institutional or market barriers are being targeted? - How does the proposed instrument address the underlying market failures and what are the economic benefits beyond project entities/beneficiaries? - Is the project accompanied by relevant policy dialogue and will the expected outcomes help reduce or eliminate the identified market failures?	The SWM management market has not correctly valued the benefits of proper solid waste management. Only about 57% of waste generated in WMZ 1 is disposed of at a landfill or dumpsite, while the remainder is left uncollected and disposed of in a manner that creates public health and environmental risks. The proposed project addresses these failures by introducing a compliant SWM system. Economic benefits include CO₂ reduction. The project context includes policy dialogue with the GoM on supporting the introduction of full-cost recovery charges and compliance and enforcement of improve SWM system.	
Size - Is the co-investment grant rightly sized (e.g. economic value of carbon emissions reductions equal or greater than proposed concessional financing)?	Total benefits from CO₂ emission reductions (2025-2045) are estimated at MEUR 207 MEUR (MEUR 82.5 in discounted terms), which is far in excess of the total project cost, as well as concessional financing. In lifecycle cost terms (15 years and 10% discount rate), the discounted value is MEUR 62.37 per ton.	
Temporary application	Full-cost recovery tariffs are calculated and implemented in 2027, as per proposed loan covenants. Based on available	

- Explain how the co-investment grant provision will be phased out over time	information and affordability constraints (1% of average disposable household income), support will not be required to compensate for the difference between the full-cost recovery tariff and the affordability constrained applied tariff. Should this prove otherwise, this support should be provided by LPAs to vulnerable households or the regional operator. Yes, increases of user charges will be covenanted.
Transition Impact - What are the sources of TI and how do they link to the rationale presented above? - What is the ETI rating?	Transition Impact occurs when the LLPAs, regional SWM system operator, and GoM commit to full-cost recovery charges in SWM, payment for services, SWM charges payment support for low-income households, and closure and enforcement of non-compliant dumpsites.
Sustainability - How is this activity expected to be mainstreamed? - How will that be measured and monitored?	The solutions and approaches applied in WMZ 1 in Moldova will serve as a benchmark SWM system to be adapted and applied throughout the country. The sustainability will be measured by the absence of operating/investment subsidies for the SWM system and the cessation of use of non-compliant dumpsites.
Conclusion	Proposed project meets concessionality requirements

4.6 Operator financial statements⁴⁶

The operator financial statements are included in the financial model under the sheet “Project-EUR” and in the tab “Financial Analysis Summary”. For the initial years of analysis, the statements reflect the current situation with the four operators in WMZ 1. Their financial statements are combined into a joint statement. This is done for comparative purposes, although no such joint financial statements exist. From 2027 onward, the financial statements represent those of the Regional Operator and reflect the impact of project implementation, system operation, and scheduled expansion investments (landfill cells) and replacement/rehabilitation investments (depreciated bins, vehicles, mobile equipment, mechanical and electrical works, etc.).

The key drivers of the operator financial statements are:

- > Revenues - User charges – the main source of support for system comes from user charges. Starting in 2027, they are the main source of system financing.
- > Revenues – Investment support – until user charges can be raised to full-cost recovery levels, periodic investment support (loans and grants) will be required for scheduled expansion and replacement/rehabilitation investments.
- > Cash flow – starting in 2027, the Regional Operator will begin to accumulate cash as the system becomes self-financing. This will provide the basis for a new landfill and accompanying facilities, replacement investments, as well as aftercare of the regional landfill in Cahul after its closure. The high initial cash flow is an artefact of the method for introducing the user charge agreed with the EBRD to avoid any other cash injections shortly after the project is operational. The point being that the regional operator needs have full-cost tariffs immediately after the system is operational. This will require introduction of higher user charges over time.

⁴⁶ See financial model tab “Project” and tab “Financial Analysis Summary”.

Table 30 Profit and loss statement – project / Regional Operator, 2027-2036

Unit EUR	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Revenue	5,154,055	5,133,586	5,084,619	5,036,905	4,990,497	4,941,217	4,974,008	4,949,062	5,431,987	5,900,897
- of which from user charges	4,827,227	4,770,065	4,713,930	4,658,879	4,604,952	4,547,980	4,580,646	4,555,549	5,038,289	5,506,987
- of which from recyclables	326,828	363,521	370,688	378,026	385,545	393,237	393,362	393,514	393,698	393,910
Cost of Sales	(3,165,008)	(3,103,690)	(3,093,861)	(3,086,674)	(3,075,962)	(3,107,638)	(3,100,291)	(3,075,847)	(3,083,728)	(3,077,876)
EBITDA	1,989,047	2,029,896	1,990,758	1,950,231	1,914,535	1,833,580	1,873,717	1,873,215	2,348,258	2,823,021
Depreciation	(1,640,955)	(1,676,682)	(1,701,554)	(1,701,554)	(1,701,554)	(1,701,554)	(1,782,104)	(1,782,104)	(2,247,493)	(2,712,881)
EBIT	348,092	353,214	289,204	248,677	212,981	132,026	91,613	91,111	100,766	110,140
Interest Expense	-	-	-	-	-	-	-	-	-	-
Other Costs/Income (provision for bad debt)	(337,139)	(232,466)	(232,880)	(90,004)	(89,632)	(90,122)	(91,613)	(91,111)	(100,766)	(110,140)
Profit before tax	10,953	120,748	56,324	158,673	123,349	41,904	-	0	-	(0)
Tax incurred	(2,191)	(24,150)	(11,265)	(31,735)	(24,670)	(8,381)	-	-	-	-
Profit after tax	8,762	96,598	45,059	126,938	98,679	33,524	-	0	-	(0)
Dividends	-	-	-	-	-	-	-	-	-	-
Profit for the year	8,762	96,598	45,059	126,938	98,679	33,524	-	0	-	(0)

Table 31 Profit and loss statement – project / Regional Operator, 2037-2045

Unit EUR	2037	2038	2039	2040	2041	2042	2043	2044	2045
Revenue	5,989,676	6,079,951	6,071,344	6,177,530	6,115,839	6,055,410	5,996,076	6,634,784	7,100,835
- of which from user charges	5,595,516	5,685,512	5,676,591	5,782,437	5,720,373	5,659,535	5,599,764	6,238,003	6,703,560
- of which from recyclables	394,160	394,439	394,753	395,093	395,466	395,875	396,312	396,781	397,274
Cost of Sales	(3,067,019)	(3,057,627)	(3,049,198)	(3,045,867)	(3,040,728)	(3,034,374)	(3,032,138)	(3,028,621)	(3,019,972)
EBITDA	2,922,658	3,022,324	3,022,146	3,131,663	3,075,111	3,021,036	2,963,938	3,606,163	4,080,863
Depreciation	(2,810,747)	(2,908,614)	(2,908,614)	(3,016,014)	(1,619,849)	(1,154,460)	(1,154,460)	(3,481,403)	(3,946,791)
EBIT	111,910	113,710	113,532	115,649	1,455,262	1,866,576	1,809,478	124,760	134,071
Interest Expense	-	-	-	-	-	-	-	-	-
Other Costs/Income (provision for bad debt)	(111,910)	(113,710)	(113,532)	(115,649)	(87,043)	(77,407)	(77,353)	(124,760)	(134,071)
Profit before tax	0	0	(0)	(0)	1,368,219	1,789,168	1,732,125	-	(0)
Tax incurred	-	-	-	-	(273,644)	(357,834)	(346,425)	-	-
Profit after tax	0	0	(0)	(0)	1,094,575	1,431,335	1,385,700	-	(0)
Dividends	-	-	-	-	-	-	-	-	-
Profit for the year	0	0	(0)	(0)	1,094,575	1,431,335	1,385,700	-	(0)

Table 32 Balance sheet – project / Regional Operator, 2027-2036

Unit EUR	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Cash	7,856,425	8,336,280	8,792,761	9,333,845	9,844,064	8,611,436	9,093,827	4,929,261	1,169,131	972,097
Receivables	635,431	632,908	626,871	620,988	615,267	609,191	613,234	610,158	669,697	727,508
Inventories	39,021	38,265	38,143	38,055	37,923	38,313	38,223	37,921	38,019	37,946
Total Current Assets	8,530,877	9,007,452	9,457,775	9,992,888	10,497,253	9,258,941	9,745,283	5,577,341	1,876,846	1,737,551
Fixed Assets	24,917,345	24,354,783	22,653,229	20,951,675	19,250,122	19,228,032	17,445,928	20,317,709	22,724,102	21,568,420
Other Assets	35,182	35,182	35,182	35,182	35,182	35,182	35,182	35,182	35,182	35,182
Total Assets	33,483,404	33,397,417	32,146,186	30,979,745	29,782,557	28,522,155	27,226,394	25,930,233	24,636,130	23,341,153
ST Debt plus CPLT Debt										
Payables	201,787	199,686	198,001	199,225	197,962	198,641	197,484	195,927	196,429	196,057
Other ST Liabilities	188,485	188,485	188,485	188,485	188,485	188,485	188,485	188,485	188,485	188,485
Total Current Liab	390,271	388,170	386,485	387,710	386,447	387,126	385,969	384,412	384,914	384,541
Long Term Debt (on-granted from GoM)	20,114,714	19,628,556	18,333,952	17,039,347	15,744,743	14,450,139	13,155,534	11,860,930	10,566,326	9,271,721
Grants from GoM (on-granting of EBRD & EIB loans and international donor CAPEX grant)	4,933,926	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599
Total Liabilities	25,438,911	25,256,325	23,960,036	22,666,656	21,370,789	20,076,863	18,781,102	17,484,941	16,190,839	14,895,861
Equity	8,044,493	8,141,092	8,186,151	8,313,089	8,411,768	8,445,292	8,445,292	8,445,292	8,445,292	8,445,292
Total Liab & Equity	33,483,404	33,397,417	32,146,186	30,979,745	29,782,557	28,522,155	27,226,394	25,930,233	24,636,130	23,341,153

Table 33 Balance sheet – project / Regional Operator, 2037-2045

Unit EUR	2037	2038	2039	2040	2041	2042	2043	2044	2045
Cash	919,537	2,521,935	1,897,287	3,605,434	5,055,087	7,048,287	4,334,186	2,447,667	5,729,917
Receivables	738,453	749,583	748,522	761,613	754,008	746,557	739,242	817,987	875,445
Inventories	37,813	37,697	37,593	37,552	37,488	37,410	37,383	37,339	37,233
Total Current Assets	1,695,803	3,309,214	2,683,401	4,404,599	5,846,583	7,832,254	5,110,811	3,302,993	6,642,595
Fixed Assets	20,314,872	17,406,258	16,736,930	13,720,916	12,101,067	10,946,607	14,446,031	15,618,514	11,671,722
Other Assets	35,182	35,182	35,182	35,182	35,182	35,182	35,182	35,182	35,182
Total Assets	22,045,857	20,750,655	19,455,513	18,160,697	17,982,832	18,814,043	19,592,025	18,956,689	18,349,500
ST Debt plus CPLT Debt									
Payables	195,365	194,767	194,230	194,018	216,181	222,696	221,616	192,919	192,368
Other ST Liabilities	188,485	188,485	188,485	188,485	188,485	188,485	188,485	188,485	188,485
Total Current Liab	383,850	383,251	382,714	382,502	404,666	411,181	410,101	381,404	380,853
Long Term Debt (on-granted from GoM)	7,977,117	6,682,513	5,387,908	4,093,304	2,798,700	2,192,061	1,585,423	978,785	372,146
Grants from GoM (on-granting of EBRD & EIB loans and international donor CAPEX grant)	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599	5,239,599
Total Liabilities	13,600,566	12,305,363	11,010,222	9,715,405	8,442,965	7,842,841	7,235,123	6,599,787	5,992,598
Equity	8,445,292	8,445,292	8,445,292	8,445,292	9,539,867	10,971,202	12,356,902	12,356,902	12,356,902
Total Liab & Equity	22,045,857	20,750,655	19,455,513	18,160,697	17,982,832	18,814,043	19,592,025	18,956,689	18,349,500

Table 34 Cash flow statement – project / Regional Operator, 2027-2036

Unit EUR	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Operating Profit (EBIT)	348,092	353,214	289,204	248,677	212,981	132,026	91,613	91,111	100,766	110,140
Depreciation & Amortisation (+)	1,640,955	1,676,682	1,701,554	1,701,554	1,701,554	1,701,554	1,782,104	1,782,104	2,247,493	2,712,881
Gross Operating CF (EBITDA)	1,989,047	2,029,896	1,990,758	1,950,231	1,914,535	1,833,580	1,873,717	1,873,215	2,348,258	2,823,021
Changes in Working Capital (+/-)	140,701	(1,179)	(4,473)	(7,196)	(4,591)	(6,364)	5,109	(1,820)	59,134	58,111
Tax Paid	2,191	24,150	11,265	31,735	24,670	8,381	-	-	-	-
Net Operating CF	1,846,155	2,006,925	1,983,966	1,925,692	1,894,455	1,831,563	1,868,608	1,875,035	2,289,125	2,764,909
Interest paid + provisions for unpaid bills	337,139	232,466	232,880	90,004	89,632	90,122	91,613	91,111	100,766	110,140
Current debt repaid (on-granted from GoM)	687,966	1,294,604	1,294,604	1,294,604	1,294,604	1,294,604	1,294,604	1,294,604	1,294,604	1,294,604
Dividends paid	-	-	-	-	-	-	-	-	-	-
Pre Investment CF	821,050	479,855	456,481	541,084	510,219	446,837	482,391	489,320	893,754	1,360,165
Capital expenditure	1,465,120	1,114,120	-	(0)	-	1,679,464	0	4,653,885	4,653,885	1,557,199
Pre Financing CF	(644,070)	(634,266)	456,481	541,084	510,219	(1,232,628)	482,391	(4,164,565)	(3,760,131)	(197,034)
EBRD new debt (on-granted from GoM)	383,240	382,740								
EIB new debt (on-granted from GoM)	426,207	425,707								
Investment support	-	-	-	-	-	-	-	-	-	-
International donor CAPEX grant	655,673	305,673	-	-	-	-	-	-	-	-
Post Financing CF	821,050	479,855	456,481	541,084	510,219	(1,232,628)	482,391	(4,164,565)	(3,760,131)	(197,034)
Cash beginning	7,048,180	7,869,230	8,349,084	8,805,566	9,346,649	9,856,868	8,624,241	9,106,632	4,942,066	1,181,935
Cash End	7,869,230	8,349,084	8,805,566	9,346,649	9,856,868	8,624,241	9,106,632	4,942,066	1,181,935	984,901

Table 35 Cash flow statement – project / Regional Operator, 2037-2045

Unit EUR	2037	2038	2039	2040	2041	2042	2043	2044	2045
Operating Profit (EBIT)	111,910	113,710	113,532	115,649	1,455,262	1,866,576	1,809,478	124,760	134,071
Depreciation & Amortisation (+)	2,810,747	2,908,614	2,908,614	3,016,014	1,619,849	1,154,460	1,154,460	3,481,403	3,946,791
Gross Operating CF (EBITDA)	2,922,658	3,022,324	3,022,146	3,131,663	3,075,111	3,021,036	2,963,938	3,606,163	4,080,863
Changes in Working Capital (+/-)	11,503	11,612	(628)	13,263	(29,833)	(14,043)	(6,263)	107,399	57,903
Tax Paid	-	-	-	-	273,644	357,834	346,425	-	-
Net Operating CF	2,911,155	3,010,712	3,022,774	3,118,400	2,831,300	2,677,246	2,623,776	3,498,764	4,022,960
Interest paid + provisions for unpaid bills	111,910	113,710	113,532	115,649	87,043	77,407	77,353	124,760	134,071
Current debt repaid (on-granted from GoM)	1,294,604	1,294,604	1,294,604	1,294,604	1,294,604	606,638	606,638	606,638	606,638
Dividends paid	-	-	-	-	-	-	-	-	-
Pre Investment CF	1,504,640	1,602,397	1,614,638	1,708,147	1,449,653	1,993,200	1,939,785	2,767,366	3,282,250
Capital expenditure	1,557,199	-	2,239,286	-	-	0	4,653,885	4,653,885	-
Pre Financing CF	(52,559)	1,602,397	(624,648)	1,708,147	1,449,653	1,993,200	(2,714,100)	(1,886,519)	3,282,250
EBRD new debt (on-granted from GoM)									
EIB new debt (on-granted from GoM)									
Investment support	-	-	-	-	-	-	-	-	-
International donor CAPEX grant	-	-	-	-	-	-	-	-	-
Post Financing CF	(52,559)	1,602,397	(624,648)	1,708,147	1,449,653	1,993,200	(2,714,100)	(1,886,519)	3,282,250
Cash beginning	984,901	932,342	2,534,739	1,910,091	3,618,239	5,067,891	7,061,091	4,346,991	2,460,472
Cash End	932,342	2,534,739	1,910,091	3,618,239	5,067,891	7,061,091	4,346,991	2,460,472	5,742,722

4.7 Project effectiveness – financial⁴⁷

Based on an applied financial discount rate of 5%⁴⁸, the following financial project effectiveness indicators were calculated and are shown in the following table.

Table 36 Financial project effectiveness indicators

Financial Project Effectiveness Parameters	Result
IRR (internal rate of return of project)	1.98%
NPV (net present value of project)	MEUR -5.534

This is an expected result for a public project in which market forces have been insufficient to bring about the necessary changes. As seen in the next section, the project is effective from the socio-economic perspective, with a positive EIRR that exceeds the social discount rate.

4.8 Project effectiveness – economic⁴⁹

Based on an applied social discount rate of 6%⁵⁰, the following economic project effectiveness indicators were calculated and are shown in the following table.

Table 37 Economic project effectiveness indicators

Economic Project Effectiveness Parameters	Result
EIRR (economic internal rate of return of project)	35.8%
ENPV (economic net present value of project)	MEUR 81.83
Benefit-cost ratio	2.9

The table presents the base case, which is tested with the sensitivity analysis (see section 4.9). The assessment of the economic (social) effectiveness of the project is based on the following adjustments to the financial analysis:

- > Socio-economic costs:
 - o Incremental operating cost (OPEX – the difference between the “with” and “without” project scenarios).

⁴⁷ See financial model tab “Fin ratios”.

⁴⁸ Confirmed in communication with the Environmental Projects Implementation Unit and no objection from Waste Management Department at Ministry of Environment.

⁴⁹ See financial model tab “EIRR”.

⁵⁰ 4% confirmed in communication with the Environmental Projects Implementation Unit and no objection from Waste Management Department at Ministry of Environment. Changed to 6% as per EBRD instruction.

> Socio-economic benefits:

- o Incremental revenues from user charges after corrections – this is the difference between revenues in the “with” and “without” project scenarios. Underlying this calculation is the assumption that household charges are calculated at a level equal to willingness to pay for improved SWM services. This assumption is tested in the sensitivity analysis (by what percentage would the willingness to pay have to decrease before EIRR = 0);
- o Revenues from recyclables;
- o Avoidance or proper collection and treatment of waste leachate – a fixed amount of 6.9 EUR/t;
- o Benefits from avoided CO₂ emissions. This compares the volume of CO₂ emission reductions in the new system multiplied by the CO₂ shadow price⁵¹.

4.9 Sensitivity analysis⁵²

The sensitivity analysis examines the impact of changes to independent variables on the main project indicators.

The independent variables are:

- > Investment costs (CAPEX).
- > O&M costs (OPEX).
- > Average disposable household income per capita.
- > Waste demand (tonnes of waste entering system).
- > Incremental revenues conversion factor (reflecting to what extent revenues reflect the household willingness to pay for SWM system improvements.
- > Recyclable prices. The sensitivity analysis includes a drop in recyclables prices, including to zero. This will not have a large impact given the method of introducing user charges that was agreed with the EBRD.
- > CO₂ shadow price.

The dependent variables are:

- > Financial: IRR, NPV
- > Socio-economic: EIRR, ENPV.
- > Financing and sustainability: Minimum DSCR, Operating/investment subsidy.

For each independent variable, the switching values (when the values equal zero or less) were calculated for the dependent variables. Those for which a 1% change results in a larger than 1% change for the dependent variable are shown in the following table.

⁵¹ According to the EBRD methodology: "Methodology for the economic assessment of EBRD projects with high greenhouse gas emissions. Technical note." The lowest value listed on page 5 was used – 46 EUR/ton. As per EBRD instruction, the rate will increase gradually up to 80 EUR/ton by 2050. In addition, the shadow price is included in the sensitivity analysis (by what amount would the price need to decrease for EIRR = 0).

⁵² See financial model tab “S”.

Table 38 Switching values (percent change from baseline value)

	Investment cost (k EUR)	O&M costs (2025), EUR/year	Average disposable HH income per capita,	Amount of waste collected	Incremental revenues conversion factor, %	Recyclable price, % of baseline	CO ₂ shadow price
IRR	-	-	-	-	-	-	-
NPV	-83%	-77%	-	-	-	683%	-
EIRR	-	-	-	-	-	-	-
ENPV	-	-	-	-	-	-	-317%
Min DSCR	-	-	-	-	-	-	-
Investment support	-	-	-	-	-	-	-

The most important conclusions are related to the socio-economic project effectiveness. Accordingly, the project's socio-economic effectiveness appears robust and only dramatic changes in independent variables compared to the baseline assumptions would have to occur before the project ceased to be socio-economically effective. For example, the CO₂ shadow price would have to decrease by 317% in order for ENPV to fall below zero. Otherwise, only investment costs have an impact on NPV and ENPV, but the switching values are beyond what can reasonably be considered plausible for the project.

5 Environmental and Social Assessment

5.1 Review of available data and site visit

The Consultant has prepared a draft English version of the available EIA (2015) and the Public Consultation Report (2016) has and reviewed these documents in addition to the FS (2015) and the Project Concept Reports (2016 and 2017) available in English.

As the available EIA (with the already expired Environmental Decision) covers only part of the service area and facilities of the new SMW system proposed for WMZ-1, a new EIA process will be required for the updated Project design.

In February 2022, the Consultant conducted a series of site visits (agreed with MoEnv and authorised by the EBRD) for verification/updating of information presented in the EIA regarding the environmental and social conditions of the sites selected for establishing the key facilities that of the areas adjacent to them. Observations for identification of any waste pickers have been made during the site visits.

Due to COVID-19 the site visits were carried out as visual inspections of the sites, telephone interviews and outdoor guidance without meetings with the site users and residents of adjacent areas. The brief reports on the site visits are included in the Appendix 2.

5.2 Environmental and social assessment

Environmental and social assessment is presented in a separate set of 6 documents:

- > ESA report (document ESA1 in Appendix 3A), accompanied by:
- > Compliance Summary Table (document ESA2 in Appendix 3B);
- > Environmental and Social Action Plan (ESAP, as document ESA3 in Appendix 3C);
- > Stakeholder Engagement Plan (SEP, as document ESA4 in Appendix 3D);
- > Non-technical Summary (NTS) of the ESA, as document ESA5 (in Appendix 3E); and
- > Land Acquisition and Resettlement Framework (LARF, as document ESA6 in Appendix 3F).

The compliance summary table includes recommended environmental and social management measures for achieving the compliance. The recommended measures are included in the Environmental and Social Action Plan proposed in line with the national laws and regulations of Moldova, the EBRD Performance Requirements, the EIB Environmental and Social Standards, as well as the best international practice.

5.3 Resilience to climate change

Engineering design and operation plans for the proposed facilities should be prepared taking into consideration the trends towards higher frequency of extreme weather events in Moldova.

According to the Country Climate Risk Profile⁵³, the climate trends observed in Moldova from the 1980s to the present include:

- > Increase in temperatures of 0.58°C per decade (with warming most significant between March–August). Seven of the ten warmest years in Moldova’s history occurred within the past two decades.
- > Gradual decline in rainfall and shift in seasonal rainfall patterns, with rainfall levels increasing March–May and decreasing June–August.

Projected changes include:

- > Increase in average temperature of 2°–3°C by 2050, with warming greatest from June– August.
- > Increase in the number of “hot” days (exceed current climate by 10 %) by 32 and “dry” days (zero precipitation) by 12 by 2050.
- > Changes in precipitation are uncertain; some projections suggest a mild reduction in annual precipitation by 2100, with drier summers (June– August), more humid winters (December–February) and more variable precipitation. Extreme precipitation events should be taken into consideration for design of leachate collection system for the landfill, as well as measures for surface runoff management at all sites planned for investments included in the Project.
- > Increase in the frequency and severity of extreme events such as droughts and floods.
- > Climate stressors and climate risks related to water resources include, *inter alia*, drought and reduced rainfall, reduced surface flows and water quality, increased scarcity of water resources for industrial use, reduced hydropower production and heating/cooling potential (thus, increased energy costs), increased scarcity of water resources for irrigation, particularly during the summer growing season, exacerbation of uneven spatial distribution of water resources.

Keeping in mind the scarcity of water resources, the Project should give due attention to assessment of conditions of the groundwater spring located within the future landfill site and to its value for the local community. Water supply for the landfill facility is envisaged via piped connection to the public grid. Allocation of water resources meeting the demand of the landfill facility will be verified at the design stage.

Resilience to climate change impacts shall be enhanced as the ability of SWM system to absorb climate-related disturbances while retaining the same basic structure and ways of functioning.

The guidance document "*Integrating Climate Change Information and Adaptation in Project Development*" elaborated by the EBRD and other financial institutions shall be followed throughout the Project to achieve the following climate resilience outcomes:

- i) Increased water availability in the face of increasing climatic variability;
- ii) Increased energy availability in the face of increasing climatic variability;
- iii) Increased agricultural potential in the face of increasing climatic variability;
- iv) Increased human health & productivity in the face of increasing climatic variability;

⁵³

v) Reduced weather-related disruption;

vi) Reduced weather-related damage.

Review of publications listed in *Annex 4: Examples of industry standards and guidance on climate resilience* to this guidance document could be supplemented by review of other publications (e.g. *Increasing the climate resilience of waste infrastructure*⁵⁴) and the experience from SWM projects and other investment projects in regions with conditions similar to the Project location.

The following measures could be recommended for enhancing resilience of waste management infrastructure:

- > Extend facility level contingency and emergency recovery plans to cover a full range of weather events;
- > Use the procurement process as an opportunity to require innovation in climate resilient solutions and flexible contingency arrangements;
- > Integrate climate risks within enterprise risk management and corporate responsibility programmes;
- > Take advantage of immediate opportunities to introduce low-cost, win-win, or no-regret measures to enhance site level management of climate risks;
- > Consider how the waste sector may be drawn into the Critical Infrastructure Resilience Programme in the future;
- > Develop a simple screening tool for vulnerability assessment at site level;
- > Include the waste sector within future cross-Government work exploring interdependencies climate resilience of various sectors;
- > Improve the coordination of emergency response and local authority resilience plans with waste infrastructure owners / operators.

Supplementary measures for awareness-raising regarding the climate change effects related to waste management could include:

- > Develop guidance for the waste sector, aimed at sites operators, and examples of adaptation opportunities;
- > Undertake activities to engage with and raise awareness across waste sector of the potential impacts of climate change.

Sites for the proposed SWM facilities have been selected in areas beyond floodplains of the surface water bodies. The risk of flooding specifically for the Project sites is low.

Engineering design and operation system of the Project facilities will include measures for strengthening the SWM infrastructure resilience to climate change, e.g., to ensure capacity of surface water runoff and leachate management systems, continuous and safe operation of SWM management system during extreme weather events, security of top cover for waste disposal sites, prevention of waste fires, waste slides and landslides, etc. As water is typically not efficient for extinguishing of landfill fires, the landfill operator will establish procedures and staff training to ensure security system preventing any unauthorised access to the sites, availability of enough soil for regular covering of waste including systematic compaction of waste and soil within the landfill cells, as well as implementation of general fire protection measures at all SWM facilities to keep the risk of fire low.

⁵⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/183933/climate-resilience-full.pdf

The following technical options for fire protection are outlined in the Feasibility Study (2017) for the landfill site and will be also relevant for the associated facilities: stormwater basin (1,400 m³), fire extinguishers placed in accordance with the local standards, storage of soil, preferably cohesive soil (a minimum capacity 500 m³).

Stormwater management system will include a network of ditches and berms that shall prevent clean water inflow from surrounding areas from entering the SWM facilities and particularly the areas occupied with waste. This will be valid during operation of SWM facilities, but also after capping of the landfill cells.

Stormwater from asphalted areas, roofs, areas of capped cell(s) or planned cell(s), the surrounding areas, etc. could be infiltrated through ditches or, taking into consideration the water scarcity, directed to a storage basin established at the lowest point of the regional waste management centre territory. To prevent water from infiltration through the basin bottom, the base of the pond, up to the maximum water level will be sealed with clay (e.g. from excavation of landfill cell) and protected, e.g. including a layer (thickness 10 cm) of crushed stones. Water accumulated in the basin could also be used for fire protection, watering the roads and vegetation, maintaining the optimal humidity of compost, cleaning of vehicles leaving the waste management centre area, etc. The water storage basin will include an overflow unit connected to a ditch leading to the local small creek.

Site-specific climate change resilience issues related to balance of precipitation and evaporation within the landfill area. They are essential for management of leachate.

Leachate at landfills is generated from precipitation (rainfall and snow) as well as from the excess humidity of the disposed waste. Treatment of the leachate is necessary to clean it, but under certain circumstances (low precipitation and high evaporation) an alternative solution is feasible: leachate collection in an artificial basin and evaporation. In case of higher precipitation, the engineered leachate treatment is required to reduce the effluent impact on the environment.

The leachate generation at the landfill should be minimized to reduce effort and costs for leachate treatment. A system of 3 cells is proposed for the regional landfill to be established within the Project. Inflow of water from areas adjacent to the accumulated waste will be prevented by drainage.

During the Feasibility Study (2017), the quantity of leachate and evaporation rate were calculated by review of the long-term meteorological data of the years 1959 - 2012, which indicated the average precipitation is 595 mm/year but varying between 307 mm in year 2003 and 818 mm in year 1966.

For the estimation of leachate balance the landfill operation scenario with the largest quantity of leachate (after the opening of Cell 3) was investigated. The typical leachate generation was estimated about 50 % of the precipitation (remaining is evaporation). In covered areas of the landfill the leachate generation rate is lower (30 % of precipitation), because the soil has a retention effect and prevents the water from infiltrating to the waste. Under these circumstances the leachate quantity generated at the landfill was estimated and used for estimating the area of leachate basin which should be located beneath the waste disposal area. The basin will be used for evaporation of leachate and as a buffer for the leachate treatment plant.

At Cahul landfill site the evaporation rate is relatively high. Hence the water surface in the leachate basin should be maximized in order to evaporate as much leachate as possible and to reduce the leachate quantity to be technically treated. The surface of the basin proposed in the FS (2017) is 1,100 m² with a storage capacity of 2,800 m³, assuming the leachate depth is 2.5 m. The required capacity of the leachate treatment plant (based on reverse osmosis process) was calculated for various stages

of the landfill lifetime. As assumed in the FS (2017), in case the capacity of the leachate treatment plant is temporary not sufficient due to extraordinary strong rainfalls or longer operation breaks or other emergency cases, the landfill is constructed in a way that the leachate pipe can be closed by a valve and the leachate can be temporary stored in the landfill, which acts like a retention basin.

Water balance is also a climate change resilience issue essential for operation of composting plant (using windrows technology) proposed within the Project for treatment of separately collected park and garden (green) waste.

As mentioned in the FS (2017), treatment in windrows required certain water content to be maintained. In cool and humid climate, the treatment is carried out partly under roof to avoid a breakdown of the biological process due to wetting. Same applies for climate with extreme heavy precipitation of 30 mm/h and more. The climate conditions in Moldova are favourable and allow running the process in open air, since larger precipitation (above 40 mm) occurs in warm months (April to September), when the daily average high temperature is mostly above 20°C. During that time, the evaporation is high, hence the windrows will quickly loose moisture. During that period irrigation of the windrows will be required. Irrigation water can be taken from the maturation basin of the leachate treatment plant, since the remaining concentrations will be low and will not contaminate the final compost product. Excess water during wet periods could be captured and directed to the leachate pond.

It is assumed in the FS (2017) that the composting plant does not require specific connections to public utility networks, because it is part of the future landfill site. The water supply for irrigation of windrows will be provided by means of a tractor pulled tank trailer which is filled at the maturation basin of the landfill leachate treatment plant. Leachate from the composting plant area is directed to the landfill leachate collection system.

Measures planned within the Project for the regular collection of practically all MSW generated in WMZ 1 and the closure/capping of dumpsites existing in WMZ-1 as soon as the new regional sanitary landfill is operational will also improve resilience of the SWM system to climate change – eliminate the risks of waste fires, of waste spreading by winds and stormwater, etc.

TA consultants contracted by the EBRD will be required to provide the necessary support and capacity building for planning and implementation of the climate change resilience measures relevant for the Project. The potential impacts related to changes in climate patterns are sufficiently covered by the FS (2017), EIA (2017), in the Environmental and Social Assessment Report (see Appendix 3A) and are addressed in the proposed design components of the Project.

6 Procurement and Contracting

6.1 Procurement principles

According to EBRD's procurement guidelines the following four formats of procurement can be applied:

- > Procurement of works;
- > Procurement of supply and installation of plant and equipment;
- > Procurement of goods (and related services);
- > Procurement of services.

6.2 Procurement plan for this Project

Taking into account the procurement strategy of the FS and required adjustments (as described in this Report) the establishment of the following measures under the integrated SWM system for WMZ-1 are foreseen:

- > Supply of equipment for waste collection and transport, including equipment for separate collection of recyclables;
- > Construction of tree transfer stations in Cantemir, Taraclia, and Comrat;
- > Construction of one sorting station in Cahul;
- > Construction of a composting plant in Cahul;
- > Construction of new sanitary landfill in Cahul;
- > Closure and re-cultivation of Cahul landfill; and
- > Closure of other dumpsites in WMZ-1.

It is the basic assumption that all tender procedures will be organized through Environmental Projects Implementation Unit (EPIU).

About implementation of the investments needed for WMZ-1, Table 39 below presents the type of contracts envisaged.

Table 39 Type of contracts envisaged

Investment	Location	Type of contract
Lot 1 - Regional Sanitary Landfill construction	Cahul	WORKS 1
Lot 1 - Composting plant construction		
Lot 1 - Sorting plant construction		
Lot 2 - Three transfer stations construction	Cantemir (Cania), Taraclia, and Comrat	
Lot 3 - Closure and re-cultivation of Cahul landfill	Cahul	
Lot 4 - Closure of other dumpsites in WMZ-1	Cahul, Cantemir, Taraclia, and ATUG (Comrat, Ceadir-Lunga, Vulcanesti districts of ATUG)	
Lot 1 - Equipment / goods for waste treatment and disposal facilities	Cahul	SUPPLY 1
Lot 2 - Equipment / goods for transfer stations	Cantemir (Cania), Taraclia, and Comrat	
Waste collection equipment: Lot 1 – Containers/bins and RFID tags Lot 2 – Concrete slabs for waste collection points	Cahul, Cantemir, Taraclia, and ATUG (Comrat, Ceadir-Lunga, Vulcanesti districts of ATUG)	SUPPLY 2
Waste collection equipment: Lot 1 – Waste compaction trucks Lot 2 – Supervision vehicles	Cahul, Cantemir, Taraclia, and ATUG (Comrat, Ceadir-Lunga, Vulcanesti districts of ATUG)	SUPPLY 3
Waste collection: Waste collection monitoring system	Cahul, Cantemir, Taraclia, and ATUG (Comrat, Ceadir-Lunga, Vulcanesti districts of ATUG)	SUPPLY 4
Technical Assistance Implementation support (design, procurement, construction supervision)	New Regional Operator, Cahul, Cantemir, Taraclia, and Comrat	SERVICE 1
Technical Assistance Corporate development (corporate development plans, ESAP, SEP, Public Service Contracts)	New Regional Operator, Cahul, Cantemir, Taraclia, and Comrat	SERVICE 2

The sections below present the different type of contracts which will be needed for implementation of the project.

6.2.1 Works contracts

The Works Contracts will be tendered as Open Tender in accordance with EBRD's Procurement Rules. The multi-stage open tendering shall be the procurement method for all design and build works contracts to be financed under the project. The time between the date of the procurement notice being sent to the Official Journal of the European Union and in the ECEPP (EBRD's Client eProcurement Portal) for publication and the deadline for submitting offers shall be at least 60 calendar days. The tables below present the four lots under the works contracts envisaged.

Table 40 Lot 1: Construction of landfill, sorting and composting plants in Cahul

Item	Details
Contract subject	Construction of landfill, sorting and composting plant in Cahul
Contract budget without VAT	EUR 5,450,000
Type of contract procedure	International Open Tender – Two stage

Table 41 Lot 2: Construction of Cania, Taraclia, and Comrat transfer stations

Item	Details
Contract subject	Construction of Cania, Taraclia, and Comrat transfer stations
Contract budget without VAT	EUR 1,450,000
Type of contract procedure	International Open Tender – Two stage

Table 42 Lot 3: Closure and re-cultivation of Cahul landfill

Item	Details
Contract subject	Closure and re-cultivation of Cahul landfill
Contract budget without VATs	EUR 800,000
Type of contract procedure	International Open Tender – Two stage

Table 43 Lot 4: Closure of other dumpsites in WMZ-1

Item	Details
Contract subject	Closure of other dumpsites in WMZ-1

Contract budget without VATs	EUR 2,808,000
Type of contract procedure	International Open Tender – Multi-stage

6.2.2 Supply contracts

The supply contracts will be tendered as Single Stage Open Tender in accordance with EBRD's Procurement Rules. The tables below presents the supply contracts envisaged.

Table 44 Equipment / goods for SWM facilities

Item	Details
Contract subject	Lot 1 - Supply of: > Equipment/goods for waste treatment and disposal facilities in Cahul Lot 2 – Supply of > Equipment/goods for three transfer stations in Cania, Taraclia, and Comrat
Contract budget without contingencies	EUR 2,782,000
Type of contract procedure	Single Stage Open Tender

Table 45 Waste collection equipment 1 for all four waste collection catchments (Cahul, Cantemir, Taraclia, Comrat)

Item	Details
Contract subject	Lot 1: > Containers/bins and RFID tags Lot 2: > Concrete slabs for waste collection points
Contract budget without contingencies	EUR 6,993,000
Type of contract procedure	Single Stage Open Tender

Table 46 Waste collection equipment 2 for all four waste collection catchments (Cahul, Cantemir, Taraclia, Comrat)

Item	Details
Contract subject	Lot 1: > Waste compaction trucks Lot 2: > Supervisors' vehicles
Contract budget without contingencies	EUR 3,470,000
Type of contract procedure	Single Stage I Open Tender

Table 47 Waste collection 3 for all four waste collection catchments (Cahul, Cantemir, Taraclia, Comrat)

Item	Details
Contract subject	> Waste collection monitoring system
Contract budget without contingencies	EUR 36,000
Type of contract procedure	Single Stage Open Tender

6.2.3 Services contracts

To implement a project of such magnitude external technical assistance will be needed to support the Operators, LPAs and beneficiary communities for implementation and management of the project.

The technical assistance component of the project will be split in two contracts – one dealing with implementation support and the second with corporate development of entities established for the service provision and stakeholder participation.

The service contracts will be tendered as Single Stage Competitive Selection in accordance with EBRD's Procurement Rules.

The responsibilities of the **Project Implementation Support, and Supervision Consultant** will consist of at least the following:

- > Coordination of project activities among the different partners (LPAs, Operator, contractors, executive agencies, etc.);
- > Update and development of design documentation for the facilities;
- > Preparing technical specifications for the supply of equipment;
- > Support the contracting authority in the preparation of Terms of References and tender dossiers for procurement contracts; and support in the evaluation and contract award to ensure contracting quality;
- > Monitoring of the project performance of contractors in respect of approved components in the work plan, and ensuring compliance with EBRD loan and policy requirements;
- > Construction supervision and assistance during commissioning of facilities;
- > Preparation of regular reports on the status of projects activities as agreed in the Work Plan
- > Participation in Steering Committee and other meetings with stakeholders.

The responsibilities of the **Corporate Development and Stakeholder Participation Programme (CDSPP) Consultant** will consist of at least the following:

- > Assistance in coordination of project activities among the different partners (LPAs, Operator, contractors, executive agencies, etc.);
- > Improve/support the development of commercial, operating and environmental performance of the regional operators;
- > Development of Corporate Development Plan for the Operators;

- > Update and support for the implementation of ESAP;
- > Update and support for the implementation of Stakeholder Engagement Plan (SEP), develop and help implement a Stakeholder Participation Programme (SPP), including public awareness campaign, if applicable;
- > Assistance to the Operators in the calculation and to local authorities in setting up user charges, developing SWM plans and regulations;
- > Assistance in financial management and reporting, drafting requirements for the uniform billing system;
- > Development and assistance in the signing of Public Service Contracts between LPAs, the Operator and operators of collection services;
- > Preparation of regular reports on the status of projects activities as agreed in the Work Plan;
- > Participation in Steering Committee and other meetings with stakeholders.

The tables below present the technical assistance service contracts envisaged.

Table 48 Technical assistance service contract for Project Implementation support, Engineering Design and Contract Supervision Consultant

Item	Details
Contract subject	Consultant for providing technical assistance for project management
Contract budget without direct and indirect taxes	EUR 900,000
Type of contract procedure	International Open Tender – Single stage

Table 49 Technical assistance service contract for Corporate Development and Stakeholder Participation Programme (CDSPP) Consultant

Item	Details
Contract subject	Consultant for providing technical assistance for Corporate Development
Contract budget without contingencies	EUR 200,000
Type of contract procedure	International Open Tender – Single stage

6.3 Procurement Plan

The Procurement Plan for WMZ-1 is presented in the table overleaf.

Table 50 Procurement Plan WMZ-1 (amounts are in EUR thousand)⁵⁵

											Time Schedule		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nr.	Description	Estimated contract value	Financing by EBRD	Financing by others		Contract type	Procurement method	Subject to Selective Review	Prequalification invitation mm/yy	Prequalification results mm/yy	Tender invitation mm/yy	Contract Award mm/yy	Contract completion mm/yy
	CapEx				Amount								
1	SWM Facilities: Landfill, sorting plant and composting plant in Cahul City (Cahul rayon); Transfer station Cania (Cantemir rayon); Transfer station Taraclia Town (Taraclia rayon); Transfer station Comrat Town (UTAG); Closure of all dumpsites in WMZ 1												
1.1	Construction of SWM Facilities for WMZ 1: Lot 1: Landfill, sorting plant and composting plant in Cahul City, Closure of dumpsite at landfill site in Cahul City Lot 2: Transfer station Cania Town n, Transfer station Taraclia Town n, and transfer station Comrat Town n	7.700	2.572	EIB	2.882	Works - FIDIC Yellow	Open Multiple Stages		N/A	N/A	Okt 25	Mrz 26	Dez 27
				IDG*	2.246								
1.2	Equipment for waste treatment and disposal facilities and transfer stations for WMZ 1: Lot 1: Equipment / goods for waste treatment and disposal facilities in Cahul Lot 2: Equipment / goods for the transfer stations in Cania, Taraclia, and Comrat	2.782	929	EIB	1.041	Goods	Open Single Stage		N/A	N/A	Okt 25	Mrz 26	Mrz 27
				IDG*	811								
1.3	Closure of all dumpsites in WMZ 1	2.808	938	EIB	1.051	Works - FIDIC Yellow	Open Single Stage		N/A	N/A	Jul 27	Dez 27	Dez 29
				IDG*	819								
2	Waste Collection Equipment												
2.1	Containers and bins, RFID tags, Concrete slabs for waste collection points for WMZ 1 Lot 1: Containers/bins and RFID tags Lot 2: Concrete slabs for waste collection points	6.476	3.238	EIB	3.238	Goods	Open Single Stage		N/A	N/A	Apr 26	Sep 26	Sep 27
2.2	Waste collection trucks and supervisors vehicles for WMZ 1 Lot 1: Waste compaction trucks Lot 2: Supervisors vehicles	3.506	1.753	EIB	1.753	Goods	Open Single Stage		N/A	N/A	Mrz 26	Aug 26	Aug 27
2.3	Waste collection monitoring system for WMZ 1	517	259	EIB	259	Goods	Alternative		N/A	N/A	Jul 26	Dez 26	Dez 27
3	Contingencies for WMZ 1												
3.1	Contingencies for WMZ 1	1.590	531	EIB	595								
				IDG*	464								
	Total CapEx	25.379	10.220	EIB	10.820								
				IDG	4.340								
	Technical cooperation												
1	Project Implementation Support Consultant and Supervision for WMZ 1	800	100	EIB	100	Consultancy	Competitive selection - Single Stage		N/A	N/A	Feb 24	Jun 24	Dez 27
				EBRD grant	600								
2	Corporate Development and Stakeholder Participation Programme Consultant for WMZ 1	300	0	EBRD grant	300	Consultancy	Competitive selection		N/A	N/A	Jun 24	Okt 24	Dez 27
3	Total TC	1.100	100		1.000								

⁵⁵ The General Procurement Notice was/will be published on the Bank's Procurement Opportunities website on [specify the date]

7 Risks

As part of the Feasibility Report (2015), the probability of occurrence of the identified risks have been assessed according to the classification proposed in the "Guide to Cost-Benefit Analysis of Investment Projects. Economic Appraisal Tool for Cohesion Policy 2014-2020", as follows:

- A: Very unlikely (0–10% probability);
- B: Unlikely (10–33% probability);
- C: About as likely as not (33–66% probability);
- D: Likely (66–90% probability);
- E: Very likely (90–100% probability).

The severity of the impact has also been assessed in line with the recommendations proposed in "Guide to Cost-Benefit Analysis of Investment Projects. Economic Appraisal Tool for Cohesion Policy 2014-2020":

- I: No relevant effect on social welfare, even without remedial actions;
- II: Minor loss of the social welfare generated by the project, minimally affecting the project long run effects. However, remedial or corrective actions are needed;
- III: Moderate: social welfare loss generated by the project, mostly financial damage, even in the medium-long run. Remedial actions may correct the problem;
- IV: Critical: High social welfare loss generated by the project; the occurrence of the risk causes a loss of the primary function(s) of the project. Remedial actions, even large in scope, are not enough to avoid serious damage;
- V: Catastrophic: Project failure that may result in serious or even total loss of the project functions. Main project effects in the medium-long term do not materialize.

Based on the level at which the likelihood of occurrence and the severity of the impact of the risk was assessed, the level of risk was assessed according to the matrix below:

Table 51 Risk assessment matrix

Severity/ Probability	I	II	III	IV	V
A	Low	Low	Low	Low	Moderate
B	Low	Low	Moderate	Moderate	High
C	Low	Moderate	Moderate	High	High
D	Low	Moderate	High	Very High	Very High
E	Moderate	High	Very High	Very High	Very High

The potential Project risks and mitigations are presented in the following table:

Table 52 Potential Project risks and mitigations

Risk	Causes	Effects	Timing	Probability of occurrence (P)	Severity of impact (S)	Risk level (=P*S)	Prevention and/or Mitigation measures	Residual risk after prevention/mitigation measures
1. Design, tendering and construction risks								
Delays in tender process	Weak tender document or appeals from bidders who are not selected	Delay in commencement of work	Short	C	III	Moderate	Ensuring appropriate time contingencies in the tender process. TA Consultant to support tender process	Low
No bids received	No interest by construction companies or low working capacity of such companies	Delay in commencement of work	Short	B	II	Low	Realistic cost estimates, taking into account the current market situation	Low
Construction delay	Contractor with low capacity	Delay in compliance to EU directives and national legislation	Medium	C	III	Moderate	Appoint Project Manager within PIU and Consultant to closely monitor construction works	Medium
2. Operational risks								
Delay in obtaining permits	Low political commitment to issue permits	Delay in commencement of work	Short	B	II	Low	Ensure close monitoring of permitting process	Low
Difficulties in organising operation	Lack of experience and appropriate trained staff	Delay in commencement of facility and lower performance of facility	Medium	D	III	High	Provide sufficient training, capacity building etc.	Medium
3. Institutional and regulatory risks								
Failure of local political decision makers to accept new institutional set-up	Lack of local initiatives, failure of proper presentations to the local councils, fear to lose control	Delay of council decisions of the LPAs to take part in the project as outlined in the FS and other related documents and subsequent delays in establishing the new IMJSC and in starting the project (condition precedent)	Short	A	V	Moderate	Close monitoring and follow-up by MoEnv (EPIU). Individual coordination with politicians before the municipal council meetings. Proper presentation.	Low

Risk	Causes	Effects	Timing	Probability of occurrence (P)	Severity of impact (S)	Risk level (=P*S)	Prevention and/or Mitigation measures	Residual risk after prevention/mitigation measures
Lack of qualified staff (managerial and technical) to be employed by the regional operator	The best resources are concentrated in Chisinau, low wages	Poor management, weak performance, delay in commencement of work	Short/Medium	C	III	Moderate	Attracting staff from current operators, from neighbouring rayons or even from Chisinau; training, as part of the CDSPP	Low
LPAs are not willing to transfer the collection and transport services from the current operators to the IMJSC after the commissioning of the regional infrastructure	Opposition from the local politicians, that may be newly elected by the time the regional infrastructure will be commissioned.	Breach of the PSA	Medium/Long	A	V	Moderate	Include the condition clearly in the Project Support Agreement; Declared readiness (decision of the municipal councils) to ensure the transfer of the collection and transportation to the IMJSC with the commissioning of the regional landfill should constitute a condition precedent for the Loan Agreement.	Low
LPAs are not able to elaborate and approve the required local regulations and SWM plans	Lack of experience, lack of knowledge, lack of staff, lack of guidance from the national authorities	Project needs to spend more time and resources to guiding, training, helping the authorities (all, small and large)	Medium	E	II	Very high	CDSPP to elaborate and to provide sample local regulations and SWM plans, as well as related training	Low
LPAs withdrawing from the cooperation (IMCA)	New politicians after new local elections, lack of cooperation culture, misunderstandings etc.	In case of LPAs – major impact, need to reconsider the institutional set-up, mediation, etc. In case of a small LPA – minor impact.	Medium/long	C	III	Moderate	Proper IMCA provisions to regulate the withdrawal from the cooperation, including detailed provisions on indemnity, compensations, procedures etc.	Low
Inability to cover operational cost through user charges	Low affordability (low disposable household income)	Insufficient revenue of the IMJSC to continue sustainable operation to the required technical	Medium/Long	C	III	Moderate	Subsidies from the local or national budget (to be included as commitments in the PSA and in the Loan Agreement)	Low

Risk	Causes	Effects	Timing	Probability of occurrence (P)	Severity of impact (S)	Risk level (=P*S)	Prevention and/or Mitigation measures	Residual risk after prevention/mitigation measures
		and environmental standard						
4. Financial risks								
Lower levels of user charges	Low political commitment towards implementation of user charges strategy	Lower revenues leading to sustainability problems	Medium	D	IV	Very High	Adopt unified charges calculation method at national level. National and local charges regulation limited to approval of proper charges calculation. GoM and/or LPA subsidy to operator if cost-recovery charges not approved. Charges calculation methodology as part of corporate development and technical assistance package.	Medium
Lower number of contracts with customers than expected	Lower contracting rate or commitment from customers	Lower revenues leading to sustainability problems	Medium	D	III	High	Awareness campaigns to introduce integrated SWM system. LPA support (customer database) to operating company to sign customer contracts. National legal changes to require SWM contract, either directly with service provider or through housing association (which has a contract with service provider).	Medium
Low level of fee collection	Customers not willing to pay for services	Lower revenues leading to sustainability problems	Medium	D	III	High	Awareness campaigns to introduce integrated SWM system. LPA support (customer database) to operating company for billing and collection.	Low
Lack of market opportunities to sell recyclables	No or low demand at local or international market	Lower revenues leading to sustainability problems	Medium	D	II	Moderate	Market study and networking to sell recyclables for attractive price (part of TA package).	Medium

Risk	Causes	Effects	Timing	Probability of occurrence (P)	Severity of impact (S)	Risk level (=P*S)	Prevention and/or Mitigation measures	Residual risk after prevention/mitigation measures
							Low baseline assumptions in financial model for sales of recyclables to minimise dependence of user charges design on recyclables.	
Deterioration of assets	Lack of operation and maintenance of facilities	Higher operation costs and higher demand for reinvestments	Medium / Long	D	III	High	Training of operator to maintain assets. Collection of charges.	Moderate
Insufficient funds to cover DSCR (part of Loan Agreement)	Low tariffs and/or revenue collection rates	Failure to meet loan requirements	Short/ Medium	D	III	High	Decouple debt service from charges calculation for this project (stipulate in Loan Agreement on-granting of loan to LPAs/operator). GoM and/or LPA investment subsidy when reinvestments required.	Low
5. Environmental and social risks								
Need for new EIA process for environmental permit obtainment	Lack of resources for the EIA process for the new Project design	Delays in the Project implementation and extra costs for a new EIA process	Short	D	III	Moderate	Clarification of the procedure to ensure validity of EIA	Low
Engineering design and ESMP not including adequate E&S mitigation measures	Designer is not selected yet ESMP is to be updated per the design	Design does not include adequate measures for mitigating E&S impacts	Short	B	III	Moderate	Procure services of competent designer Design review by MoEnv, EBRD, EIB	Low
Poor performance and supervision CESMP implementation by contractors and suppliers	Contractor is not selected yet, CESMP is not available	Structures constructed without adequate measures for mitigating E&S impacts	Short	B	IV	Moderate	Involve capable contractors and suppliers, enforce their performance per approved design/ specifications	Low
Poor operation of equipment and facilities - fragmental implementation of OESMP	Operator is not in place yet, OESMP is not available	Poor mitigation of the Project's E&S impacts	Long (throughout the Project lifetime)	C	IV	High	Strengthen capacity to enforce E&S performance of SWM service providers	Moderate

Risk	Causes	Effects	Timing	Probability of occurrence (P)	Severity of impact (S)	Risk level (=P*S)	Prevention and/or Mitigation measures	Residual risk after prevention/mitigation measures
Fragmental implementation and not updating of SEP including grievance mechanism	Lack of capacity (EPIU, contractor, SWM service providers)	Lack of support from stakeholder. Conflicts not resolved	Long (throughout the Project lifetime)	D	III	High	Strengthen capacity of EPIU, contractor and SWM service providers to implement and updating of SEP with grievance mechanism	Low
Poor reporting on E&S performance	Reporting procedures are not established yet	Requirements of the Banks and local stakeholders are not met	Long (throughout the Project lifetime)	B	II	Low	Establish and maintain the E&S reporting procedures per approved ESMP	Low
Need for new EIA process for environmental permit obtainment	No agreement on extending the validity of existing EIA	Delays in the Project implementation and extra costs for a new EIA process	Short	D	III	Moderate	Clarification of the procedure to ensure validity of EIA	Low
6. Other risks								
Opposition from locals to accept the locations for SWM facilities	Negative impact on the environment and the quality of life of the inhabitants of the region	Delay in commencement of activity	Short	C	III	Moderate	Awareness sessions on applied technologies Mitigation measures and implementation social projects for concerned population	Low
Protests of local population during construction of SWM facilities	Poor work with local population on awareness regarding the new SWM system	Delay in construction of SWM facilities	Short	C	III	Moderate	Discussion sessions with population to understand and respond to their concerns Awareness sessions with the population on modern SWM facilities/technologies	Low
Project Cost overrun	Inadequate design cost estimates or unpredictable price increases	Invest cost higher than expected	Short	D	IV	High	Prepare realistic price estimates	Medium

8 Alignment of the project with Bank's mandate

8.1 Green Economy Transition ("GET")

The Paris Agreement was signed by the Prime Minister of the Republic of Moldova in New York on 21 September 2016, being subsequently ratified by the Parliament by Law no. 78 of 04.05.2017 on ratification of the Paris Agreement, while GHG emission reduction targets set in the National Determined Contribution of the Republic of Moldova, were officially approved at national level by Government Decision no. 1470 of 30.12.2016 on approval of the Low Emission Development Strategy of the Republic of Moldova until 2030 and the Action Plan for its implementation.

In accordance with the Updated Nationally Determined Contribution (2020) where waste as a source of about 10% of all GHG emissions in the country is mentioned among the key emitter sectors, the Republic of Moldova has committed to reach by 2030 the unconditional target of reducing GHG emissions by 70% as compared to the level recorded in the reference year (1990). The reduction commitment could be conditionally increased to about 88%, in line with this global agreement, which addresses important issues such as provision of low-cost financial resources, technology transfer and technical cooperation, access to all of them as appropriate to the challenges of global climate change.

The development of the Third Biennial Update Report (BUR3) of the Republic of Moldova prepared in 2021 to be reported to the United Nations Framework Convention on Climate Change (UNFCCC), the implementation of the Low Emission Development Program of the Republic of Moldova until 2030 (LEDP 2030) and of the Action Plan for its implementation streamline an essential contribution of Moldova to solving the climate change problem both nationally and globally. LEDP 2030 will serve as guidance and officially approved document for achieving the targets included in the updated NDC.

Targets for reducing GHG emissions compared to the level of 1990 reference year defined in the LEDP 2030 for the key emitter sectors in Moldova including waste management are presented in the following table:

Table 53 GHG emission reduction targets in Moldova by sector, %

Sectors	Until 2025		Until 2030	
	unconditional	conditional	unconditional	conditional
Energy	83	87	81	87
Transport	56	58	52	55
Buildings	76	78	74	77
Industry	34	37	27	31
Agriculture	48	50	44	47
LULUCF	-33	195	10	391
Waste	16	19	14	18
TOTAL	71	83	70	88

Source: Third Biannual Update Report of the Republic of Moldova, Chisinau, June 2021

The GET analysis describes qualitatively and quantitatively which parts of the Project investment can be seen as an environmentally sustainable investment in terms of the Green Economy Transition Approach. An overview table of the GET analysis is presented in Appendix 4.

The proposed Project's aim is to improve the waste management system in the WMZ-1 in Moldova with increased coverage of waste collection services, increased sorting/recovery of recyclables and improvement of waste disposal practices in line within the legislative agreements of the EU.

The collected MSW in WMZ-1 is currently disposed of at about 100 dumpsites; only a few of them are authorised sites. In urban areas the MSW is transported to the waste disposal sites by the SWM companies. In most villages, the MSW is transported individually by the residents to the local dumpsites.

Generally, the collected waste in WMZ-1 is delivered to dumpsites, which do not comply with requirements on environmental and human health protection. They are not fenced, not monitored, and not equipped with weighbridges. Many residents of the area dump the waste in the nature (open fields, rivers, woodlands, etc.). In addition, backyard burning of waste is a common practice in the region.

To end the practice of dumpsites and littering, a system for the collection of waste and its sound disposal will be implemented within the proposed Project. A separate collection of recyclable waste and residual waste is to be implemented where the residual waste will be taken to the EU compliant landfill and the recyclables (plastic, cardboard/paper, glass) will be separately sorted/recovered and sold to recycling companies. Furthermore, organic/green waste from parks and gardens will be treated at a composting facility and thus also diverted from landfilling. The Project proposes to dispose of residual waste at an EU compliant regional landfill at a site near Cahul town in Cahul Rayon. The landfill needs to be established and gradually developed with capacity sufficient for receiving the residual waste from whole WMZ-1 for about 20 years.

8.1.1 GET category

The three main categories of projects and project component activities recognised as addressing key global environmental concerns and providing physical environmental benefits within the GET approach as defined in the EBRD GET Handbook⁵⁶ are:

1. climate change mitigation (reduction of greenhouse gas emissions)
2. climate change adaptation (enhancement of climate change resilience)
3. other environmental benefits (including improved resource efficiency, reduced local pollution, improved resilience, and restoration of ecosystems).

The aim of the proposed Project is to implement an improved SWM system in WMZ-1 of Moldova with the following key components:

- > Regular collection of waste from all urban and most of rural areas using containers for separate collection of recyclables, of residual MSW, as well as of park and garden waste;
- > Digital monitoring of the waste collection process;

⁵⁶ Implementing the EBRD Green Economy Transition. Technical Guide for Consultants: Reporting on projects performance against the Green Economy Transition Approach, Version 2 May 2018

- > Construction and operation of sorting station for separately collected recyclables;
- > Construction and operation of regional sanitary landfill (compliant with the EU Landfill Directive) in Cahul for disposal of residual waste;
- > Construction and operation of composting station (for treatment of separately collected park and garden waste);
- > Construction and operation of transfer stations for waste (residual, recyclables, and green waste), one in Cantemir, one in Comrat and one in Taraclia; and
- > Closure of all dumpsites in WMZ-1 as soon as the regional sanitary landfill is operational.

The GHG emission reductions due to the Project could be calculated as a difference between emissions generated within the SWM system without the Project (baseline or business-as-usual scenario) and emissions generated within the future system established due to the Project implementation.

In the baseline scenario, decomposition of waste disposed of at dumpsites results in uncontrolled emissions of landfill gas containing methane. The EU compliant regional sanitary landfill established within the Project will have a system for management of landfill gas generated during decomposition of waste. As estimated in the FS (2015), the highest generation of methane would be reached about 20 years after the landfill operation start. The maximum annual emission rate will be about 1,040,000 m³ or 118.5 m³/h. During further 20 years, the landfill gas generation rate will gradually decrease. For the time frame of 88 years considered in the FS (2015) including 21 years of waste disposal period and further years of post-closure period with the estimated total landfill gas quantity generated (23.4 million m³) and the realistic landfill gas collection rate of 60%, the total amount of collected methane is estimated 14 million m³.

The FS (2015) assumes that the extracted landfill gas will be directed to a gas flare for combustion. Cost of landfill gas collection and flaring system (i.e., vertical gas collection wells, gas transmission pipes, blower, dehumidification unit, and high temperature gas flare) is included in CAPEX (as part of the PIP for the landfill construction investments). The degassing system will be constructed in a way that a gas engine for production of electricity can be included at a later stage, after getting reliable information about gas quality and flow in a long-term prospect. Landfill gas generation usually starts 6-12 months after the start of landfill, depending on the type and amount of waste. A network of gas collection wells will be established by gradually building up the vertical perforated metal or plastic (HDPE) pipes while placing of waste into a Cell. To protect each gas collection well from being clogged by waste, a column of gravel will be filled up around the perforated pipe. The gas wells will be connected gradually to the gas flaring system during the operation of the LF as the waste is disposed of. The capping (closure) of Cell 1 is part of LTIP and will include any extra activities needed to make sure that all gas collection wells are connected to the gas flaring system. With the construction and operation of Cell 2 and Cell 3 of the landfill (as part of LTIP) the gas collection wells installed in them will be also connected to the gas flaring system. Any future needed improvements (including replacements) for the entire gas flaring system will be made gradually as part of the LTIP.

The National Waste Management Strategy elaborated for 2013-2027 does not include specific quantitative targets for waste prevention/recovery except for the following target with regard to Packages and Waste Package: Increase in the degree of reuse and recycling of packages by 20% by 2027.

Objectives set out in the Regulation on packaging and waste of packaging approved by GD 561 of 31.07.2020⁵⁷ in its Article 11 sets the following targets regarding the recovery and recycling of

⁵⁷ https://www.legis.md/search/getResults?doc_id=122773&lang=en

packaging waste, that must be achieved at national level, in stages, according to Annex no. 2, no later than 2029:

- > recovery of at least 50% of the weight of packaging waste;
- > recycling of at least 45% of the total weight of packaging materials contained in packaging waste, with the achievement of the following minimum values for the recycling of each type of material contained in packaging waste:
 - > 45% by weight for glass;
 - > 50% by weight for paper / cardboard;
 - > 40% by weight for the metal;
 - > 10% by weight for wood;
 - > 20% by weight for plastic, considering only the recycled material in the form of plastic.

In order to achieve the objectives, administrative-territorial units and economic agents shall be responsible for packaging which has become waste in the national territory. The regulation stipulates the categories of economic operators responsible for the entire quantity of packaging placed on the national market and their obligations.

The concept of extended producer responsibility (EPR) was introduced in Moldova in 2016 by Law No. 209 on Waste, which brought the provisions of national legislation in line with the EU's Waste Framework Directive 2008/98/EC. This law was followed by the implementing legislation, the Regulation on Waste Electrical and Electronic Equipment, Decision No. 212, in 2018, which established the EPR regime for producers of electrical and electronic equipment, as well as the Regulation on Packaging and Waste of Packaging approved by GD 561 of 31.07.2020.

The report on EPR issues⁵⁸ contains, inter alia, the following conclusions: The absence of waste sorting mechanisms in the current sanitation system increases the importance of the EPR implementation. Developing EPR systems with incentives for consumers by categories of hazardous and recyclable waste will help extract all recyclable and hazardous components from household waste, ensuring that municipal sanitation systems receive mainly organic waste (with a rate of over 50%) that have a lower environmental impact and that cannot be recycled. Supplementing the current waste collection system with effective EPR mechanisms could be the cheapest and the most efficient solution for ensuring the sorting of household waste. This is why the EPR mechanisms in Moldova need solutions of monetary rewards for consumers in order to ensure the separation of the respective waste categories and their introduction in the recycling chain. It is recommended for the Government to set up working groups for every waste category, both recyclable and hazardous waste.

The working groups must include representatives of all participants in the respective process, including civil society representatives. Besides developing regulations, it is critical to define functioning operational patterns and potential alternatives, which will be further included in operational guidelines for PRO and participants in the EPR mechanism.

The proposed digital monitoring system is intended mostly to be used to monitor the capacity in the containers, so that a truck collects waste from a container only when the container is full. There is no baseline to assess the mileage avoided due to not driving for collecting waste from not full containers equipped with digital tags and therefore it is impossible to calculate environmental effects of the changed driving pattern, which probably will be negative rather than positive, as the future system will have more containers installed for waste collection in areas previously not covered by waste collection

⁵⁸ https://www.expert-grup.org/media/k2/attachments/EN_Study_Responsabilitatea_Extinsa_a_producatorilor_2021_03_29_En_sg_vg.pdf

services. Thus, it is not possible to separately quantify the investment in digital monitoring system within the GET approach. The PIP also considers the digital monitoring system as integral part of the waste collection and transport system.

The table below, prepared on the basis the PIP (Table 11)⁵⁹, indicates that the proposed investment components are eligible for GET finances within the categories of climate change, sustainable and efficient use of material and resources as well as pollution prevention. There are multiple investment components that contribute to these categories, as reflected in the table.

Table 54 Investment components and GET finances, based on the PIP

Investment component	Project investment in 1,000 EUR (short-term)	GET finance elements (1,000 EUR)			Total GET finance (1,000 EUR)
		Climate change mitigation	Sustainable and efficient use of material and resources	Pollution prevention	
<i>Solid waste collection and transport in WMZ-1 including digital monitoring system</i>	10,499	10,499	10,499	0	10,499
<i>Construction of Cahul landfill (EU compliant)</i>	5,500	5,500	0	5,500	5,500
<i>Construction of composting station</i>	500	500	500	0	500
<i>Construction of sorting station</i>	1,150	1,150	1,150	0	1,150
<i>Construction of Cania transfer station</i>	715	715	715	0	715
<i>Construction of Taraclia transfer station</i>	908	908	908	0	908
<i>Construction of Comrat transfer station</i>	908	908	908	0	908
<i>Closure of dumpsites</i>	3,608	0	0	3,608	3,608
Contingency, 12%					1,590
Total PIP and Contingency					25,379

As could be seen from the table, the amount of EUR million 25.379 planned within the Project's PIP is applicable for GET financing, which corresponds to 100% of the total PIP.

⁵⁹ The PIP includes a separate line for closure of the existing Cahul waste disposal site located within area planned for construction of the regional landfill.

8.1.2 Criteria for selecting the environmental benefits

The overall Project aims to divert the waste stream from disposal at dumpsites and non-compliant landfill towards recycling, composting and disposal at an EU-compliant (sanitary) landfill. This shift in the waste stream will reduce GHG emissions and contributes to increased recycling. The reduction in emissions of GHGs will occur if all elements of the proposed SWM system work, and therefore it is difficult to assign the GHG emission reductions to one single investment component.

Some GHG emissions could be avoided if nutrients from compost could replace nutrients from mineral fertilisers. It is estimated⁶⁰ that emissions totalling a maximum of 35.5 kg CO₂ equivalent could be avoided per tonne of compost. However, it is not certain that compost produced out of park and garden waste in WMZ-1 will be used as a replacement for mineral fertiliser products. It is more likely that the compost, as not necessarily certified for use in agriculture, will be used for landscaping and restoration of areas not related to agriculture and thus not receiving any mineral fertilisers in the baseline (without Project) scenario.

On the other hand, compost produced from park and garden waste at the composting station established within the Project could be used for establishing the “biocover” layer/windows in the top cover of landfill and dumpsites for oxidation of methane emitted from waste after its capping. The biochemical processes in compost allow oxidation of methane to CO₂ and water⁶¹ and thus contribute to reduction of GHG emissions, as the Global Warming Potential (GWP) values for CO₂ emissions are 28 times lower than for methane emissions⁶². Therefore, potential emission reductions due to the substitution of mineral fertiliser in agricultural processes was not considered in this assessment.

To date, the waste in WMZ-1 is dumped at about 100 smaller and bigger dumpsites. Experience shows that the dumpsites are from time to time affected by fires (open burning of waste).

The Project proposal with regards to closure of dumpsites includes compaction of the remaining waste and simple covering with soil - it does not include a clean-up of dumpsites (moving of waste from dumpsites to the new landfill) and other measures for remediation of the closed dumpsites. Closure of dumpsites as soon as the new regional landfill is operational, is supposed to stop the accumulation of new waste at the existing non-compliant sites. This might have a major effect in terms of reduction of GHG emissions, related, inter alia, to burning of dumped waste. However, the simple covering/capping of the existing dumpsites will not significantly contribute to a reduction of GHG emissions from the already accumulated waste, as (i) most of the waste at dumpsites has been burned or is already decomposed and therefore emits relatively small amounts of GHGs and (ii) any remaining GHGs will be able to reach the atmosphere through a simple cover. At the same time, the closure of dumpsites is essential for prevention of pollution. Therefore, has the closure of the dumpsites been categorised as GET finance elements.

The closure of the dumpsites will sustain only if there is a systematic collection of the newly generated waste. Functioning of both the door-to-door collection and the bring system is a precondition for getting an appropriate handling of the waste. The collection system qualifies for GET as re-directing the

⁶⁰ Waste Management Options and Climate Change, AEA Technology, 2001 (p. 155, table A5.50) www.napoliassise.it/Waste_management_options_and_climate_change.pdf

⁶¹ Mitigation of methane emissions in a pilot-scale biocover system at the AV Miljø Landfill, Denmark, https://www.av.dk/CustomerData/Files/Folders/3-pdf/13_av-biocover-final-report-oct2014.pdf

⁶² https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

generated waste streams from dumpsites and uncontrolled landfills towards appropriate treatment and disposal facilities.

The proposed waste transportation system will ensure that the collected waste is taken to appropriate treatment facilities and disposal facility. The transportation system including transfer stations will allow for efficient use of vehicles which contributes to reduced driving mileage for small trucks and thus consumption of fuels for transportation per tonne of waste. Furthermore, the system with transfer stations will assure that the separately collected recyclable materials are transported to appropriate sorting/treatment facilities. Therefore, the transfer system qualifies for GET category as reducing emissions from transport and by diverting recyclable fractions of waste from waste dumping to recycling.

8.1.3 Quantification of environmental benefits

The calculation of environmental benefits is based on the calculated average waste quantity per year within the project planning horizon (2027 to 2046). As the whole system contributes to reduction in emissions of GHGs by diverting waste from dumping and open burning, the waste system's total GHG emission reduction can be quantified.

Various sources could be used for selecting the emission factors for specific investment components. Ecoinvent database⁶³ and PEF European Platform on Life Cycle Assessment⁶⁴ are the internationally recognised sources often used for selecting the GHG emission factors for various elements of waste management projects. As the Ecoinvent database provides emission factors for all types of waste management processes that should be considered per “without the Project” (the baseline) scenario and per “with the Project” scenario, this database was used for selection of emission factors corresponding to each of the processes considered as related to waste management and to waste transport.

The Ecoinvent database presents, *inter alia*, emission factors using the 100-year Global Warming Potential (GWP 100a) indicator applied for the category “climate change”. The emission factors are estimated on the basis of comprehensive studies performed during more than 20 years with references to publications from various experts, sectors, countries, contexts, processes, activities, products, etc. The detailed datasets, properties of exchanges, mathematical relations, parameters, contact information for authors and reviewers are available in the dataset documentation. The information is updated annually to include new and updated data, as well as technical improvements. The release of the new and updated data takes place in the end of summer each year. Following the official Ecoinvent release, most software tools that integrate the whole Ecoinvent database are also updated with the latest version. Currently, the latest release is Ecoinvent version 3.8.

The emission factors selected from Ecoinvent database (version 3.8) to quantify the GHG emission reductions from waste management and from waste transport are presented in the following tables.

⁶³ www.ecoinvent.org

⁶⁴ https://eplca.jrc.ec.europa.eu/permalink/Guide_EF_DATA.pdf

Table 55 GHG emissions factors selected for waste treatment processes

Waste treatment	Emission factor, tCO ₂ e/t	Activity per Ecoinvent 3.8	Note
Baseline (without the Project)			
Dumpsites	0.825	Treatment of municipal solid waste, open dump	
Open burnings	0.761	Treatment of municipal solid waste, open burning	NA in WMZ-1
With the Project			
Composting at CS	0.0599	Treatment of biowaste, industrial composting	
Recovery of recyclables at SS	-0.0999	Treatment of waste plastic, mixture, sanitary landfill	Avoidance of waste plastic treatment at landfill
EU compliant landfill	0.64	Treatment of municipal solid waste, sanitary landfill	

Table 56 GHG emissions factors selected for transport of waste

Transport of waste	Average annual amount of waste transported, t	Average share of all generated waste transported	Average distance to unloading destination, km	Activity as per Ecoinvent 3.8	EF value, tCO ₂ eq/tkm
Baseline (without the Project)					
Waste transported to dumpsites (share of all generated waste)	15,321	35%	10	transport, freight, lorry 3.5-7.5 metric ton, EURO4	0.000509
With the Project					
Collected waste to regional Waste Management Centre via TS	18,900	45%	55	transport, freight, lorry >32 metric ton, EURO6	0.000087
Collected waste directly to WMC	23,450	55%	25	transport, freight, lorry 16-32 metric ton, EURO6	0.000163

Table 57 GHG emissions factors selected for collection of waste

Collection system	Distance during waste collection (km)	Emission factor, tCO ₂ e/tkm	Vehicle type	EF value source
Baseline - 35% of generated waste	10	0.00392	EURO4 3.5-7.5t lorry, gross load capacity 4 t, average load 2.05 t (50% load factor during waste collection)	Extrapolation by COWI (see Table 60 further below)
With the Project - Practically all generated waste	20	0.00128	EURO6, 16-32t lorry, gross load capacity 8.2 t, average load 4.1 t (50% load factor during waste collection)	Ecoinvent 3.8 (for waste collection by 21t lorry)

The emission factors included in the above tables are used for calculations presented in Appendix 4 and explained below.

The Ecoinvent database contains around 18'000 reliable life cycle inventory datasets, covering a range of sectors. These include agriculture and animal husbandry, building and construction, chemicals and plastics, energy, forestry and wood, metals, textiles, transport, touristic accommodation, waste treatments and recycling, and water supply, among other industrial sectors.

Each activity in the Ecoinvent database is attributed a geographic location. Geographic locations, otherwise referred to as 'geographies', are reported using internationally accepted abbreviations as part of the dataset's name. As the Ecoinvent database is a background database, the aim is to cover activities in the most relevant geographies for the selected product or service. At the same time, geographic coverage is dependent on data quality and availability. Thus, almost every activity in the database features a dataset representing the process globally, meaning the average global production. Some datasets with calculations of emission factors are available only for certain geographic coverage (e.g., Europe, a specific country). For example, the only available datasets and emission factors for EURO2 vehicles refer to Brazil and South Africa.

In case mixed plastic waste is landfilled, the emission factor related to life cycle of this type of waste is estimated in Ecoinvent taking into consideration emissions to air via landfill gas incineration and landfill leachate, burdens from leachate treatment in a wastewater treatment plant with WWTP sludge disposal in municipal incinerator, as well as other long-term emissions from landfill. Diversion of recyclables from landfilling would mean avoidance of the emissions.

The transport datasets selected from Ecoinvent refer to the entire transport life cycle, i.e., to the construction, operation, maintenance and end of life of vehicle and road infrastructures. The lorry size and load factor (defined as gross vehicle weight, e.g. 16-32 t) and emission class (e.g. EURO6) presented in the Ecoinvent datasets determine the fuel consumption and amount of both exhaust and non-exhaust emissions. Non-exhaust emissions are those resulting from tyre, brake and road wear.

Values of the GHG emission factors available in Ecoinvent database version 3.8 for vehicles of various types is presented in the following table:

Table 58 Emission factors in Ecoinvent for transport and waste collection by various types of vehicles

Activity as specified in Ecoinvent 3.8	Emission factor, kgCO ₂ eq/tkm	
	Europe	Rest of the World
transport, freight, lorry 3.5-7.5 metric ton, EURO3	0.514	0.547
transport, freight, lorry 3.5-7.5 metric ton, EURO4	0.509	0.541
transport, freight, lorry 3.5-7.5 metric ton, EURO5	0.511	0.544
transport, freight, lorry 3.5-7.5 metric ton, EURO6	0.511	0.543
transport, freight, lorry 7.5-16 metric ton, EURO3	0.215	0.227
transport, freight, lorry 7.5-16 metric ton, EURO4	0.213	0.224
transport, freight, lorry 7.5-16 metric ton, EURO5	0.215	0.226
transport, freight, lorry 7.5-16 metric ton, EURO6	0.213	0.224
transport, freight, lorry 16-32 metric ton, EURO3	0.166	0.174
transport, freight, lorry 16-32 metric ton, EURO4	0.165	0.172
transport, freight, lorry 16-32 metric ton, EURO5	0.166	0.174
transport, freight, lorry 16-32 metric ton, EURO6	0.163	0.17
transport, freight, lorry >32 metric ton, EURO6	0.087	0.0898
municipal waste collection service by 21 metric ton lorry	-	1.28

Waste transport assumes not only driving of trucks delivering waste to unloading destinations, but also driving of empty trucks returning to collection areas, as well as driving of empty trucks to and from garages. So, the overall driving distances for waste transportation could be calculated as approximately 2 times longer than an average distance between the service areas and the waste unloading destination, however, assuming that the average load will be half of the truck's capacity.

Emissions during the collection of waste, when vehicles are operated in Stop&Go mode, could be calculated by extrapolation on the basis of the emission factor values available in Ecoinvent 3.8 for transport and for waste collection. The emission factor for municipal waste collection is available for service by 21 metric ton lorry with gross load capacity of 8.2 t assuming the load factor of 50% (reflecting the gradual increase of load), i.e., the average load of 4.1 t. The emission factor value is 1.28 kgCO₂ eq per 1 tkm during collection of waste. The emission factor in Ecoinvent 3.8 is estimated with extrapolation from data for lorry 16 t class and reference to waste collection studies with lorries typical in Swiss and German municipalities (assumingly EURO5/EURO6 waste collection and hydraulic compression vehicle, gross load capacity 8.2 tons, load factor 50%, average load 4.1 tons.). It could be assumed that the emission factors for lorries of EURO5 and EURO4 during waste collection could be calculated as proportional to the emission factors for transport by vehicles of these classes. As presented in the table below, the Ecoinvent dataset allows to estimate that the emission factor for EURO5 lorry during collection by is 7.7 times higher than the emission factor for transport. Assuming that that the emission factor for the selected EURO4 lorry during collection is also about 7.7 times higher than the emission factor for transport, than the estimated value of emission factor for collection for EURO4 lorry of 7.5-16 t is 1.64 kgCO₂e/tkm, for EURO4 lorry of 3.5-7.5 t is 3.92 kgCO₂e/tkm. A similar calculation for EURO3 lorry would give the emission factor of 4.0 kgCO₂e/tkm.

Table 59 Estimate of emission factor for waste collection services with EURO4 lorry

Vehicle class	Per Ecoinvent 3.8		Per calculation by COWI		Selected for GET calculations
	EF for transport, kgCO ₂ e/tkm	EF for waste collection, kgCO ₂ e/tkm	Ratio of EF for collection and EF for transportation	EF estimate for collection, kgCO ₂ e/tkm	EF for collection, tCO ₂ e/tkm
EURO5 lorry 16-32 metric ton, (assumed as like 21 metric ton lorry)	0.166	1.28	7.7	-	0.00128
EURO4 lorry 7.5-16 metric ton,	0.213	-	7.7	1.64	0.00164
EURO4 lorry 3.5-7.5 metric ton,	0.509		7.7	3.92	0.00392

Key assumptions regarding the waste management system and emission factors selected for scenarios without the Project and with the Project are included in Appendix 4 together with the overview table presenting the calculation of GHG emissions. The calculation approach is explained in the following sections. The integrated emission factors used in the calculations cover the emissions of NO_x, PM and other pollutants for specific activities. No detailed analysis of specific pollutants was carried out. Increased waste collection service coverage by regular waste collection services will involve more vehicles, and regionalisation of the waste management system including transfer stations might increase NO_x and PM emissions, but this might be balanced out by newer engine/fuel types and improved transport logistics with digital monitoring system.

8.1.4 Baseline scenario

The baseline represents the situation of the SWM system without the Project implementation. The baseline scenario means operation of the SWM system similar to the current SWM system in WMZ-1 as it is specified in the overview table in Appendix 4 and within a fragment presented below.

Table 60 Data describing the baseline scenario for years 2027 and 2028 and the annual average without the Project

Data		2027	2028	Annual average (2027-2046)
Waste generated	ton/year	60,038	59,486	55,320
Waste collection coverage	%	60%	60%	60%
Waste collected (60% of generated)	ton/year	36,023	35,692	33,192
Waste collected separately - recyclables	ton/year	0	0	0
Waste collected separately - green waste	ton/year	0	0	0
Total recovered	ton/year	0	0	0
Total recovered (of all generated waste)	%	0%	0%	0%
Waste to EU-compliant landfill (t/y)	ton/year	0	0	0

Baseline (without the Project) scenario assumes that all waste generated in WMZ-1 throughout the next 20 years will continue being disposed of at dumpsites or by open burning. Waste collected in urban areas will be transported to dumpsites by trucks (in average 10 km distance is assumed). Inhabitants of rural areas will manually carry their waste to disposal sites. The collection and recovery of recyclables

will remain at the level of years 2024-2025 (which is zero in WMZ-1). No green waste will be separately collected and composted. The key assumptions for the baseline scenario and emission factors reflecting them are presented in Table 61.

Table 61 Assumptions and emission factors for the baseline scenario

Assumption	Emission factor for calculation	Table reference
All generated waste is disposed of by dumpsites and open burning	0.825 tCO ₂ e/t (EF for waste treatment at open dump) 0.761 tCO ₂ e/t (EF for waste treatment by open burning)	Table 56
Only 60% of generated mixed waste is collected (using EURO4 3.5-7.5t trucks driving about 10 km during collection)	0.00392 tCO ₂ e/tkm (EF for waste collection by EURO4 truck)	Table 60
Only 60% of generated mixed waste is transported by vehicles (EURO4 3.5-7.5t trucks) to the nearest dumpsite (for an average distance of 10 km)	0.000509 tCO ₂ e/ton km (EF for waste transport)	Table 57
No recyclables are collected and recovered	NA	
No green waste is collected and composted	NA	
No waste is disposed of at EU compliant landfill	NA	

Emissions from dumpsites and open burning

The total annual CO₂-equivalent (CO₂e) emissions from waste management in dumpsites or non-compliant landfills and open burning is calculated based on the emission factor for dumpsites, multiplied by the amount of waste entering this kind of waste treatment. The applied emission factor is based on GHG emissions from decomposing waste without landfill gas collection.

*Emissions from dumpsites and open burnings (tonne CO₂e) = Amount of dumped or burned waste (t) * Emission factor (t CO₂e /tonne)*

It should be mentioned that emissions from dumpsites and from open burnings could be calculated separately with a split based on an assumption regarding the share of all generated waste that is accumulating at dumpsites and the share of all generated waste that is burned in households and/or at dumpsites. Annually, new portion of waste ends up at dumpsites, where its decomposing (as a long-term source of emissions) contributes to GHG emissions throughout the future years. The amount of waste causing emissions at dumpsites is gradually increasing. Thus, emissions from dumpsites during

a specific year could be calculated as proportional to cumulative amount of waste annually added to dumpsites over the years until the specific year:

$$\text{Emissions from dumpsites (tonne CO}_2\text{e/year)} = \text{Cumulative amount of waste dumped until the year (t)} * \text{Emission factor for waste treatment at dumpsite (t CO}_2\text{e/tonne)}$$

Cumulative amount of waste that would be disposed at dumpsites in 2027-2046 in the scenario without the Project could be calculated on the basis of waste generation forecast for WMZ-1 assuming that 100% of generated waste end up at dumpsites. Every year the amount of waste accumulated at dumpsites would get an additional amount of waste that has been generated within the year. As waste decomposition at dumpsites takes more than 20 years, all waste accumulated at dumpsites by a specific year within 2027-2046 will continue being a source of emissions. The more waste is accumulated, the more emissions will be generated due to its decomposition. For the calculation simplicity it could be assumed that the emission factor remains the same throughout the waste lifetime at dumpsites. The calculation results could be seen in the overview table in Appendix 4, but are also presented in a concise table below including columns for only some of the years and for the annual average within 2027-2046:

Table 62 Calculation of cumulative amount of waste at dumpsites in baseline (without Project) scenario

Year	Waste generated in t/year	Waste going to dumpsites (100% of annually generated waste) in t/year	Cumulative amount of waste at dumpsites in t/year
2027	60,038	60,038	60,038
2028	59,486	59,486	119,524
2029	58,943	58,943	178,467
2030	58,411	58,411	236,877
2035	55,887	55,887	521,270
2040	53,587	53,587	793,717
2046	51,100	51,100	1,106,397
Annual average (2027-2046)	55,320	55,320	596,479

As could be seen from the table above, the average annual cumulative amount of waste at dumpsites in the baseline (without the Project) scenario is 596,479 tons.

Open burning will mainly lead to emissions during burning itself (as a short-term source of emissions) – the emissions are proportional to the annual amount of waste burned:

$$\text{Emissions from open burning (tonne CO}_2\text{e/year)} = \text{Amount of waste burned during the year (t/year)} * \text{Emission factor for open burning (t CO}_2\text{e /tonne)}$$

It is assumed that in the current system in WMZ-1 only a minor part of annually generated waste is burned, while the major part is delivered to dumpsites.

Emissions from collection of waste

The baseline scenario assumes collection of part (35%) of all generated waste by EURO4 trucks driving between collection points within a serviced (mainly urban) area in Stop&Go mode for about 10 km to fill up the truck. As could be seen in Table 60 or Table 62, emission factor per 1 tkm transported in such mode is higher than for transport without stop.

*Emissions during collection (tonne CO₂e/year) = Amount of waste collected during the year (t/year) *
* Distance (10 km) * Emission factor for waste collection (tCO₂e /tkm)*

Emissions from transport

In the baseline scenario, the waste from the urban areas is transported to nearest authorised dumpsite in small trucks for an average distance of about 10 km from serviced areas. Based on the description of the current waste truck fleet presented in the Inception Report, the majority of available garbage trucks at waste management operators are old and shall not be considered for the new Integrated Solid Waste Management (ISWM) system. There is no list describing all garbage trucks in terms of the EURO norms. However, the standards somewhat correspond to years of vehicle manufacturing, so based on the above analysis the newest garbage trucks are likely being EURO6 and the older ones could be EURO3, 4 or 5. For the calculation of the baseline scenario it is assumed that the currently operated truck fleet includes EURO4 trucks, as this emission standard is from 2005.

It is estimated that in the baseline scenario, like in the current SWM system in WMZ-1, the waste collected in urban and rural areas (about 60% of all waste generated in WMZ-1 throughout the next 20 years) is transported for about 10 km distance in 3.5-7.5t EURO4 trucks to the nearest waste disposal site. The emission factor of 0.509 kg CO₂e/tkm is applicable for the EURO4 3.5-7.5 t truck as indicated in the internationally recognised database Ecoinvent (version 3.8). Calculation of the GHG emissions for transport of waste is performed as multiplication of amount of waste, transportation distance and the emission factor for the specific truck type:

*Emissions from transport (tonne CO₂e/year) = Amount of transported waste (t/year) * Distance (10 km on average) * Emission factor for waste transport (t CO₂e/tonne km)*

The waste from rural areas is assumed to be transported (to dumpsites or open burnings) manually (by walking) with neglectable emissions related to transport.

Emissions from management of recyclables in baseline scenario

The baseline scenario assumes that, like within the current SWM system in WMZ-1, no PET waste or other recyclables will be collected and transported to a recycling facility outside WMZ-1 for recovery, i.e., diverted from being placed at an open dump. Thus, emissions from management of recyclables will be zero.

Emissions from composting in baseline scenario

The baseline scenario assumes no changes in management of park and garden waste (no separate collection and no industrial composting of park and garden waste) like in the current SWM system in WMZ-1. Thus, emissions from composting of green waste will be zero.

Summary of emissions assessed for baseline scenario

The following table contains key data from the overview GET analysis table presented in Appendix 4.

Table 63 Assessment of baseline annual average emissions

		Annual waste amount/year (tonne)	GHG emission factor	Annual average emissions (tonne CO ₂ e)
Baseline scenario (without Project)	Dumpsites and open burning (cumulative amount of decomposing waste)	596,479	0.825 tonne CO ₂ e/tonne	492,095
	Collection of waste (only 60% of all generated waste)	33,192	0.00392 tonne CO ₂ e/tkm	1,301
	Transport of waste (only 60% of all generated waste)	33,192	0.000509 tonne CO ₂ e/tkm	338
	Recyclables, including their transport	0	-0.0999 (tonne CO ₂ -eq/tonne)	0
Total Baseline				493,734

8.1.5 Scenario with Project implementation

Implementation of the proposed Project will lead to changes in waste collection, transportation, treatment and disposal.

Waste from all urban areas and vast majority of rural areas of WMZ-1 instead of being disposed of at dumpsites, littered or burned will be regularly collected and transferred to the regional Waste Management Centre (WMC) a sorting station, a composting station and the EU compliant landfill near the city of Cahul. About 3.4% of all generated waste could remain in households and treated by home composting. It is estimated that about 43% of all collected waste will be transported to the regional WMC directly, while about 57% of all collected waste will be transported via the transfer stations (one TS in Taraclia, one in Comrat and one TS in Cantemir)

All dumpsites in WMZ-1 will be closed as soon as the new system is operational.

Assumptions and emission factors for the scenario with the Project are as follows:

Table 64 Assumptions and emission factors for scenario with the Project

Assumption	Emission factor for calculation
About 96.6% of MSW generated in WMZ-1 are regularly collected using modern trucks	0.00128 tCO ₂ e/ton km (Table 58)
Negligible amount of waste (not collected 3.4% of all generated waste) is disposed of at dumpsites and open burnings, i.e., outside the regional SWM facilities	NA
About 43% of all collected waste are transported to Regional Waste Management Centre via transfer station (by EURO6 >32t transfer trucks for an average distance of 55 km)	0.000087 tCO ₂ e/ton km (from EF table for waste transport with the Project - Table 57)
About 38% of all collected waste are transported to Regional Waste Management Centre directly (by EURO6 16-32t trucks for an average distance of 25 km)	0.000163 tCO ₂ e/ton km (from EF table for waste transport with the Project - Table 57)
Separately collected recyclables recovered at Sorting Station are diverted from disposal at landfill	-0.0999 tCO ₂ e/ton (from EF table for waste treatment with the Project - Table 56)
Separately collected green waste is composted at Composting Station	0.0599 tCO ₂ e/t (from EF table for waste treatment with the Project - Table 56)
All collected residual waste and rejects from Sorting Station are disposed of at EU compliant sanitary landfill	0.000163 tCO ₂ e/ton km (from EF table for waste transport with the Project - Table 57)
All collected residual waste is disposed of at EU compliant sanitary landfill	0.64 tCO ₂ e/t (from EF table for waste treatment with the Project - Table 56)

The green (organic) waste from parks and gardens will be treated at a composting facility, the recyclables will be transferred to a sorting station and afterwards treated at recycling stations and the residual waste will enter an EU-compliant landfill. The new SWM system will ensure that 97% of MSW waste generated in WMZ-1 is collected and managed properly. The waste flow projection is included in Appendix 4. The annual amount of waste entering each waste management type is presented in the table below.

Table 65 Annual average amount of waste within each waste management type with the Project implementation (annual average 2027-2046)

Annual average with Project	
Waste generated (t/y)	55,320
Waste collection service coverage rate (%)	97%
Waste collected (t/y)	53,474
Waste collected separately - recyclables (t/y)	7,735
Waste collected separately - green waste (t/y)	1,366
Total recovered (t/y) (the reject is directed to landfill)	6,513
Total recovered (% of collected waste)	13%
Waste to EU-compliant landfill (t/y)	45,779

Calculation of GHG emissions from the SWM system without and with the Project implementation is presented in Appendix 4. The GHG emission factors for each of the waste treatment/handling methods are based on Ecoinvent database.

Emissions from transport

Most of the existing waste collection trucks shall not be considered for the new ISWM system. Provided that no major changes in definition of the standards for vehicles occur by the time of the Project procurement for the new SWM system in WMZ-1, the new waste collection trucks will most likely be EURO6 trucks, as this emission standard is from 2011⁶⁵ and therefore most trucks available at the market today meet the EURO6 emission standards. The emissions from transport in terms of door-to-door collection could be calculated based on data on measured diesel consumption by EURO5 standard waste collection trucks in per tonne of waste collected in various types of residential areas and services/containers (urban areas with apartment buildings, single-family houses, small towns, rural areas, etc.)⁶⁶. The studies showed that total GHG emissions related to collection of each tonne of waste vary depending on the types of containers and residential areas.

During the Project implementation, about 43% of annually generated waste will be transported to the regional SWM facilities (regional Waste Management Centre, WMC) directly, while the remaining 57% of waste will be transported via a transfer station. For simplicity of the emission calculations from transport, it is assumed direct transport means delivering the waste by the collection trucks (EURO6 class 16-32 t) driving an average distance of 25 km. The transfer will assume transport by larger trucks (EURO6 class >32 t) for an average distance of 55 km.

The total amount of waste transported to transfer station or landfill per year is indicated in Appendix 4.

⁶⁵ [Commission Regulation \(EU\) No 582/2011 of 25 May 2011 implementing and amending Regulation \(EC\) No 595/2009 of the European Parliament and of the Council with respect to emissions from heavy duty vehicles \(Euro VI\) and amending Annexes I and III to Directive 2007/46/EC of the European Parliament and of the Council Text with EEA relevance \(europa.eu\)](#)

⁶⁶ Larsen A., Vrgoc M., Lieberknecht P., Christensen T. Diesel consumption in waste collection and transport and its environmental significance. Waste Management & Research, 2009

Calculation of the GHG emissions for transport of waste is performed as multiplication of amount of waste amount (43% for direct transport and 57% for transfer), the respective transportation distance and the emission factor for the respective truck type:

$$\text{Emissions from transport (tonne CO}_2\text{e)} = \text{Amount of transported waste (t)} * \text{Distance (XX km)} * \text{Emission factor (t CO}_2\text{e /tkm)}$$

Emissions related to transport are related to transport of residual waste, separately collected recyclables and separately collected green waste. With the same type of trucks, transport distances and unloading destination assumed in the assessment, the transport emissions (in general, they are proportional to the amount of specific waste type) related to delivery of separately recyclables to the Sorting Station, the separately collected green waste to the Composting Station and the residual waste to the EU compliant Regional Sanitary Landfill could be summarized – calculated as emissions from transport of all generated waste, i.e. without split into fractions. The transport emissions are anyhow rather low in comparison with other emission generating activities within the Project.

Emissions from composting

The emissions from the composting plant are calculated based on biodegradation of organic waste and operating activities at the plant (industrial composting). The three stages of composting include the shredding stage, the intense decomposition, and the maturation state. The operating activities include fuel and electricity for machinery at the composting station.

$$\text{Emissions from composting (tonne CO}_2\text{)} = \text{Amount of separately collected green waste (t)} * \text{Emission factor (t CO}_2\text{ /tonne)}$$

In the overview GET analysis table presented in Appendix 4, the total emissions related to composting are calculated as emissions from treatment and from transportation of green waste.

Emissions from landfill

The emissions are calculated assuming that all mixed residual waste collected within WMZ-1 is decomposed with the regional landfill established within the Project and compliant with the EU Landfill Directive.

$$\text{Emissions from landfill (tonne CO}_2\text{)} = \text{Amount of landfilled waste (t)} * \text{Emission factor (t CO}_2\text{ /tonne)}$$

As emissions from landfilled waste will continue throughout many years, the emissions during a specific year will originate from all waste accumulated by this year. Thus, the cumulative amount of waste by the specific year is used in the calculation.

Cumulative amount of waste that would be disposed at regional sanitary landfill for WMZ-1 in 2027-2046 in the scenario with the Project could be calculated based on the forecast for annual amount of waste disposed of at the landfill. Every year the amount of waste accumulated at the landfill would get additional amount of waste that has been disposed of within the year. As waste decomposition at landfill takes more than 20 years, all waste accumulated at landfill by a specific year within 2027-2046 will continue being a source of emissions. The more waste is accumulated, the more emissions will be generated due to its decomposition. For the calculation simplicity it could be assumed that emission factor remains the same throughout the waste lifetime at the landfill. The calculation results could be seen in the overview table in Appendix 4, but are also presented in a concise table below including columns for only some of the years and for the annual average within 2027-2046:

Table 66 Calculation of cumulative amount of waste at landfill in scenario with the Project in WMZ-1

Year	Waste generated in t/year	Waste coming to regional sanitary landfill in t/year	Total (cumulative) waste amount received sanitary landfill in t/year
2027	60,038	51,813	51,813
2028	59,486	50,725	102,538
2029	58,943	50,035	152,573
2030	58,411	49,349	201,922
2035	55,887	46,369	439,297
2040	53,587	43,779	663,318
2046	51,100	40,844	915,585
Annual average (2027-2046)	55,320	45,779	499,067

As could be seen in the table, the estimated average annual cumulative amount of waste disposed of at regional sanitary landfill in WMZ-1 is 499,067 tons.

Emissions from management of recyclables

Separately collected recyclables will be transported to the sorting station, aggregated into fractions and then sold for organisations performing their further processing, i.e., diverted from landfilling. For simplicity of the assessment emissions from transport of recyclables to sorting station are considered as part of all waste transport to the regional WMC.

Diversion of recyclables throughout 20 years would mean avoidance of emissions from decomposition of total cumulative amount of recyclable materials (e.g. waste plastic mixture) that have avoided the landfill by the year considered:

*Emissions from diversion of recyclables (tonne CO₂) = Amount of separately collected recyclables (t) * Emission factor for management of waste plastic mixture (t CO₂ /tonne)*

Similar calculations using the emission factors available in Ecoinvent could be made for a number of specific types of recyclable materials, if the quantities of these materials could be estimated.

8.1.6 Summary of Scope 1 and other emissions

The emissions from landfill, composting and transportation lie within scope 1 as these are direct emissions from waste and from waste treatment. The emission credits from closure of dumpsites have not been considered. The benefits from recycling and substituting virgin materials with recycled materials are accounted for outside of scopes in accordance with the GHG Protocol⁶⁷.

⁶⁷ [Corporate Value Chain \(Scope 3\) Standard | Greenhouse Gas Protocol \(ghgprotocol.org\)](https://www.ghgprotocol.org/)

Table 67 GHG average annual emissions from the waste management system with the Project implementation

	Average annual amount (tonne)	GHG emission factor	Annual emissions (tonne CO ₂) – Scope 1	Annual emissions (tonne CO ₂) – outside of scopes
Residual waste (cumulative amount at EU compliant landfill)	499,067	0.64 tCO ₂ e/t	319,403	
Green waste composting	1,366	0.0584 tCO ₂ e/t		82
Recovery of recyclables	6,329	-0.0999 tCO ₂ e/t		-632
Collection of waste	53,474	0.00128 tCO ₂ e/t km	1,369	
Waste transport in waste truck (25 km or 55 km)	53,474	0.000163 or 0.000087 tCO ₂ e/t km	523	
Total			321,295	-550

Project activities allowing for reduction of GHG emissions will start from the year 1 of the new system operation (2027 in accordance with the procurement plan presented in Chapter 6) and will continue throughout the Project. As presented in the overview GET analysis table in Appendix 4, the average annual reduction of GHG emissions in 2027-2046 is estimated 172,989 tCO₂e/year. The change from management of waste at dumpsites in the baseline scenario (with the estimated annual average emissions of 492,095 tCO₂e/year) to management of waste at the EU compliant landfill under the Project (with the estimated annual average emissions of 319,403 tCO₂e/year) will bring in the major reduction of emissions (172,692 tCO₂e/year). Recovery of recyclables will result in estimated annual emission reduction of 550 tCO₂e/year due to avoidance of adding new portions recyclables for their further decomposing at landfill. The collection and transportation of all waste by modern trucks and the waste recycling activities within the Project will be associated with certain increase of GHG emissions in comparison with the baseline (without the Project) scenario, when only part of waste is collected, and no waste is recycled.

The annual amount of waste sent to composting and recycling is estimated at 9,101 tonnes, as presented in the following table.

Table 68 Average annual amount of waste materials recovered, utilised, recycled or going to EU compliant landfill with the Project implementation (2027-2046)

GET topic	Impact indicator	Unit	Baseline	Performance indicator	Activity data
Solid Waste	Average annual amount of waste recovered	tonnes/year	0	7,735	Separately collected recyclables
	Average annual amount of composted green waste	tonnes/year	0	1,366	Separately collected park and garden waste
	TOTAL Annual amount of waste recovered, utilised, recycled	tonnes/year	0	9,101	
Solid waste	Annual average amount of waste going to EU compliant facility	tonnes/year	0	45,779	Regional sanitary landfill

Emissions from the generation of acquired and consumed electricity, steam, heat, or cooling (collectively referred to as “electricity”) are termed “scope 2” and are considered an indirect emissions source (along with scope 3), because these emissions are a consequence of activities of the reporting organization but actually occur at sources owned or controlled by another organization (here, they are owned or controlled by an electricity generator or utility). Electricity consumers have significant opportunities to reduce those emissions by reducing electricity demand, and increasingly play a role in shifting energy supply to alternative low-carbon resources.

The methods used to calculate and report scope 2 emissions include multiplying activity data (MWhs of electricity consumption) by source- and supplier-specific emission factors to arrive at the total GHG emissions impact of electricity use. The calculation should highlight the role of green power programs in reducing emissions from electricity use. As a forecast of electricity consumption in the baseline scenario and in scenario with the Project, as well as information about the grid emission factors for the local supplier are not available at the current stage of the Project preparation, it is currently not possible to calculate the scope 2 emissions.

The national grid emission factors recommended by the EBRD for calculation of emission reductions in Moldova are: 0.399 tCO₂/MWh for energy efficiency projects (e.g., improvement of energy efficiency of public buildings) and 0.488 tCO₂/MWh for renewable energy projects (e.g., development of windfarms). The proposed SWM project is not related to energy efficiency of public buildings. As for renewable energy projects, utilisation/combustion of landfill gas, if feasible for the amount of gas coming from the proposed EU compliant regional landfill in WMZ-1 could be developed as a renewable energy project that cannot be implemented with the baseline (without Project) scenario. The landfill gas generation due to decomposition of waste depends on a combination of many processes within the landfill body and changes throughout the landfill lifetime. Reduction of GHG emissions due to utilisation of landfill gas could not be assessed before the landfill gas flow and capacity of gas utilisation equipment could be assessed, for example a few years after filling up and closure of the landfill’s first cell.

8.1.7 Results

The summarised results of analysis for all GET categories are presented in Table 69. The annual CO₂-eq. emission reduction are mainly scope 1 emissions.

Table 69 GET Impact Indicators and Baselines for Climate Change Mitigation Activities

Indicator	Unit	Baseline, (2027 – 2046) Scope 1	With project scenario (2027 – 2046) Scope 1	With project scenario (2027 – 2046) outside of scopes	Estimated Annual Change (change between baseline and with project) – scope 1	Estimated Annual Change (change between baseline and with project) – incl. emissions outside of scope
Annual CO ₂ e (rounded to nearest '00)	tons CO ₂ -e/yr.	493,700	321,300	-550	172,400	173,300
Annual CO ₂ e per inhabitant (per the population forecast)	tCO ₂ e /year/ person	1.94	1.28	-0.002	0.69	0.69
Annual CO ₂ e per tonne of generated waste (per the waste forecast)	tCO ₂ e /year/ t	8.93	5.81	-0.01	3.12	3.13

8.1.8 Project's eligibility for the EBRD Green Cities Programme

The Projects eligibility to for the EBRD Green Cities Programme is provided in the following points.

- > *Population:* The population of the WMZ-1 is 300,500.
- > *Impact:*
 - a. The investment meets the impact threshold for 20% reduction in GHG emissions compared to baseline.
 - b. The Project design will assume climate change adaptation measures, but the Climate Resilience Outcome Ration could not be estimated at the present stage of the Project.
 - c. The Project is targeting environmental impacts beyond climate change
 - i. The landfill and other SWM facilities included in the Project will be constructed and operated in accordance with the EU environmental standards, including Best Available Techniques. The Project implementation includes recognised GIP for pollution prevention and control techniques and standards.
 - ii. Diverting the waste from dumping and open burnings to a controlled EU compliant landfill will contribute to a reduced local pollution (97% of waste will be diverted from dumping and open burning)
 - iii. The collection and recovery of recyclables out of all generated waste will increase from

0% in the baseline scenario to 13% (7,735 t) as average annual throughout the 20 years of the Project implementation. The resource efficiency in terms of recovered materials will increase much more than 20% and contribute to improved circular economy.

- > **GCAP Commitment: The waste management zone is not a city and therefore not eligible for the Green Cities Programme**
- > *Priority Environmental Challenges:* No prior projects

As the Project is proposed for a Waste Management Zone, the Consultant cannot find any link between the Project and city administration. Thus, the Project does not seem directly eligible for the Green Cities Programme.

8.2 Promotion of Gender Equality

8.2.1 EBRD Strategy for the Promotion of Gender Equality

Gender issues are related to the characteristics of women, men, girls and boys that are socially constructed and reflected in norms, behaviours, roles and relationships associated with being a woman, man, girl or boy. As the social constructs, the norms, behaviours, roles and relationships vary from society to society and can change over time.

The universal advantages of gender equality have been well-documented, and several international frameworks have affirmed its centrality to human rights and sustainable development. The Beijing Declaration and Platform for Action, for example, unanimously adopted by 189 countries in 1995 and still the strongest global consensus for advancing and protecting girls' and women's equality and justice, recognizes that persistent inequalities pose "serious consequences for the well-being of all people." However, progress towards gender equality has been slow and dramatically undermined by the COVID-19 pandemic.

Whilst women make up over half of the population in the EBRD's Countries of Operation, they do not have equal access to opportunities for formal employment, finance or services. Labour markets and decision-making abilities are still divided along gender lines. Women still face significant wage differentials with respect to their male peers and there is still discrimination on the labour market.

The EBRD Strategy for the Promotion of Gender Equality (SPGE) sets out how the Bank will continue to work to prevent gender discrimination, and to promote gender equality within its mandate. SPGE seeks to increase women's economic empowerment and equality of opportunities in EBRD's Countries of Operation. In order to effectively promote gender equality, SPGE ensures that there is no disproportionate advantage for either men or women, and importantly recognises that engaging men will be a key requirement to ensure success.

The SPGE 2021-2025 builds on the lessons learnt under the previous SPGE, with a focus on consolidating and strengthening gender-responsive results while taking into consideration the impact of the Covid-19 crisis on women's access to economic opportunities. The SPGE 2021-2025 aims to continue to strengthen the EBRD's gender-responsive investment culture across sectors and countries of operations.

The SPGE 2021-2025 sets out to scale up the EBRD's operations to enhance gender equality. It integrates four new thematic lenses as cross-cutting priorities that reflect new megatrends as well as persistent challenges: (1) Gender equality in the green economy, (2) Gender equality in the digital

economy, (3) Gender equality in the care economy, and (4) Gender equality by supporting voice, agency and addressing gender-based violence and harassment (GBVH).

8.2.2 The policy context in Moldova

The Republic of Moldova has made international and national commitments to promote gender equality and the empowerment of women, in particular by ratifying the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and various ILO Conventions. Since the adoption in 2006 of Law No. 5 on Equality of Opportunities for Men and Women, a series of national strategies and action plans have promoted gender equality. In 2016, a law on temporary special measures introduced a 40% quota for each gender in cabinets and electoral lists, and provisions for paternity leave together with a ban on sexist advertising.

Significant progress was achieved during the past decades in Moldova ensuring that women and men benefit from equal opportunities in all areas of their activity. Moldova committed to the 2030 Sustainable Development Agenda and adopted the 'Moldova 2030' strategy paper. Several public policy papers on gender equality were developed and approved in Moldova to adopt measures aiming to integrate the principle of equal opportunities in all public policies and special measures promoting women.

- > The 2017-2021 Gender Equality Strategy and the Action Plan for its implementation.
- > The 2018-2023 National Strategy to Prevent and Combat Violence against Women and Domestic Violence and the 2018-2020 Action Plan for its implementation.
- > The 2018-2023 National Strategy to Prevent and Combat Trafficking in Human Beings and the 2018-2020 Action Plan for its implementation – developed in line with the Council of Europe Convention on Preventing and Combating Violence Against Women and Domestic Violence (Istanbul Convention).
- > The 2018-2021 National Program on the United Nations Security Council Resolution 1325 on Women, Peace and Security and the Action Plan for its implementation.
- > The 2018-2022 National Program on Sexual and Reproductive Health and Rights.
- > The 2017-2021 National Employment Strategy.
- > The 2018-2023 National Action Plan on Human Rights.

However, implementation of gender equality measures is hindered by many challenges. Discrimination and inequality of women in social, economic and political life and their representation in Moldavian politics and decision-making at various levels remains below international benchmarks.

Specific education and labour market barriers, persistent patriarchal attitudes limit educational choices and employment options for females. Significant wage disparities, segregation into lower-paying occupations, unequal sharing of work and family responsibilities and limited access to childcare, to bank loans and to the governmental programmes for entrepreneurship development remain being the challenges in the country.

Many international organisations working in Moldova provide assistance targeted for women. For example, UN Women Strategy for Moldova 2018-2022 focuses on three main areas: 1) strengthening women's participation in politics and decision-making, 2) economic empowerment of women and 3) ending violence against women and girls. To achieve progress in these areas, UN Women works with a variety of national and international partners, as part of different national and regional initiatives.

UNDP Moldova has launched an Institutional Capacity Development Programme in 2020 under the UNDP-SIDA “Resilient Communities through Women Empowerment” Project. The aim is to strengthen NGOs’ organizational capabilities to be actively involved in promoting and implementing climate resilience measures and environmentally friendly practices at the local level.

Moldova Comprehensive Gender Assessment, developed by the UN Country Team in Moldova, including the World Bank, provides the state of equality between women and men in Moldova in education, health, economic opportunities, and voice and agency and a better understanding of the root causes of gender inequality in Moldova. The assessment published in 2022 takes a No One Left Behind (NOLB) analytical approach and is based on analysis of data from the Generations and Gender Survey, Household Budget Survey, Labour Force Survey and Development of the Business Environment survey produced by the National Bureau of Statistics and other data. The qualitative component of the assessment included focus group discussions and key informant interviews with representatives of vulnerable groups of women. Additionally, representatives of CSOs representing vulnerable groups of women were consulted⁶⁸.

Since 24 February 2022, people have been fleeing from Ukraine to the neighbouring countries as a result of the war in Ukraine. As of 04 September 2022, 597,984 refugees from Ukraine and Third Country Nationals (TCNs) were registered at border crossing points (BCPs) while entering from Ukraine into the Republic of Moldova. At the same time, movements of persons crossing back to Ukraine have also been reported. According to the General Inspectorate for Border Police, 147,577 Ukrainian nationals and TCNs, who have entered into the Republic of Moldova after 24 February 2022, have since exited back to Ukraine⁶⁹. The high proportion of females among refugees could affect gender balance in host communities but is not expected to affect the gender equality policy context in Moldova.

8.2.3 Representation of women in Rayon Councils in WMZ-1

As could be seen in the following table prepared basing on information available on a number of websites of Rayon Councils, Municipal Councils and of Peoples Assembly of ATUG, out of 8 legislative power bodies presented in the table the number of female members is about one third (which corresponds to the quota established by the national legislation) is in 4 bodies. The lowest percentage of female members (only 6%) is in the ATUG People Assembly, and it is the highest (37%) in Ceadir-Lunga Municipal Council.

Table 70 Percentage of female members in various legislative power bodies in WMZ-1

Council	Number of members	Female staff	% of female staff	Source (accessed 05.10.2022)
Cahul Rayon Council	35	11	31	https://cahul.md/consilieri-raionali/
Cantemir Rayon Council	33	7	21	https://www.cantemir.md/lista-consilieri-raionali/
Taraclia Rayon Council	27	9	33	https://raiontaraclia.md/sovetniki-raiona/

⁶⁸ <https://moldova.un.org/en/185065-moldova-comprehensive-gender-assessment>

⁶⁹ <https://moldova.un.org/en/199966-republic-moldova-displacement-surveys-ukrainian-refugees-and-tcns-crossing-ukraine-20-july>

Taraclia Municipal Council	22	4	18	https://taraclia.md/ru/page/mstny-sovt/mstny-sovt-215/mstn-sovtniki-i-sfr-otvtstvnnosti
ATUG People Assembly	35	2	6	https://halktoplushu.md/index.php/rukovodstvo/spisok-deputatov-vi-sozyva-2
Comrat Municipal Council	27	8	30	https://comrat.md/municipalnye-sovetniki.html
Vulcanesti Municipal Council	23	4	17	https://www.vulcanestimd.com/deputatskie-okruqa
Ceadir-Lunga Municipal Council	23	10	37	https://ceadir-lunga.md/munitsipalnyj-sovet/sovetniki

The Rayon Councils will be involved in decision-making related to changes in the SWM system within the Project. For the decisions could take into consideration the aspects of gender equality in access to employment and improved services the members of Rayon Councils would require a program of information and training during the Project preparation and implementation including the promotion of women's participation in public consultation and decision-making processes.

8.2.4 Gender issues in SWM service providers in WMZ-1

Sex- and age-disaggregated data collected from the three largest providers of SWM services in WMZ-1 as presented in the following table, show that the SWM department of Municipal Enterprise Cantemir (total 13 employees) has 38% of female employees, while the Municipal Enterprise Cahul (total 40 employees) has only 5% of female employees. Females are not employed as technical specialists but are practically dominating among marketing and control staff. No information on the wage gap between male and female staff was reviewed.

Table 71 Data on female staff and on staff age groups for the largest providers SWM services in WMZ 1

Personnel type	Total staff	Female staff	% of female staff	SWM staff age			
				20-35	36-45	46-60	60+
<i>Municipal Enterprise Cahul (IM Gospodăria Comunal-Locativă Cahul), Cahul Town</i>							
Administrative	3	2	67	0	1	2	0
Marketing and control	3	0	0	0	1	2	0
Technical	28	0	0	1	9	14	4
Auxiliary	6	0	0	0	0	3	3
Subtotal	40	2	5	1	11	21	7
<i>Municipal Enterprise Cantemir (IM Apa-Canal Cantemir), Cantemir Town</i>							
Administrative	2	1	50	1	1	0	0
Marketing and control	2	2	100	0	0	1	1
Technical	7	0	0	2	0	2	3
Auxiliary	2	2	100	0	2	0	0
Subtotal	13	5	38	3	3	3	4
<i>Municipal Enterprise Vulcanesti (IM Gospodaria Locativ-Comunala Vulcanesti). Vulcanesti Town</i>							

Personnel type	Total staff	Female staff	% of female staff	SWM staff age			
				20-35	36-45	46-60	60+
Administrative	5	4	80	0	1	0	4
Marketing and control	2	2	100	1	0	0	1
Technical	8	0	0	2	2	4	0
Auxiliary	9	0	0	0	0	5	4
Subtotal	24	6	25	3	3	9	9
Municipal Enterprise Taraclia (IM Apa-Canal Taraclia), Taraclia Town							
Administrative	3	2	67	0	0	2	1
Marketing and control	2	2	100	0	1	1	0
Technical	14	0	0	2	4	6	2
Auxiliary	3	0	0	0	0	2	1
Subtotal	22	4	18	2	5	11	4
Public works and sanitation department within mayoralty, Ceadir-Lunga Town							
Administrative	1	0	0	1	0	0	0
Marketing and control	2	2	100	1	0	0	1
Technical	16	0	0	0	8	4	4
Auxiliary	2	0	0	0	0	2	0
Subtotal	21	2	10	2	8	6	5
Municipal Enterprise Comrat (IM Gospodaria Locativ-Comunala Comrat), Comrat Town							
Administrative	2	1	50	1	0	1	0
Marketing and control	2	2	100	1	1	0	0
Technical	17	0	0	0	4	10	3
Auxiliary	4	0	0	0	1	2	1
Subtotal	25	3	12	2	6	13	4
Total in WMZ-1, persons	145	22	15	13	36	63	33
Total in WMZ-1, %	100			9	25	43	23

Source: information from the SWM service providers

It is worth noting that, as indicated in the table above, more than 40% of employees in six largest SWM service providers are of the age 46-60, age of 23% is above 60 while less than 10% are of age 20-35 and the total number of staff in age groups 20-35 and 36-45 is less than in age group 46-60. It could be expected that introduction of new equipment and modern systems for control of waste collection operations as well as for data management would result in making the work in SWM service providers more attractive for women and for younger staff.

Certain changes in the organisational setup and staff responsibilities for implementation of the Project. Development and implementation of HR management policy throughout the Project will be required for PIU and SWM service providers. This would be part of the ESAP.

The organisational setup for the Project and operation of the proposed facilities could allow for opportunities for employing men and women. Quotas promoting the gender equality could be used for specific positions in the organisational setup. Sex-disaggregated data regarding the current operations could hardly be relevant for assessment of the future employment opportunities taking into consideration possible improvement of working conditions for the staff. At the same time the Project should be prepared and implemented to ensure that men and women equally benefit from the improved SWM services and sustainability of the new system. Collection and review of sex-disaggregated data could confirm a need and provide a basis for development and implementation of a Gender Equality Plan as part of the Project. This would be part of the ESAP or a separate document.

8.2.5 Gendered implication of the proposed Project

The proposed Project will contribute to improvement of hygienic conditions and thus the living standards for men, women, boys and girls in the rayons included in WMZ-1.

Women in Moldova like in many other countries are supposed to keep the house clean and deal with solid waste generated in households. Cleaning work at premises of various organisations is also carried out mainly by female staff. In domestic situations most men do not bring waste to the container or dumpsite if this would affect their status. Thus, women and children are typically supposed to handle the waste and get exposed to the health hazards related to waste in case of absent or poor waste management services. As women educate their children, the improved waste management practices achieved during the Project will have a direct and sustainable effect on the overall hygienic and health situation of families and communities.

Needs and habits of women and children of different age actively affect the overall consumption pattern of community (e.g. in terms of food waste minimisation and use of leftovers, giving preference to certain types of goods and packaging materials, reusing of clothes, purchase of long-lasting and repairable household items, etc.). Women and children typically play active role in source-separation of waste in the households with is significant for proper separation and high quality of separately collected recyclable. The pattern is essential in the context of the 3Rs principle: reduce, reuse, recycle. Roles and practices of women are also important for managing of household-like waste generated at shops, catering places, factories, other commercial organisations and at premises of various public institutions.

The EPIU and Regional Operator will take the gender aspects into consideration and plan their activities throughout the Project accordingly. They should also keep in mind that in households and in organisations women typically take care of timely payments for public services and have experience with various payment methods, which would be important for successful collection of user charges for SWM services within the Project.

Women are in general very active in informal communication regarding improvements of public services. Women, children and youth are eager and willing to learn about new system of services. At the same time, women possess and can share practical experiences, which could be lost if they are not invited to participate in the planning of solid waste management services. This would contribute to selecting the most suitable equipment, locations of waste collection points and schedule of services, keeping in mind that sets of equipment, facilities and services are in many cases designed by men and organisations often having other priorities than learning and addressing women's perceptions, specific needs and concerns regarding the waste management issues.

The EPIU and the LPAs will promote participation of women (for they could be heard and contribute to decision-making) in the public consultations and keep sex-disaggregated lists of participants as the documentation. The Project grievance mechanism (with sex-disaggregated registration of grievances) would allow to reveal gender differences in attitudes of people as users of the waste management system in WMZ 1 recognising that the Project can affect men and women in different ways, so that this information could be incorporated into the Project design and implementation activities.

The two Technical Assistance Consultants contracted, as envisaged by the EBRD, would raise gender awareness among the male and female staff of the EPIU, contractors, the Regional Operator, the local authorities and the media, so that gender aspects are addressed during the engineering design, tender and contractual requirements for procurement of works, goods and services, as well as within the CDSPP.

Appendix 1 Meeting protocols with LPAs about preferred institutional set-up model

MINUTES OF MEETING

COWI

TITLE SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1

DATE 09 September 2022

PLACE Cahul municipality, meeting room of the city hall

PARTICIPANTS List of participants included

PREPARED BY COWI, 09 September 2022

DISTRIBUTION to the participants

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Participants

No	Name	Position
Ministry of Environment		
1.	Svetlana Bolocan	Head of the Waste and Chemicals Management Policy Directorate
I.P. U.I.P.M.		
2.	Anatol Risina	Head of EPIU
3.	Aurelia Bahnaru	National consultant in the field of waste, EPIU
Key LPAs from WMZ-1		
4.	Serghei Anastasov	Mayor of Comrat municipality
5.	Baldji Victor	Head of PIU, Comrat municipality
6.	Nicolae Dandiș	Mayor of Cahul municipality
7.	Torlan Ivan	Head of territory planning and sanitation department, Ciadîr-Lunga municipality
Consultants (COWI)		
8.	Vladislav Cantea	SWM Expert/Project Deputy Team Leader
9.	Ion Beschieru	Local Institutional Expert

Agenda

- > Presentation of the waste management system and the institutional model for RMD-1 according to the gap analysis
- > Comments, questions and answers
- > Decisions

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Summary of presentations, comments, questions and answers

1. Mr. Anatol Risina opened the meeting, giving a brief presentation of the project implementation stage, mentioning the activities carried out and the remaining activities to be implemented. He mentioned that the loan agreement between the EBRD and the Republic of Moldova is expected to be signed by the end of October so that the start of the implementation of the project/investments can proceed.
2. Mrs. Svetlana Bolocan also mentioned that the key LPAs have an important role in the project implementation process. She also emphasized that this loan will be guaranteed/repaid by the state. She mentioned that the current dumpsites will be closed after the new regional landfill is put into operation and that there must be a focus on reducing the amount of waste disposed of at the landfill.
3. Mr. Vladislav Cantea made a presentation of the waste management system proposed for WMZ-1, presenting details regarding the regional infrastructure, collection equipment, the necessary investments of various components of the regional municipal solid waste management system, etc.
4. Mr. Ion Beschieru made a presentation on the institutional model. He mentioned that in the process of developing and selecting the preferred institutional model, several options and variations of the institutional model were analyzed in WMZ-5, but in the end, the model with a single regional operator founded by larger LPAs was selected, which will be responsible for both regional infrastructure management and waste collection and transportation. The founders of the regional operator in the case of WMZ-1 will be the municipalities of Cahul, Comrat, Cantemir, and Taraclia. He also mentioned the fact that the lands on which the elements of the regional infrastructure are to be located (i.e., transfer stations, regional waste landfill, recyclables sorting station, composting station) are proposed to be transferred to the property of the state, the use/management of which shall be later transferred to the regional operator. The waste collection and transportation equipment will be transferred to the property of the key LPAs. He also mentioned that the current operators will continue to operate until the regional infrastructure is put into operation, when the provision of waste collection and transportation service and management of the regional infrastructure will be taken over by the regional operator. The LPAs refusing to sign a contract for delegating the waste collection and transport service to the regional operator will have to bring the waste to the landfill or transfer stations themselves and pay the gate fee. The current dumpsites are to be closed and the state authorities shall enforce the ban on their further use.
5. Ms. Bahnaru made a brief presentation on the evolution of the main statistical indicators regarding the generation and volume of solid waste collected, the number of waste dumpsites, the coverage with waste management services, and the need to focus on recycling and waste recovery to reduce the amount of waste disposed of at the dumpsites.



6. During the questions and answers session, the mayor of Cahul had several questions, one related to the implementation schedule, the answer being that according to the plan the infrastructure would be put into operation towards the end of 2026. There were also questions regarding the access road at the landfill, and how tariffs are to be calculated and approved, to which COWI consultants and representatives of the ministry and EPIU gave answers.
7. After clarifying the questions asked, all LPA representatives present at the meeting expressed their agreement and support for the implementation of the project according to the model presented by the consultants.
8. Regarding the next steps, Mr. Ion Beschieru mentioned that after the completion of the final report of the gap analysis, certain important parts of the report will be translated into Romanian (because the report is drawn up in English due to the involvement of international experts). Following the support expressed by the mayors (executive authority), the feasibility study, together with the gap analysis report will also have to be approved by the local councils, to express a clear and firm commitment to participate in the implementation of the project.
9. The two key LPAs who were not present at the meeting for some urgent reasons, Taraclia and Cantemir, are to be contacted by phone by the COWI consultants, to also inform them about what was reported during the meeting (especially the institutional model) and to obtain their approval or lack of objections.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. Contact the LPA representatives of the cities of Taraclia and Cantemir to present the institutional model and other relevant information from the gap analysis and obtain their approval and confirm their interest to participate in the project (followed by the approval by the local councils at a later stage).

MINUTES OF MEETING



TITLE SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1

DATE 09 September 2022

PLACE Online

PARTICIPANTS List of participants included

PREPARED BY COWI, 09 September 2022

DISTRIBUTION to the participants

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Participants

No	Name	Position
Key LPAs from WMZ-1		
1.	Roman Ciubaciuc	Mayor of Cantemir municipality
Consultants (COWI)		
2.	Ion Beschieru	Local Institutional Expert

Agenda

- > Presentation of the institutional model for RMD-1 according to the gap analysis
- > Comments, questions and answers
- > Decisions

Summary of presentations, comments, questions and answers

1. At the meeting with the representatives of the LLPAs from the WMZ-1 it was decided to call/organize follow-up online meetings with the mayors of the key LPAs from the zone that did not attend the meeting (Cantermir, Taraclia and Cania¹). Separate online meetings with all 3 municipalities have been organized.

¹ Though not a large LPA (not a residence municipality for the rayonal administration), on the territory of Cania municipality a transfer station will be located and they have to agree with the transfer of the ownership of the land to the state.



PAGINA 2/2

2. In the online meeting with the Mayor of Cantermir municipality, Mr. Ion Beschieru made a presentation on the institutional model, similar to the one made during the meeting on Cahul the same day. He mentioned that in the process of developing and selecting the preferred institutional model, several options and variations of the institutional model were analyzed in WMZ-5, but in the end, the model with a single regional operator founded by larger LPAs was selected, which will be responsible for both regional infrastructure management and waste collection and transportation. The founders of the regional operator in the case of WMZ-1 will be the municipalities of Cahul, Comrat, Cantemir, and Taraclia. He also mentioned the fact that the lands on which the elements of the regional infrastructure are to be located (i.e., transfer stations, regional waste landfill, recyclables sorting station, composting station) are proposed to be transferred to the property of the state, the use/management of which shall be later transferred to the regional operator. The waste collection and transportation equipment will be transferred to the property of the key LPAs. He also mentioned that the current operators will continue to operate until the regional infrastructure is put into operation when the provision of waste collection and transportation service and management of the regional infrastructure will be taken over by the regional operator. The LPAs refusing to sign a contract for delegating the waste collection and transport service to the regional operator will have to bring the waste to the landfill or transfer stations themselves and pay the gate fee. The current dumpsites are to be closed and the state authorities shall enforce the ban on their further use.
3. The mayor had no major questions and declared his support for the project implementation according to the presented institutional model.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. The mayor agreed with the proposed institutional model.

MINUTES OF MEETING

COWI

TITLE SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1

DATE 16 September 2022

PLACE Online

PARTICIPANTS List of participants included

PREPARED BY COWI, 16 September 2022

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Participants

No	Name	Position
Key LPAs from WMZ-1		
1.	Boşneaga Alexei	Deputy Mayor of Taraclia municipality
2.	Viorica Railean	Deputy Mayor of Taraclia municipality
Consultants (COWI)		
2.	Ion Beschieru	Local Institutional Expert

Agenda

- > Presentation of the institutional model for RMD-1 according to the gap analysis
- > Comments, questions and answers
- > Decisions

Summary of presentations, comments, questions and answers

1. At the meeting with the representatives of the LLPAs from the WMZ-1 it was decided to call/organize follow-up online meetings with the mayors of the key LPAs from the zone that did not attend the

meeting (Cantermir, Taraclia and Cania¹). Separate online meetings with all 3 municipalities have been organized.



PAGINA 2/2

2. In the online meeting with the Mayor of Cantermir municipality, Mr. Ion Beschieru made a presentation on the institutional model, similar to the one made during the meeting on Cahul the same day. He mentioned that in the process of developing and selecting the preferred institutional model, several options and variations of the institutional model were analyzed in WMZ-5, but in the end, the model with a single regional operator founded by larger LPAs was selected, which will be responsible for both regional infrastructure management and waste collection and transportation. The founders of the regional operator in the case of WMZ-1 will be the municipalities of Cahul, Comrat, Cantermir, and Taraclia. He also mentioned the fact that the lands on which the elements of the regional infrastructure are to be located (i.e., transfer stations, regional waste landfill, recyclables sorting station, composting station) are proposed to be transferred to the property of the state, the use/management of which shall be later transferred to the regional operator. The waste collection and transportation equipment will be transferred to the property of the key LPAs. He also mentioned that the current operators will continue to operate until the regional infrastructure is put into operation when the provision of waste collection and transportation service and management of the regional infrastructure will be taken over by the regional operator. The LPAs refusing to sign a contract for delegating the waste collection and transport service to the regional operator will have to bring the waste to the landfill or transfer stations themselves and pay the gate fee. The current dumpsites are to be closed and the state authorities shall enforce the ban on their further use.
3. The deputy mayors had no major questions and declared that the local administration of Taraclia municipality supports the project implementation according to the presented institutional model.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. The deputy mayors of Taraclia agreed with the proposed institutional model.

¹ Though not a large LPA (not a residence municipality for the rayonal administration), on the territory of Cania municipality a transfer station will be located and they have to agree with the transfer of the ownership of the land to the state.

MINUTES OF MEETING



TITLE SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1

DATE 16 September 2022

PLACE Online

PARTICIPANTS List of participants included

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Participants

No	Name	Position
Key LPAs from WMZ-1		
1.	Anatolie Manole	Mayor of Cania municipality (commune)
Consultants (COWI)		
2.	Vladislav Cantea	SWM Expert/Project Deputy Team Leader

Agenda

- > Presentation of the institutional model for RMD-1 according to the gap analysis
- > Comments, questions and answers
- > Decisions

Summary of presentations, comments, questions and answers

1. At the meeting with the representatives of the LLPAs from the WMZ-1 it was decided to call/organize follow-up online meetings with the mayors of the key LPAs from the zone that did not attend the meeting (Cantermir, Taraclia and Cania¹). Separate online meetings with all 3 municipalities have been organized.

¹ Though not a large LPA (not a residence municipality for the rayonal administration), on the territory of Cania municipality a transfer station will be located and they have to agree with the transfer of the ownership of the land to the state.



2. Mr Cantea shortly presented the main elements of the institutional model and the model for solid waste management in the WMZ-1. Importantly, he mentioned the fact that the land from Cania municipality on which the transfer station will be located needs to be transferred to the state ownership. This was also applied in the other regions to ensure the sustainability of the investment.
3. The mayor of Cania municipality, Mr Manole had no major questions and agreed with the idea that the land should be transferred to the ownership of the state.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. The mayor of Cania municipality, Mr Manole agreed with the proposed institutional model and with the transfer of the ownership of the land plot for the construction of the transfer station to state ownership.

Appendix 2 Site Visit Reports

Appendix 3 Site Visit Reports

Filed visit to Regional Landfill site in Cahul Municipality, Cahul Rayon

Field visit date: 10.02.2022

Regional Landfill site

The site designated for the Regional Landfill of WMZ-1 is located in Cahul Municipality, Cahul Rayon (see the maps in Annex 1). The LF site is located at about 3.5 km east of Cahul City, near the dumpsite used currently by Cahul Municipality. The site is as described in the FS and it is suitable for the construction of the planned regional landfill. The size of the landfill area is sufficient for the generated waste in WMZ-1, including Comrat District of Gagauzia, which was not included in the FS. The geographical condition of the site allows for landfilling of large quantities of waste within a small footprint as the waste body of the landfill has 20 m in height on average. Potential area (of 8 ha) for new landfill cells is available near the site.

The site designated for the regional landfill and other infrastructure for waste treatment (Sorting station for separately collected recyclables and Composting station for green waste), consists of a series of land plots. The largest land plot (property of Cahul Municipality) has an area of 9.1 ha and includes the current dumpsite used by Cahul Municipality. Just north of this plot of land is the area designated for the construction of the regional landfill. Almost all the land designated for the construction of the regional landfill belongs to Cahul Municipality except for 2 small plots (0.22+0.28 ha) which are private; the owners of these 2 plots of land refused to exchange them for other parcels of land proposed by Cahul Municipality. Cahul Municipality must initiate the official process of expropriation for these 2 plots of land.

A landscape view over the regional landfill site is presented in Fig. 1. In addition, Fig. 2 presents a general map of the site with points where photos were taken during the field visit on February 10, 2022. The number of the photo and its view direction are also shown on the map. The photos (according to the number presented on the map in Fig.2) are presented in Table 1.

Fig. 1: Landscape view towards the regional landfill site (view from west to east)



Covered currently by grass, the land designated for the construction of the regional landfill has an area of 8.8 ha (see Map 2 and Map 3 in Annex 1). The landfill will include 3 cells with a total of 6.3 ha (cell 1 = 2.1 ha, cell 2 = 1.8 ha, cell 3 = 2.4 ha). Since the land is situated in a valley flanked by two hills, it allows for storage of large quantities of waste; the waste body of the landfill is 20 m in height on average.

The landfill site is connected to the main road by a gravel road of 1.5 km which needs improvement. There are no utilities on the site. Electric network is available at about 2 km from the site. No water supply or sewage network are available near the site.

The residential areas of Cotihana Village and Cahul City are located at about 2.6 km and 3.5 km respectively from the landfill site. The site is not visible from any localities around.

No rivers or lakes can be seen near the landfill site. The landfill site is mainly surrounded by grassland and shrubland. Some vineyards can be seen east of the site, while cultivated agricultural lands can be seen west of the site.

The dumpsite currently used by Cahul Municipality is guarded all the time. No delivery of waste without a receipt from the local SWM company can be done at the dumpsite. Also, no person without proper authorisation is allowed on site. The waste is placed at the dumpsite, which is then periodically covered with earth. The earth is taken from the site, near the dumpsite (the place where a part of the composting facility is to be located). A bulldozer is used to compact the waste and cover it with earth. A wheel loader is used to bring and place earth on the compacted fresh waste.

According to LPA, no waste pickers are coming to the dumpsite. No activities of waste pickers were observed on site or near the site during the field visit.

Fig. 2: Map of the regional landfill site with the location of photo views

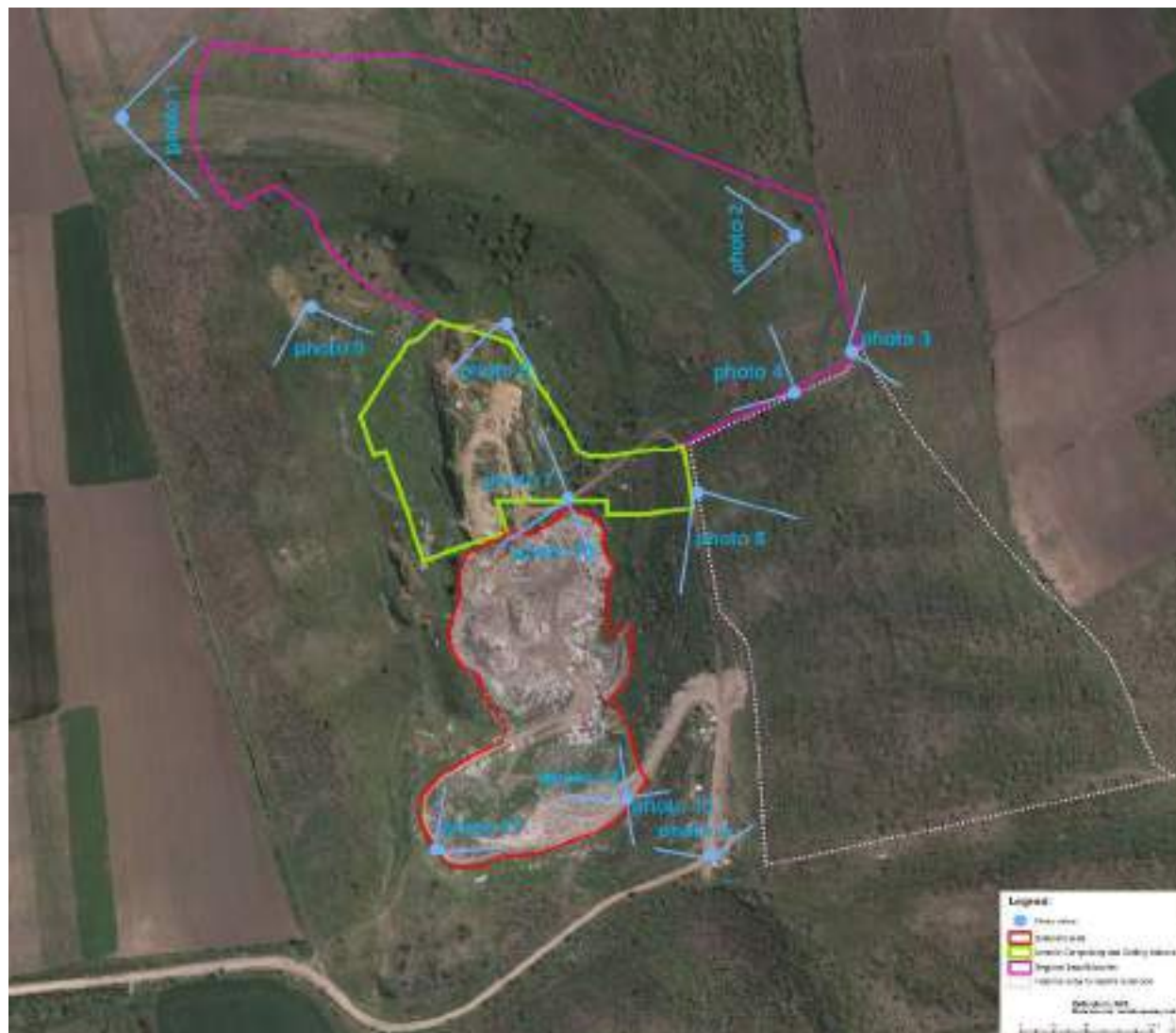


Table 1: Photo views from the regional landfill site (10.02.2022)



Photo 1: View (from North-West border of the site) to East-South direction



Photo 2: View (from East border of the site) to West direction



Photo 3: View (from East border of the site) to East direction, vineyards on the border of the site



Photo 4: View (from North-East border of the site) to West-North direction



Photo 5: View (from East border of the site) to South direction, possibility for new cells on the left



Photo 6: View (from South border of the site) to North direction, possibility for new cells on the right



Photo 7: View (from the centre of the site) to North-West direction, the area for the planned facilities for waste treatment (Sorting and Composting stations)



Photo 8: View (from the centre of the site) to South direction, the area for the planned facilities for waste treatment (Sorting and Composting stations)



Photo 9: View (from the West border of the site) to South direction, the area for the planned facilities for waste treatment (Sorting and Composting stations)



Photo 10: View (from the centre of the site) to South-West direction, the upper part of the dumpsite area



Photo 11: View (from the West-South border of the site) to East-North direction, the lower part of the dumpsite area



Photo 12: View (from the South border of the site) to North-West direction, the dumpsite area



Photo 13: View (from the South-East border of the site) to South-East direction, the waste reception area/security booth at the dumpsite

Conclusion:

The site designated for the Regional Landfill is suitable for the construction of the landfill and other waste treatment facilities as described in the FS.

The size of the planned landfill area is sufficient for the generated waste in WMZ-1, including Comrat District of Gagauzia (which was not included in the FS). The landfill area can be increased in the future since 8 ha of land is available near the site.

Map 1: Location of the regional landfill site

Map 3: Regional landfill area as planned in the FS



Filed visit to Cania Transfer Station site

Field visit date: 10.02.2022

The site designated for the Transfer Station (see map in Annex 1) in Cania Municipality is as described in the FS. The site is suitable for the construction of the Transfer Station.

Being designated for the construction of the Transfer Station, the site has an area of 1.78 ha and belongs to Cania Municipality (land cadastral nr. 21142070182). The land designated for the construction of the transfer station is covered by grass, brush and small trees.

The site is just on the side of road R56 – Cania-Baimaclia-Taraclia de Salcie (see photos 6 and 7 in Table 1 below). Electricity (10 kV) is near the site. Water supply and sewerage networks are not available near the site.

The site is more than 1.300 m away from residential area (Cania Village). A river (Saca River) is at 700 m away from the site. Cultivated land are near the site, on East boarder of the site. Grassland and shrubland are on the other sides of the site.

Fig. 1 presents the map of the Transfer Station site with points where photos were taken during the field visit on February 10, 2022. The number of the photo and its view direction are also shown on the map. The photos (according to the number presented on the map in Fig. 1) are presented in Table 1.

Fig. 1: Map of Cania Transfer Station site with the location of photo views



Table 1: Photo views from the Transfer Station site (Cania Village, 10.02.2022)



Photo 1: View (from South-East corner of the site) to West direction



Photo 2: View (from South-East corner of the site) to North direction



Photo 3: View (from North-East corner of the site) to West-South direction



Photo 4: View (from West border of the site) to East direction



Photo 5: View (from South-West corner of the site) to East-North direction



Photo 6: View (from North border of the site) to East direction, Nation Road R56 (Baimaclia Village direction)



Photo 7: View (from North border of the site) to West direction, Nation Road R56 (Cania Village direction)

Conclusions:

1. The designated site for the transfer station is suitable for its construction as described in the FS.
2. The access to the transfer site is good.

Transfer Station site (Cania Municipality), 2022

The map displays the geographical context of the transfer station site in Cania Municipality. The site is highlighted by a yellow outline. A white box indicates the area shown in the inset map. Distances are marked as 1.586 km and 7.05 km from the site to other locations. The legend identifies various infrastructure elements:

- Roads (red line)
- Railway (blue line)
- Water (light blue)
- Land parcels (green/brown)
- Transfer station site (yellow outline)

A scale bar at the bottom left indicates distances up to 200 meters.



Filed visit to Taraclia Town Transfer Station site

Field visit date: 10.02.2022

The site designated for the Transfer Station (see map in Annex 1) in Taraclia Town Municipality is as described in the FS. The site is suitable for the construction of the Transfer Station.

Being designated for the construction of the Transfer Station, the site has an area of 1.74 ha and belongs to Taraclia Town Municipality (land cadastral nr. 8701104.862). The land is covered by grass and includes ruins of former livestock farm.

The site can be accessed from the main road R38 (Chisinau-Taraclia) by two gravel roads, each of about 650 m. The access road (650 m) needs improved. Electricity is available at about 500 m from the site. Water supply and sewerage networks are not available near the site.

The site is more than 1.900 m away from residential area (Taraclia Town). Cultivated lands are near the site, on East and North borders of the site. Grassland with ruins of former livestock farm is on the other sides of the site.

The site is at 700 m from Lake Taraclia, 1,000 m from Lunguta River, 500 m from Ialpugul Mare River, and 400 m from a small canal. The required buffer/protection zones of the rivers are 500 m, while the protection zone of the small canal is only 15 m.

Fig. 1 presents the map of the Transfer Station site with points where photos were taken during the field visit on February 10, 2022. The number of the photo and its view direction are also shown on the map. The photos (according to the number presented on the map in Fig. 1) are presented in Table 1.

Fig. 1: Map of Taraclia Town Transfer Station site with the location of photo views



Table 1: Photo views from the Transfer Station site (Taraclaia Town, 10.02.2022)



Photo 1: View (from East boarder of the site) to South direction



Photo 2: View (from East boarder of the site) to West direction



Photo 3: View (from East boarder of the site) to West-North direction



Photo 4: View (from East boarder of the site) to North direction



Photo 5: View (from East boarder of the site) to East direction



Photo 6: View (from North boarder of the site) to East direction



Photo 7: View (from North boarder of the site) to South direction



Photo 8: View (from North boarder of the site) to West direction

Filed visit to Comrat Municipality Transfer Station site

Field visit date: 24.02.2022

The site designated for the Transfer Station (see map in Annex 1) in Comrat Municipality is as described in the waste management concept for WMZ-2 (IRCON and SWECO, 2017). The site is suitable for the construction of the Transfer Station, however the land is private property. Hence, Comrat Town Municipality proposed a second site, which is located 700 m away from this site, near Comrat Dumpsite (see the next field visit report for the description of the second site).

The site proposed for the TS has an area of 2.3 ha, which is part of a larger plot of land (cadastral nr.: 9601520.548) of 6.4536 ha designated for agriculture. Once part of a large livestock farm, the land is now covered by grass.

The site is just on the main road R35 (Comrat-Basarabeasca). Electricity line is available on the site. Water supply and sewerage networks are not available near the site.

The site is about 1.800 m away from residential area (Comrat Town). The site is surrounded by a farm and cultivated lands. A tailing pond (without any water at the moment) is at about 500 m from the site. The current dumpsite used by Comrat Municipality is at about 1 km south-west from the site.

Fig. 1 presents the map of the Transfer Station site with points where photos were taken during the field visit on February 24, 2022. The number of the photo and its view direction are also shown on the map. The photos (according to the number presented on the map in Fig. 1) are presented in Table 1.

Fig. 1: Map of Comrat Transfer Station site with the location of photo views



Table 1: Photo views from the Transfer Station site (Comrat Municipality, 24.02.2022)



Photo 1: View (from West-North corner of the site) to North-East direction



Photo 2: View (from West-North corner of the site) to East-South direction



Photo 3: View (from West-North corner of the site) to South direction



Photo 4: View (from West-North corner of the site) to South-West direction



Photo 5: View (from North-East corner of the site) to North-East direction



Photo 6: View (from North-East corner of the site) to North direction



Photo 7: View (from North-East corner of the site) to North-West direction

Conclusions:

1. The site is suitable for the construction of the transfer station but the land is private property. Thus, the land cannot be used for the construction of the Transfer station without the procurement of the plot of land from the private owner.
2. Comrat Municipality proposed a new site near Comrat Dumpsite at about 700 m from this initial site. The second site is suitable for the construction of the transfer station (see the next visit report).

Annex 1: The map of the Transfer Station site in Comrat Municipality



Filed visit to Comrat Municipality Transfer Station site 2

Field visit date: 08.09.2022

The second site proposed for the Transfer Station (see map in Annex 1) in Comrat Municipality is located near Comrat Dumpsite, at about 700 m from the first site proposed for the Transfer Station in the waste management concept for WMZ-2 (IRCON and SWEKO, 2017). The site is public land and it is suitable for the construction of the Transfer Station.

Being located on the border of the dumpsite used by Comrat Town Municipality, this site has an area of 0.369 ha. The land belongs to Comrat Town Municipality. The land of the site is now covered by grass.

The site is near the main road R35 (Comrat-Basarabeasca). Electricity line is available on about 300 m from the site. Water supply and sewerage networks are not available near the site.

The site is about 1.200 m away from residential area (Comrat Town). The site is bordered by Comrat Dumpsite (East) and cultivated lands (South-West). A quarry and farm buildings can be observed at about 200 m from the site. A tailing pond (without any water at the moment) is located at about 200 m from the site.

Fig. 1 presents the map of the Transfer Station site with points where photos were taken during the field visit on September 8, 2022. The number of the photo and its view direction are also shown on the map. The photos (according to the number presented on the map in Fig. 1) are presented in Table 1.

Fig. 1: Map of Comrat Transfer Station site with the location of photo views



Table 1: Photo views from the Transfer Station site (Comrat Municipality, 8.09.2022)



Photo 1: View (from North-West corner of the site) to South-East direction



Photo 2: View (from North-West corner of the site) to East direction



Photo 3: View (from North-West corner of the site) to North direction



Photo 4: View (from North-West corner of the site) to West direction



Photo 5: View (from South-West corner of the site) to North-West direction



Photo 6: View (from South-West corner of the site) to West direction



Photo 7: View (from South-West corner of the site) to South direction



Photo 8: View (from South-West corner of the site) to East direction



Photo 9: View (from East border of the site) to West-North direction



Photo 10: View (from North-East corner of the site) to South direction



Photo 11: View (from North-East corner of the site) to East-South direction



Photo 12: View (from North-East corner of the site) to North-East direction



Photo 13: View (from North-East corner of the site) to North-West direction (access road)

Conclusions:

1. The site is suitable for the construction of the transfer station.
2. Comrat Town Municipality needs to designate the plot of land for the construction of Transfer Station.

Annex 1: The map of the Transfer Station site 2 in Comrat Municipality



Appendix 3A Environmental and Social Assessment Report

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

ENVIRONMENTAL AND SOCIAL ASSESSMENT



COWI

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

ENVIRONMENTAL AND SOCIAL ASSESSMENT

PROJECT NO.

A226634

DOCUMENT NO.

WMZ-1 ESA1

VERSION

01

DATE OF ISSUE

24.02.2023

DESCRIPTION

ESA report WMZ-1

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

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APPENDICES

Appendix A Names of those responsible for
preparing the E&S Assessment

ABBREVIATIONS

Abbreviation	Explanation
ATUG	Administrative Territorial Unit of Gagauzia
CAPEX	Capital Expenditures
CDR	Center Development Region
CDSPP	Corporate Development and Stakeholder Participation Programmes
CDW	Construction and Demolition Waste
CS	Composting Station
CST	Compliance Summary Table
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EBRD	European Bank for Reconstruction and Development
EPIU	Environmental Projects Implementation Unit (from 2023, NOIEP)
ESAP	Environmental and Social Action Plan
ESP	Environmental and Social Policy
FS	Feasibility Study
GET	Green Economy Transition
GHG	Greenhouse Gases
GPS	Global Positioning System
IDA	Inter-municipal Development Association
IFI	International Financing Institution
IMCA	Inter-municipal cooperation agreement
IMJSC	Inter-municipal joint stock company
IRR	Internal rate of return
IWMS	Integrated Waste Management System
JSC	Joint Stock Company
LCAM	Landfill Closure and Aftercare Manual
LF	Landfill
LOM	Landfill Operation Manual
LPA	Local Public Authority

Abbreviation	Explanation
LTIP	Long-term Investment Programme
MARDE	Ministry of Agriculture, Regional Development and Environment, Republic of Moldova (prior to the Government's restructuring in August 2021)
MDL	Moldovan Leu (currency)
MoEnv	Ministry of Environment (after the Government's restructuring in August 2021)
MoF	Ministry of Finance
MSW	Municipal Solid Waste
NOIEP	National Office for Implementation of Environmental Projects (until 2023, EPIU)
NAER	National Agency for Energy Regulation
NDR	North Development Region
NTS	Non-Technical Summary
OPEX	Operational Expenditures
PIP	Priority Investment Programme
Rayon	Administrative District (in Moldova)
RDF	Refuse Derived Fuel
RFID	Radio-frequency identification
SDR	South Development Region
SEP	Stakeholder Engagement Plan
SLA	Service Level Agreement
SOJSC	State-owned joint stock company
SS	Sorting Station
SWM	Solid Waste Management
TA	Technical Assistance
ToR	Terms of Reference
TS	Transfer Station
WMC	Waste Management Centre
WMZ	Waste Management Zone

1 Introduction

This Environmental and Social Assessment (ESA) has been elaborated by the team of COWI A/S (the Consultant) within preparation of Moldova Solid Waste Project (further the Project) considered for financing by the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) in close cooperation with the Ministry of Environment of Moldova of Moldova (MoEnv)¹ and representatives of the Waste Management Zone 1 (WMZ-1).

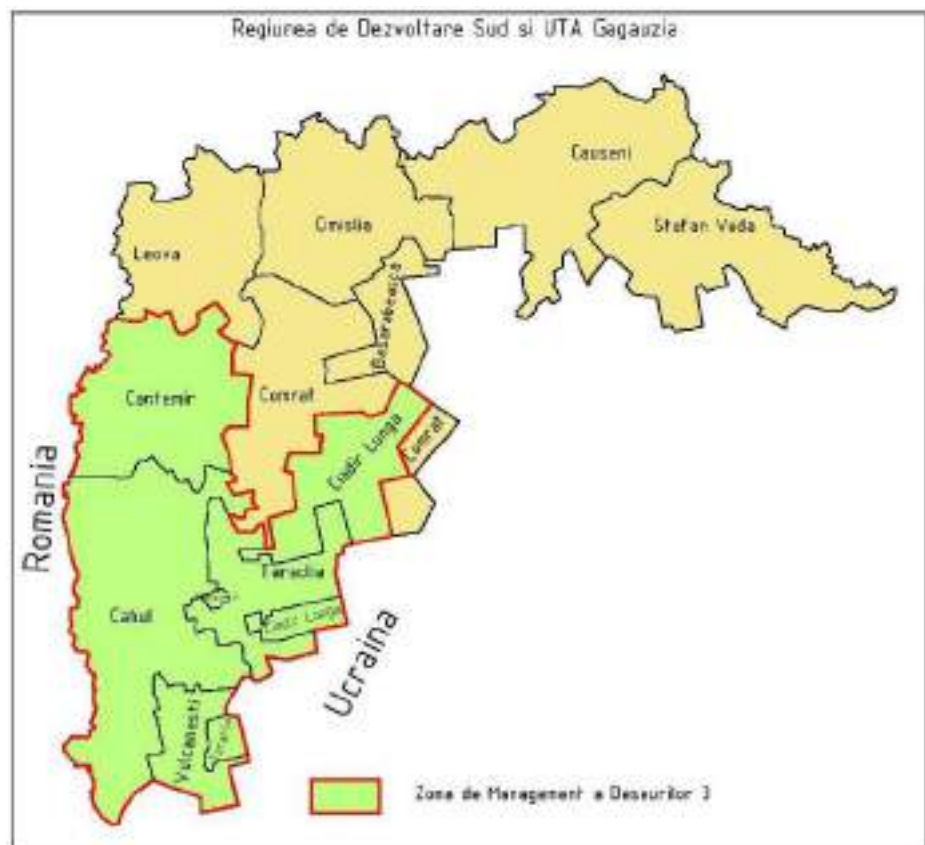


Figure 1.1 Map of Republic of Moldova

¹ until reorganisation in August 2021, the Ministry of Agriculture, Regional Development and Environment (MARDE)

As defined in the National Waste Management Strategy (2013-2027), WMZ-1 includes Cahul Rayon², Cantemir Rayon, Taraclia Rayon (part of South Development Region, SDR), and three Rayons comprising the Autonomous Territorial Unit of Gagauzia (ATUG) – Comrat Rayon, Ceadir-Lunga Rayon, and Vulcanesti Rayon. The Rayons of ATUG are rather small and do not have the same status as other, typically larger, Rayons in Moldova. The WMZ-1 is located in the southern part of the country, bordering with Romania and Ukraine. The average driving distance between the administrative centres of the Rayons is about 50 km. The driving distance between Cahul and Chisinau, the capital of Moldova, is about 170 km.

The Feasibility Study (FS) from GIZ (2015) for the Integrated Waste Management System (IWMS) for WMZ-1 did not include Comrat Rayon of ATUG in the proposed system (see Figure 1.2). WMZ-1 was considered as WMZ-3 in the FS.



Source: FS, GIZ, 2015

Figure 1.2 Administrative areas and proposed SWM infrastructure included in WMZ-1 (WMZ-3 in 2015)

Comrat Rayon was considered as part of WMZ-2 in the waste management concept for this zone (and including ATUG) developed by Ircon and SWECO in 2017 within the project "Technical and institutional support of solid waste management in Southern Moldova", supported by the International Development Cooperation of the Czech Republic. The waste from all municipalities located in Comrat Rayon was supposed to be transported to the regional landfill planned

²Error! Bookmark not defined.

near Cimislia Town in WMZ-2; a transfer station (TS) was planned to be located near Comrat Town for this purpose.

MoEnv decided to include the whole area of ATUG (with Comrat Rayon as its part) into the SWM system of WMZ-1. Comrat is the largest city and the administrative centre of ATUG, which brings an advantage in terms of organizational setup and management capacity for implementing the new regional-scale SWM system in WMZ-1.

The present ESA report is based on the mentioned Feasibility Study and EIA prepared for WMZ-3 in 2015 (by a consortium contracted by GIZ), on the waste management concept prepared in 2017 (by Ircon and SWEKO) and their update elaborated by COWI in 2022 following the recommendations of the MoEnv.

According to the information collected in 2022 on the basis of questionnaires filled in by all LPAs in WMZ-1, there are 22 publicly owned SWM operators in WMZ-1. Additionally, the SWM services in other 15 municipalities are provided directly by the LPAs without any registered company. The largest operators, represented by Municipal Enterprises, are working in the urban areas. The operators working in rural areas are quite small.

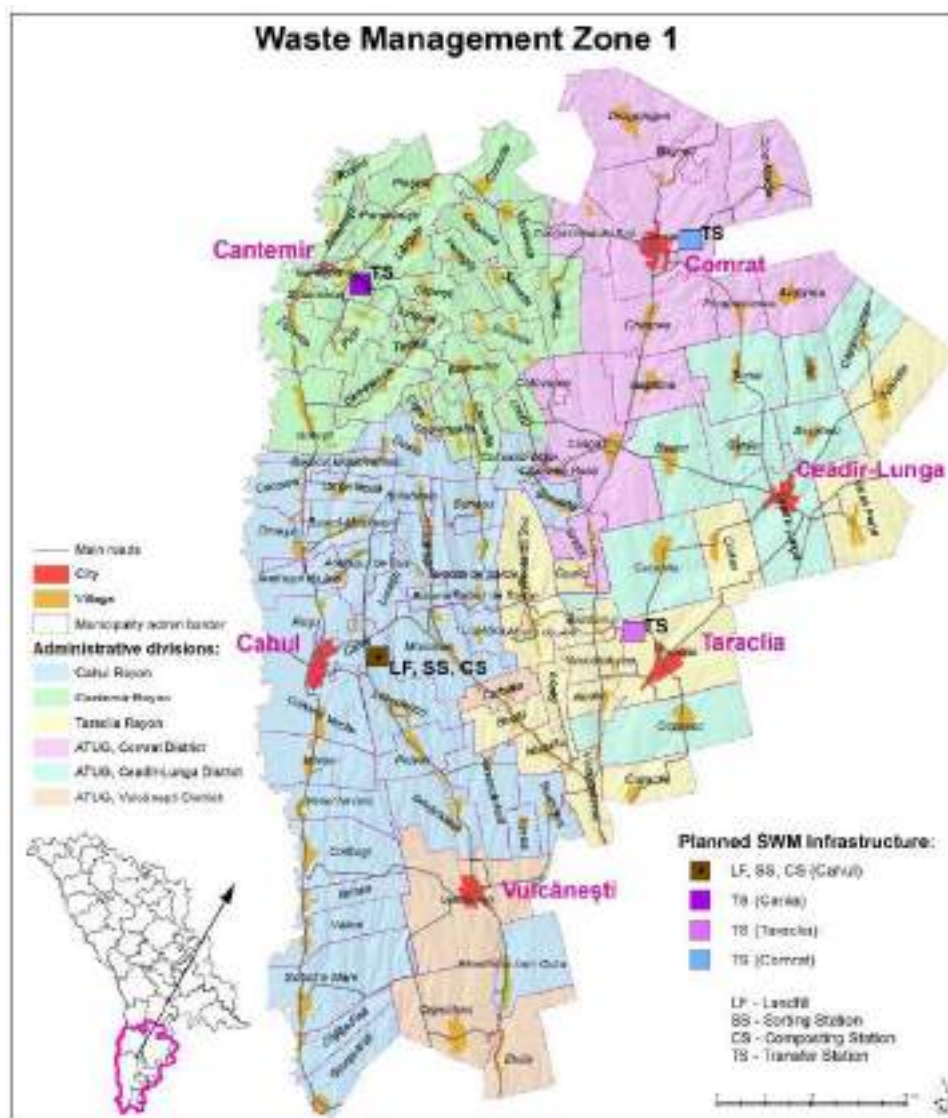
As there are no weighbridges used for waste management in WMZ-1, the current information on quantities of waste generated in WMZ-1 is approximate. The collected MSW is disposed of at about 100 dumpsites in WMZ-1; only a few of them are authorized sites. In urban areas the MSW is transported to the waste disposal sites by the SWM companies. In most villages, the MSW is transported individually by the residents to the local dumpsites. Many residents dump the waste in the nature (open fields, rivers, woodlands, etc.). Also, backyard burning of waste is a common practice in the region.

Waste picking is not a common practice in the region, because of the low market value of recyclables. Only scrap metal (which has a better market value) is collected from disposal sites by a limited number of waste pickers. Waste separation at source is not carried out in WMZ-1. None of the largest SWM operators in WMZ-1 collects recyclables.

The proposed Project is focused on general improvement of waste management practices in WMZ-1 by developing the new Integrated Municipal Solid Waste Management System (IMSW system) with investments in equipment (containers and vehicles for waste collection and transport) and new infrastructure facilities.

The new major infrastructure to be established with investments planned for WMZ-1 (see Figure 1.3) will include:

- > regional Waste Management Centre (WMC) located near Cahul Town and including a Landfill (LF), a Sorting Station (SS) for separated collected recyclables, and a Composting Station (CS) for green waste;
- > three waste Transfer Stations (TSs), one in Cania (Cantemir Rayon), one in Taraclia Town (Taraclia Rayon), and one in Comrat Town (Comrat Rayon).



Source: COWI

Figure 1.3 Administrative areas and proposed SWM infrastructure included in WMZ-1

The investments planned within the Project will also include preparation of engineering design and performing civil works for the closure of all existing dumpsites in WMZ-1 as soon as the new regional landfill is operational, i.e., starts receiving the collected waste. Taking the waste to dumpsites will be prohibited. The dumpsites will be covered with soil.

The following chapters include a more detailed description of the proposed Project for WMZ-1, the baseline conditions and assessment of the Project's potential environmental and social impacts as well as a description of measures envisaged for mitigation of the impacts and enhancement of benefits/opportunities associated with the proposed Project.

2 Project Description

2.1 Background

The European Bank for Reconstruction and Development (“**EBRD**” or “**the Bank**”) is considering providing a sovereign loan of up to EUR 25 million (the “Loan” or “EBRD Loan”) to the Republic of Moldova (the “Borrower”) to finance critical improvements in the solid waste management system across the country (the “National Solid Waste Programme” or the “Programme”). The Ministry of Environment (MoEnv, or the “**Client**”)³ is the promoter of the Programme and the main authority developing waste management policies and regulations, as well as the main Governmental counterpart to oversee the Programme implementation.

The National Waste Management Strategy 2013-2027 (NWMS) foresees the regionalization of currently fragmented waste management services into 8 waste management zones (WMZs). The EBRD loan will be provided in four tranches to support the investments in several regions. Tranche 1 will focus on Waste Management Zone 5 (Ungheni, Cararasi and Nisporeni Rayons). Further tranches will, inter alia, aim to co-finance investments in Waste Management Zone 1 including the administrative areas of Cahul, Cantemir and Taraclia Rayons of South Development Region (SDR), as well as Vulcanesti, Cheadir-Luga and Comrat Rayons of ATUG.

The overall Programme intends to provide modern solid waste facilities compliant with EU standards, contribute to higher service levels, and address pressing environmental challenges in the solid waste sector across the country in line with NWMS.

The total cost of the Programme is expected to amount to ca. EUR 103 million, of which the equal loans from EBRD and EIB loans will be used to finance 68% of the total cost of the *priority investments* (17.7 million EUR) preliminary planned for the Project in WMZ-1. The remainder (32%) is envisaged to be financed with an investment grant, which the EBRD intends to attract from an international donor with a likely source being the Eastern Europe Energy Efficiency and Environmental Partnership Fund (E5P Fund).

The Project implementation structure is expected to involve the authorities at both central and regional levels (a semi-decentralised model).

At the central level – the National Office for Implementation of Environmental Projects (NOIEP), an existing monitoring unit within MoEnv, will manage the Project in WMZ-1 and other SWM projects via the Programme Management Unit (PMU), which is yet to be established.

³ until August 2021, the MARDE

At the regional level - two operational sub-levels are envisaged for SWM services within an Integrated Waste Management System which is to be established in WMZ-1 within the proposed Project:

- (1) Inter-municipal Joint Stock Company (IMJSC, also referred to as the Regional Operator or the RO), which will be a new legal entity established in WMZ-1 by LPAs of the largest towns and basing on Public Service Contract(s) with these and other LPAs (if decided by LPAs' councils) will take responsibilities for the extension of waste collection, transportation, transfer and disposal services to cover all municipalities of WMZ-1 and for operation of the regional SWM infrastructure facilities.
- (2) LPAs in WMZ-1 that decide not to transfer the waste collection and transportation services from their existing SWM operators to the Regional Operator will have to pay the gate fee for the use of the regional SWM infrastructure facilities.

2.2 Current SWM practices

Providers of services

Local public authorities (LPAs) are responsible for municipal solid management services in Moldova. It could be envisaged that within the Project implementation horizon, small LPAs would be amalgamated. However, possible changes in the existing territorial-administrative setup for SWM system cannot be planned at the present stage of the Project preparation.

There are 22 publicly owned SWM operators in WMZ-1. Additionally, the SWM services in other 15 municipalities are provided directly by the LPAs without any registered company. The largest operators, represented by Municipal Enterprises, are working in the urban areas. The operators working in rural areas are quite small.

The largest SWM operators are represented by 5 Municipal Enterprises working in Cahul Town (I.M. Gospodaria Comunal-Locativa Cahul), Cantemir Town (I.M. Apa Canal Cantemir), Comrat Town (I.M. Gospodaria Locativ-Comunala Comrat), Taraclia Town (I.M. Apa Canal Taraclia), and Vulcanesti Town (I.M. Gospodaria Locativ-Comunala Vulcanesti). There is no separate SWM operator working in Ceadir-Lunga Town; the SWM service is provided by the Department of Public Works and Sanitation of Ceadir-Lunga LPA.

Most of waste collection trucks currently used by local waste management operators are very old and would need replacement within the proposed Project. Even though a small number of bins/containers have been recently procured in some LPAs, this number is not significant for the procurement plan for the new ISWM system.

According National Bureau of Statistic (statistica.md) data for 2020, the population coverage by waste collection services in urban areas was about 90%, while in rural areas it was about 40%.

No information on the collection of construction and demolition waste or any other waste streams is available. The hazardous waste is not part of MSW, and its management is not the responsibility of LPAs.

Amounts of generated and collected waste

The population and MSW generation forecasts according to FS (2015) with an update for the year of 2021 are presented in Table 2.1.

The MSW forecast shows that the generated MSW in WMZ-1 is correlated with the decrease of the population in the region. The generated MSW is estimated to decrease from 63.600 t/year in 2021 to 50.700 t/year in 2047.

Table 2.1 Population and waste generation forecasts in WMZ-1

	Year 2021 (FS forecast)			Year 2021 (updated forecast)		
	Total	Urban	Rural	Total	Urban	Rural
Population (1.000 inhabitants):	294.8	95.7	199.1	300,5	89,0	211,6
Population (%):	100	32	68	100	30	70
Waste generation (1.000 tons/year):	68.2	34.9	33.3	63,6	28,6	35,0
Waste from households	54.7	24.5	30.3	51	19.9	31,5
Similar waste (from institutions and commercial companies)	9.1	6.1	3.0	8	5,0	3,2
Park/garden waste	1.9	1.9	0.0	2	1,7	0,0
Other waste (street waste, bulky, waste from markets)	2.4	2.4	0.0	2	2,1	0,3
Waste generation (kg/cap/year)	231	365	167	212	321	165

Source: COWI on the basis of FS 2015

It is estimated (for year 2021) that the MSW in WMZ-1 contained about 16,000 tons of recyclables (mainly packaging waste of plastic, paper/cardboard, metal, and glass), 25,500 tons of bio-waste (including 23,800 tons of the organic fraction from the household and similar wastes as well as 1,700 tons of “green” waste from parks and gardens). The residual (after excluding the recyclables and the bio-waste) combustible fraction of the household and similar waste for year 2021 is estimated at about 2,200 tons.

The current data on quantities of waste collected in WMZ-1 and composition of the waste are general and approximate, as there are no weighbridges available at the waste disposal sites in WMZ-1. The quantities of collected MSW as reported to the National Bureau of Statistic by the waste collection operators in the region are also approximate.

Total collected MSW (from households, institutions, and businesses) reported by the National Bureau of Statistics⁴ for the year of 2020 in WMZ-1 is 380,100 m³ (Cahul Rayon - 54,100 m³, Cantemir Rayon - 8,600 m³, Taraclia Rayon - 84,100 m³, Ceadir-Lunga Rayon - 99,300 m³, Vulcanesti Rayon - 19,200 m³, Comrat Rayon - 114,800 m³). The information of the collected MSW reported by the National Bureau of Statistic is overestimated. The reported information on the MSW collected is based on the volume of vehicles used to collect the waste but not on actual weight of the waste. There are no weighbridges at any of the dumpsites in WMZ-1. The waste collection vehicles are not always full. Additionally, the transported waste reported to National Bureau of Statistic may include other types of waste (e.g., manure or other agricultural wastes), which is not part of MSW.

According to the information received from LPAs of WMZ-1 in 2022, most of waste collection trucks available with waste management operators are too old to be considered for the new SWM system. Only 6 units of compaction trucks (4 units of 10-16 m³ MAZ trucks in Comrat and 2 units of 9 m³ GAZ trucks in Cahul) procured between 2017-2021 can be considered as reserve trucks for the new SWM system. Although a small part of bins/containers have been recently procured in some LPAs, they should not be considered during preparation of the procurement plans for the new SWM system - by the time of the new SWM system launching, all the containers used by the municipalities in WMZ-1 now will need to be renewed anyway.

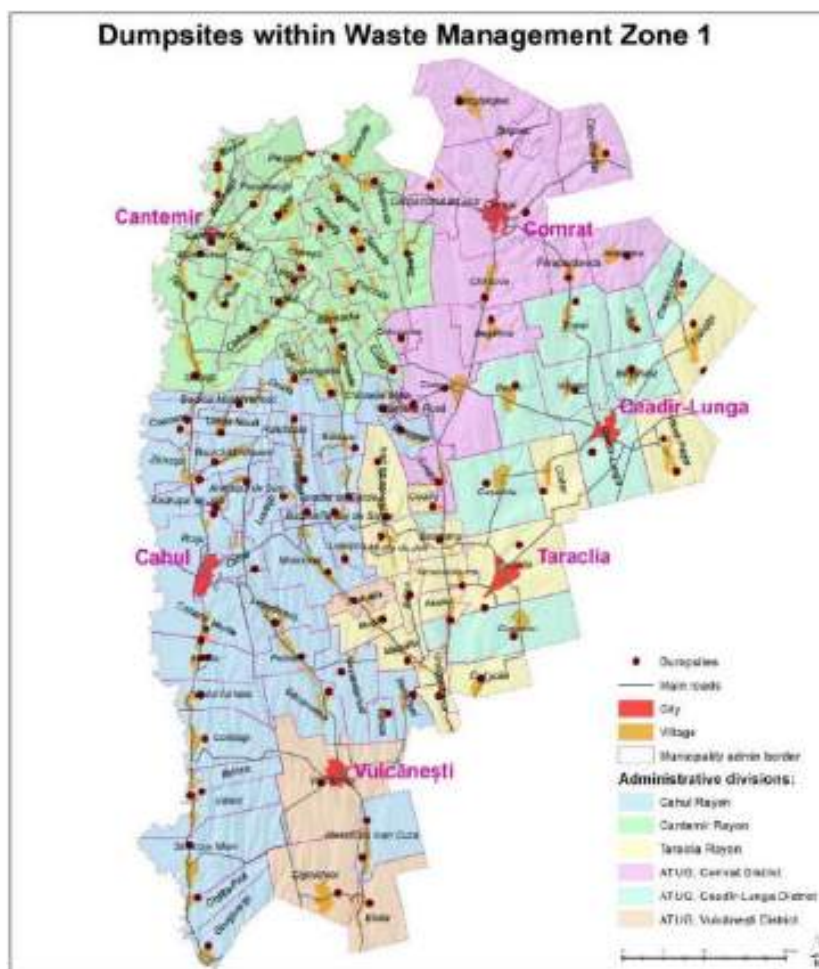
It is estimated by COWI that 35,000 – 40,000 tons of MSW are currently collected in urban and rural areas of WMZ-1, corresponding to approximately 63% of the forecasted amount of MSW generated in WMZ-1.

No information on the collection of construction and demolition waste or any other waste streams is available. The hazardous waste is not part of MSW and it is not the responsibility of LPAs. According to the law, hazardous waste is the responsibility of the generators. Companies must monitor and ensure processing/neutralization or safe storage of the generated hazardous waste. At the same time, there is no special facility for hazardous waste treatment or disposal in the Republic of Moldova. Some hazardous waste (medical waste, used oils, batteries, and containers/packaging materials used for paints, pesticides, and other toxic chemicals) from day-to-day activities of households ends up in the MSW stream. According to composition analyses of MSW, the hazardous waste is usually about 0.5% of the MSW, which translates to about 300 tons per year of such waste for the entire WMZ-1. The design of transfer stations, sorting station, and the regional landfill includes separate containers (metal 1.1 m³ containers) for temporary storage of hazardous waste. It should be noticed that the system for the collection of used batteries, lamps, and other waste from electrical and electronic equipment (WEEE) is in operation in the Republic of Moldova (www.e-circular.org/statistici/operatori; www.e-reciclare.md); people can get rid of such waste at the major stores selling such goods or other bring-in locations.

⁴ www.statistica.md

Current waste disposal practices

The collected MSW is disposed of at 116 waste disposal sites (dumpsites) in WMZ-1 with the total area of about 150 ha (average area of a dumpsite is 1.3 ha); only a few of them are authorized sites. Location of dumpsites identified during the inventory conducted by the Ministry of Environment in 2013 is presented in Figure 2.1. In urban areas the MSW is transported to the waste disposal sites by the SWM companies. In most villages, the MSW is transported individually by the residents to the local dumpsites.



Source: MoEnv, 2013

Figure 2.1 Location of existing dumpsites in WMZ-1

Generally, the collected waste in WMZ-1 is delivered to dumpsites which do not comply with requirements on environmental and human health protection. They are not fenced, not monitored and not equipped with weighbridges. They do not comply with EU standards on landfilling. Many residents dump the waste in the nature areas (open fields, rivers, woodlands, etc.). Also, backyard burning of waste is a common practice in the region.

Ongoing recovery of recyclable fractions of waste

Waste separation at source is not carried out in the WMZ-1. None of the largest SWM operators in the region is collecting recyclables.

Waste picking is not a common practice in the region because of low market value of recyclables contained in the MSW. Only scrap metal (that have a better market value) is collected from disposal sites by a limited number of waste pickers.

Home composting is not a common practice in the region. Many residents transport the organic waste (agricultural waste) to local dumpsites or dump it directly in the nature.

Waste separation at source is carried out only in a few of municipalities (Cantemir Town, Muasaitu Village, Ceadir-Lunga Town, Copceac Village, Comrat Town) in WMZ-1. Only small quantities of recyclables are collected; no data on the collected recyclables is available.

There is no statistical data on the quantities of recyclable materials collected and sold/procured in Moldova. The main buyer of plastic material on Moldovan market is ABS. ABS is operating sorting and processing facilities in other WMZ's as Chisinau and Orhei. There are two glass container companies in Chisinau (Chisinau Glass Factory, Glass Container Company) that procure and process recyclable glass bottles. The biggest buyer and processor of cardboard and paper is Candelux-com (paper mill) operating in Chisinau; it collects over 70% of the cardboard/paper recyclables on the market. Cardboard items production company (Combinatul de Articole din Carton) is another company based in Chisinau that buys and process paper and cardboard. Metalferos JSC is a state-owned company that collects, buys, process, and export scarp metals. Until recently, Metalferos JSC had exclusivity for export of scrap metals. However, the law has been changed and more companies get authorisations (form the Environmental Agency of MoEnv) to export such materials. In 2021, 15 companies besides Metalferos JSC were authorised to export such materials. As mentioned above, the system for collection of WEEE is in operation in Moldova and the companies exporting such waste are also getting authorisation form the Environmental Agency of MoEnv.

A system for collection of waste electrical and electronic equipment (WEEE) is in operation in Moldova, and the companies exporting such waste are also getting authorisations from the Environmental Agency.

Other dealers procure recyclables (mainly plastic materials and cardboard) to export them to neighbouring countries.

The prices for plastics and other recyclables in Moldova and elsewhere on the global market are fluctuating somewhat depending on petrol prices, and this might affect the local market prices.

Current system of paying for and funding of SWM services

SWM services in Moldova are financed based on user charges (taxes or tariffs) and are approved by local authorities at the request of SWM operators. In general, user charges are regulated by local governments and increasing user charges to cost recovery levels can be subjected to political constraints.

According to the response on questionnaires collected from LPAs (56 out of 105 LPAs completed the questionnaire prepared by COWI), the mechanism for paying for waste management services is mixed (based either on a tariff or local tax). Local councils approve both tariffs and local taxes. The SWM system operator charges a tariff directly to customers (households and businesses/institutions), whilst in the case of a local tax, the LPA charges the tax to residents and then pays the SWM service provider. Another difference is the VAT: in the case of the local tax, the LPA being a legal entity should pay VAT (20%) for services, whereas the tariff the operator charges to households/individuals is VAT exempted.

In case of legal entities (companies and institutions) the tariff includes VAT (20%) and the service is provided on demand.

In the cities of Cantemir, Cahul and Taraclia the payment system is based on tariff, while in Ceadir-Lunga, Comrat and Vulcanesti it is based on a local tax. The level of tariff/local tax varies from 9-12 MDL/person/month for citizens living in apartments and 9-15 MDL/person/month in households. In case of Cantemir and Taraclia cities, the tariff varies from 30-33 MDL/household/month/. The tariff for legal entities (companies and institutions) varies from 143.60 to 217.96 MDL/m³, including VAT. Water supply is the main activity in the case of the Cantemir and Taraclia municipal enterprises. Waste management services are the main activity of the operator in Cahul, Comrat and Vulcanesti. In Ceadir-Lunga city, the WMS is provided by the Department of public works and sanitation within mayoralty.

The following table presents detailed information on the current user charges for waste management services in urban areas of WMZ-1.

Table 2.2 Current user charges for waste management services in urban areas of WMZ-1

LPA	Operator	Approved user charges for:			Type of payment
		Apartments	Households	Legal entities	
Cahul	IM Gospodaria Comunal-Locativa Cahul	11 MDL/ person/month	15 MDL/ person/month	182,15 MDL/m ³	Tariff
Cantemir	IM Apa-Canal Cantemir	12 MDL/ person/month	33 MDL/ household/month	171,12 MDL/m ³	Tariff
Taraclia	IM Apa-Canal Taraclia	20 MDL/ apartment/month	30 MDL/ household /month	217,96 MDL/m ³	Tariff
Comrat	IM Gospodaria Locativ-Comunala Comrat	10 MDL/ person/month	10 MDL/ person/month	4 MDL/m ² of legal entities surface	Local tax
Ceadir-Lunga	Primaria mun. Ceadir-Lunga, Department of Public Works and Sanitation.	10 MDL/ person/month	10 MDL/ person/month	198 MDL/m ³	Local tax
Vulcanesti	IM Gospodaria Locativ-Comunala Vulcanesti	9 MDL/ person/month	9 MDL/ person/month	143,6 MDL/m ³ and 1,65 MDL/m ² of industrial entity area and 3 MDL/m ² of commercial entity area	Local tax

Source: Data collected from LPAs by questionnaires and State register of local documents
www.actelocale.gov.md

According to the questionnaires filled in by LPAs in 2022, SWM services are provided in 33 of 52 rural communities that responded. In the case of 20 LPAs services are provided by local municipal enterprises, the main activity of which is water supply. In the case of 13 LPAs the services are provided by the mayoralty using its own personnel and means. The level of the tax/tariff differs greatly from 1 MDL/person/month to 10 MDL/person/month. In several LPAs the tax/tariff is established per household (apartment)/month and varies from 15 to 25 MDL/month.

Companies and institutions pay tariffs for similar-to-household waste by different methods as:

- > Fixed equal monthly payment for each legal entity (21 LPAs) which varies from 15 to 150 MDL/month,
- > Tariff established per m³ (6 LPAs) which varies from 50 to 131 MDL/m³,
- > Tariff established per m² of legal entity's surface (1 LPAs) which is 1 MDL/m²/month,
- > No tariffs established (5 LPAs).

The revenues with the current user charges are estimated as insufficient for proper maintenance and expansions of SWM services.

2.3 Proposed Project

The Project proposed for developing in WMZ-1 an Integrated Solid Waste Management (ISWM) system via the improvement of waste collection, transportation, treatment and disposal operations.

2.3.1 Key components of the new ISWM system

The types and capacities of facilities planned for the future ISWM system are planned after the analysis of the local waste generation trends. The SWM system planned in the FS (GIZ, 2015) was designed to serve population of almost 300,000 people located in Cahul, Cantemir, and Taraclia Rayons and in two Rayons (Ceadir-Lunga and Vulcanesti) of ATUG. However, after the population forecast update according to new population census data, the population in the considered area decreased to almost 231,000. With inclusion of Comrat Rayon of ATUG into WMZ-1 the population of the service area is estimated at 279,000, i.e., it is not exceeding the population forecast and the system capacity originally assumed in the FS (2015). It has been recommended to include Comrat Rayon of ATUG into the new SWM system for WMZ-1.

The new SWM system as described in the FS (2015) shall be implemented with some adjustments recommended in 2022 as described below:

- > *Implementation of "door-to-door" collection of waste in 25% of households (approx. 20,500 units) in rural areas with good road access. This implies: i) including additional 20,500 units of 120 l bins for residual waste collection*

from individual households in rural areas; ii) adjust the number of 1.1 m³ metal containers designated for residual waste collection at collection points. This will reduce the speed of the waste collection trucks, which implies including enough reserve capacity of compaction trucks in the system.

- > *Use of "bring system" with 1.1 m³ containers.* From the information provided in the FS (GIZ, 2015), no investment costs for waste collection points (concrete slabs for containers) are included. The containers for the "bring system" cannot be placed directly on the ground. Prefabricated concrete slabs shall be used to establish waste collection points where 1.1 m³ containers are placed on. These concrete slabs shall be prefabricated elements that are just brought and placed at the locations defined in advance by LPAs. Doing so, the collection points will represent removable structures for which construction permits are not necessary. The procurement of prefabricated slabs for the waste collection points shall be part of the supply tender. Some collection points exist in towns but none of them exist in villages. Concrete slabs for containers, mainly in rural areas, shall be included for the "bring system" in the updated SWM system. Almost all 1.1 m³ containers (for residual waste and recyclables) will need concrete slabs, with exception of about 20% of the containers as it is assumed that they are placed on an available collection points or paved areas.

Depending on the number of containers needed in one spot, several concrete slabs/pads can be placed next to each other to accommodate more containers at a waste collection point (see Figure 2.2). With the support from the regional operator (and Implementation Support Consultant), the LPAs shall plan and prepare (including any necessary ground works) the location of the waste collection points before the delivery of prefabricated concrete slabs for containers. The supplier of the prefabricated concrete slabs shall just deliver the slabs to each LPA and place them at the designated locations. A special tender requirement for the supplier on the delivery of goods shall be included to accommodate this.

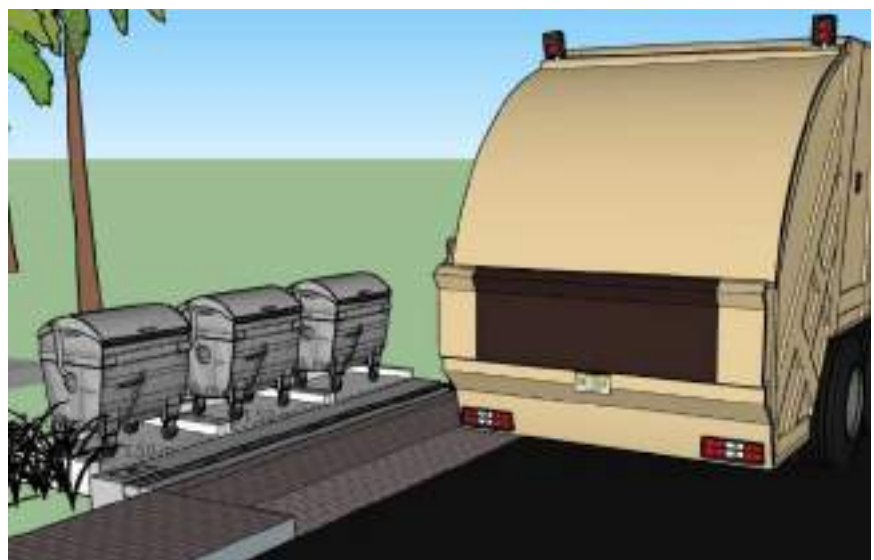


Figure 2.2 Example of a collection point with 3 concrete slabs

- > *Containers for separate collection of recyclables.* It is proposed to use see-through containers for recyclables. Examples of metal 1.1 m³ containers with mesh and plexiglass sides are presented in Figure 2.3 below. It is expected that the use of see-through containers will increase the efficiency of waste separation at source.



Figure 2.3 Example of a metal 1,100 l containers with mesh (left) and plexiglass (right) sides

- > *Digital monitoring of the waste collection process.* To ensure the monitoring of waste collection process, an automated waste collection tracking system shall be implemented. The monitoring information will increase the efficiency of the waste collection by allowing for appropriate monitoring/control and any necessary adjustments of the waste collection routes and other related processes. The implementation of such a system requires: (i) installation of radio-frequency identification (RFID) tags to all containers; (ii) installing global positioning system (GPS) units, fuel sensors, and RFID readers on the trucks; (iii) optimisation of the software system; (iv) connection to the service for the monitoring of the collection trucks. Several companies in Moldova provide such services. The SWM operators will have access to the monitoring system through a simple web browser without the need of special software and hardware. The monitoring system (including database) will be hosted by the service provider; the service provider will maintain the system as part of the service provision fee paid by SWM operators on each vehicle monitored.
- > *Containers for Construction & Demolition (C&D) waste.* Containers (roll-on) for C&D waste were added to the system to allow for collection of C&D waste when needed. The containers will be also used for green waste transport when needed. The hook-lift truck at the transfer stations shall be used to transport these containers.
- > *Vehicles for supervisors and pick-up trucks at transfer stations.* Vehicles for supervisors responsible for waste collection were added to the system to allow for a better management of waste collection activities. Additionally, pick-up trucks were added at the transfer stations to improve the mobility of the supervisors and workers at the facilities when needed.

- > *Waste Transfer Stations in Cania, in Taraclia and in Comrat.* As the distances from other Rayons to the regional landfill in Cahul are too long for waste collection trucks, a Transfer Station (TS) will be established in each of the three mentioned Rayons to ensure efficient logistics for waste transportation (see Figure 1.3). It is proposed to use transfer stations with ordinary unloading bays with open 40 m³ containers, with a rolling compactor (mobile machinery) for compacting the waste in the container when necessary. Additionally, by using easier TSs, more unloading bays can be constructed to accommodate containers for all types of MSW (i.e., residual waste, deferent types of recyclables, green waste) that must be transported separately to the landfill or treatment facilities. The TS in Cania is planned with 4 unloading bays, while TS in Taraclia and TS in Comrat are planned with 5 unloading bays each. The TSs will have the same design concept and capacity of 12,000 tons/year each. The TSs will be able to handle the residual waste, recyclables and green waste and transfer them to landfill, sorting station and composting station, respectively, at Cahul site.

- > *Regional landfill, sorting station and composting station in Cahul.* The regional landfill (LF) for disposal of residual waste from all Rayons of WMZ-1 will be designed, constructed and operated in accordance with the EU Landfill Directive. Sorting station (SS) will be used for recovery of materials from source-separated recyclables collected in all Rayons of WMZ-1. Capacity of the soring plant will be approximately 14,000 t/year. Composting station (CS) will be used for windrow composting of source-separated green (park and garden) waste collected in WMZ-1. Capacity of the composting station will be approximately 1,000 t/year.

- > *Closure and remediation of existing dumpsites.* The priority investments within the Project will include the closure and remediation of all dumpsites in WMZ-1 as soon as the regional landfill in Cahul starts operating. The dumping of waste at all dumpsites within WMZ-1 shall not be allowed – the existing dumpsites will be closed for receiving more waste. Local council decisions shall be enforced on this issue in order not to jeopardize the operation new ISWM system. Many of the dumpsites have been developing over many years. The recently dumped waste is typically visible within a lesser area than the area polluted with waste throughout the dumpsite development history. The remediation of all existing dumpsites in WMZ-1, considering that there are about 120 of them with an average area of 1.3 ha by carrying out civil works within 1-2 years.

A schematic map of facilities planned for the new SWM system in WMZ-1 is included in Figure 2.4.

According to the map, the territories of municipalities in WMZ-1 were grouped as four Waste Collection Catchments taking into consideration the proximity of each municipality to a Transfer Station or the regional sanitary landfill.

The name of the waste collection catchments includes the name of the Rayon in which the Transfer Station or Regional Landfill is located:

- > Cantemir Waste Collection Catchment includes the municipalities within Cantemir Rayon (excluding Visiniovca, Sadic, Samalia, and Cietu municipalities).
- > Cahul Waste Collection Catchment includes the municipalities within Cahul Rayon (excluding Chioselia Mare and Borceag municipalities), all municipalities within Vulcanesti Rayon of ATUG, and Budai Municipality within Taraclia Rayon.
- > Taraclia Waste Collection Catchment includes the municipalities of Taraclia Rayon (excluding Budai Municipality), municipalities within Ceadir-Lunga Rayon of ATUG (excluding Tomai Municipality), Chioselia Mare and Borceag municipalities within Cahul Rayon, and Chioselia Rusa and Svetlii municipalities within Comrat Rayon of ATUG.
- > Comrat Waste Collection Catchment includes the municipalities within Comrat Rayon of ATUG (excluding Chioselia Rusa and Svetlii municipalities), Visiniovca, Sadic, Samalia, and Cietu municipalities within Cantemir Rayon, and Tomai Municipality within Ceadir-Lunga Rayon of ATUG.

As it can be seen in the map, some municipalities located close to Rayon borders were, despite of the administrative borders, included in the waste collection catchments in which a Transfer Station or the Regional Landfill is located closer to the municipalities than a TS in their own Rayon. For example, four municipalities located in Cantemir Rayon (i.e., Visiniovca, Sadic, Samalia, and Cietu) are included into Comrat Waste Collection Catchment as they are located closer to the Transfer Station site in Comrat than to the TS in Cantemir.

The combination of regional landfill, waste sorting station and composting station located close to each other at Cahul site will be further referred to as the Waste Management Centre (WMC).

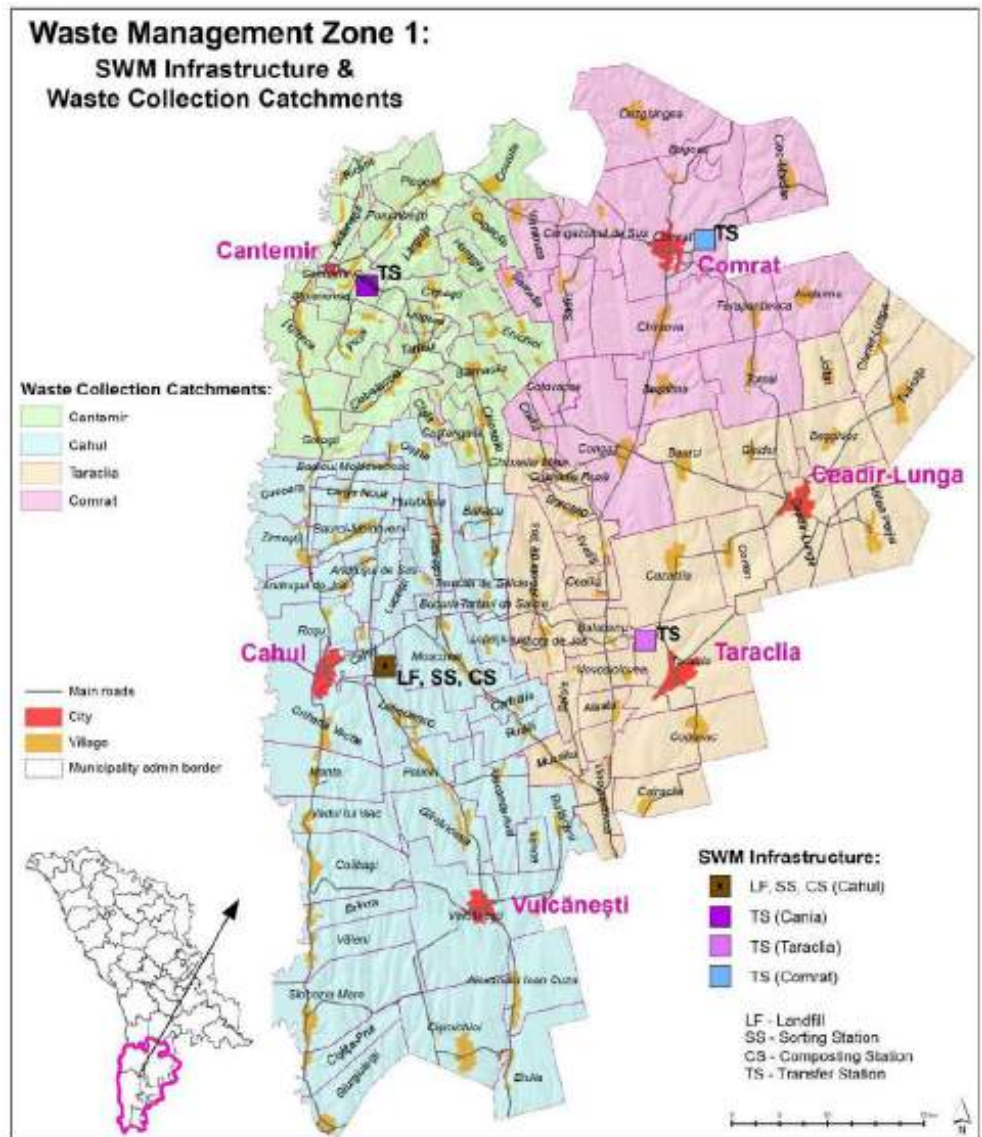


Figure 2.4 Regional SWM facilities proposed within the Project in WMZ-1

2.3.2 Proposed Investment Programme

The proposed Project in WMZ-1 will include improvements planned as the Long-Term Investment Programme (LTIP) covering the period from 2026 to 2047, while a number of activities are planned already for 2025-2028 and defined as the Priority Investment Programme (PIP).

The total cost of the PIP planned for 2025-2028 is estimated at EUR 25.4 million.

Table 2.3 provides a summary of the investments, including description, cost and timing.

Table 2.3 Priority Investment Programme (PIP), 2025-2028, WMZ-1

#	Investment Programme	Brief Description of the Project	Cost of Equip-ment in '000 EUR	Cost of CIW in '000 EUR	Total Cost in '000 EUR	Timing
1	Waste treatment and disposal facilities	Waste treatment and disposal facilities, closure of existing Cahul landfill, closure of all dumpsites in WMZ-1 (works)		10,508	10,508	2025-2028
2	Waste treatment and disposal facilities	Waste treatment facilities (equipment)	2,782		2,782	2026-2027
3	Waste collection and transport equipment	Machinery, vehicles, and equipment	9,318	1,180	10,499	2026
4	Contingencies	12% contingencies for construction works, buildings, machinery and equipment (pos. 1&2)	333	1,257	1,590	2025-2028
5		TOTAL for PIP, WMZ 1	12,433	12,945	25,379	2025-2028

In addition to the investments included in the PIP, the EBRD is intended to provide Technical Assistance as services of two consultants contacted to support the implementation of the PIP:

- > Technical implementation and supervision support.
- > Corporate development: setting user charges, implementation of ESAP, SEP, public awareness.

2.3.3 Project implementation phases

Implementation of the proposed investments is expected to be carried out in phases.

The first phase planned as the PIP will include:

- > Construction of new regional landfill (2025-2026, total capacity: 1,084,000 m³, capacity of cell 1: 289,000 m³), sorting station (2025-2026, capacity 6,000 tons/year), and composting station (2026, open windrow composting, capacity 1,600 tons/year), closure and remediation of the existing dumpsite of Cahul located within the site planned for the new regional landfill;

- Construction of Cania TS in Cantemir Rayon (2025-2026, capacity 8,000 tons/year), Taraclia TS in Taraclia Rayon (2025-2026, capacity 15,000 tons/year) and Comrat TS in ATUG (2025-2026, capacity 12,000 tons/year).
- Purchase and deployment of 1.1 m³ metal containers for residual waste (4,350 units), 120 l bins for residual waste and recyclables (70,800 units), 9.8 m³ roll-on containers for C&D waste (16 units), see-through 1.1 m³ metal containers for collection of recyclables (5,030 units), 16 m³, 10 m³, and 6 m³ compaction trucks (38 units), long-distance trucks with trailers for waste transfer (5 units), pick-up trucks (3 units), and supervisors vehicles (4 units) to collect, transport, and transfer the MSW, including C&D waste in Cahul Rayon, Cantemir Rayon, Taraclia Rayon, and all Rayons of ATUG (i.e., Comrat, Vulcanesti, and Ceadir-Lunga) of WMZ-1, to ensure SWM collection services are provided to 100% of the population in WMZ-1 and an estimated average annual amount of 53,500 tonnes of MSW is collected.
- Closure of dumpsites in WMZ-1: closure of all dumpsites in WMZ-1 immediately after the start of operation of the regional sanitary landfill in Cahul. This includes the closure of dumpsites (2026-2028) in Cahul Rayon, Cantemir Rayon, Taraclia Rayon, and all Rayons of ATUG (i.e., Comrat, Vulcanesti, and Ceadir-Lunga). The procedures for tender and selection of contractors for the closure of the dumpsites shall be organised in 2025, while the construction works for the closure of the dumpsites shall be carried out during 2026-2028.

Further phases planned as elements of the LTIP will include the regular purchase, use and maintenance of waste collection equipment, the operation, maintenance and development of facilities established during the PIP, as well as the closure and remediation of dumpsites.

Financing of works required for remediation of closed dumpsites will be planned according to the elaborated plan.

The total cost of the LTIP in 2028-2047 is estimated at EUR 29.9 million.

Within LTIP the operation/filling of Cell 1 will be continued until reaching its design capacity and closed in 2032. Cell 2 will be constructed by that time and operated until 2039, while Cell 3 is constructed. Cell 3 will be in operated until its closure in 2047.

Table 2.4 provides a summary of the investments, including description, cost, time-period, and purpose.

Table 2.4 Long-term Investment Programme (LTIP), 2028-2047, WMZ-1

#	Investment Programme	Brief Description of the Project	Cost of Equipment in '000 EUR	Cost of CIW in '000 EUR	Total Cost in '000 EUR	Timing
1	Waste treatment and disposal facilities	Waste treatment facilities	5,564	2,700	8,264	2028-2047
2	Waste collection and transport	Machinery, vehicles, and equipment	18,614	-	18,614	2028-2047
3	Dumpsite and landfill closures		-	1,800	1,800	2028-2047
4	Contingencies	10% contingencies for construction works buildings, machinery and equipment	655	538	1,204	2028-2047
		TOTAL for LTIP, WMZ 1	24,843	5,038	29,882	2028-2047

2.4 Description of proposed waste transfer stations

Two transfer stations (TSs) are planned within WMZ-1 for more efficient transportation of all collected waste to the WMC in Cahul. The capacity of each TS will be sufficient to manage all waste collected in the municipalities within service area of the TS. The basic design idea is to have a flexible/robust and accessible system.

Each transfer truck is supposed to carry 2 covered containers - the truck-and-trailer vehicles will have capacity of 40 m³ (see Figure 2.5). The option without compaction of waste has been selected. Thus, the maximum load capacity of the truck-and-trailer is estimated 22 tons of waste. The number of long-distance trips carried out by the transfer trucks will be planned to ensure the regular transfer of all waste delivered to the TS.



Source: GIZ/MSPL

Figure 2.5 Example of truck-and-trailer vehicle for long-distance transportation of waste from TS to WMC

According to the preliminary design, each transfer station shall include:

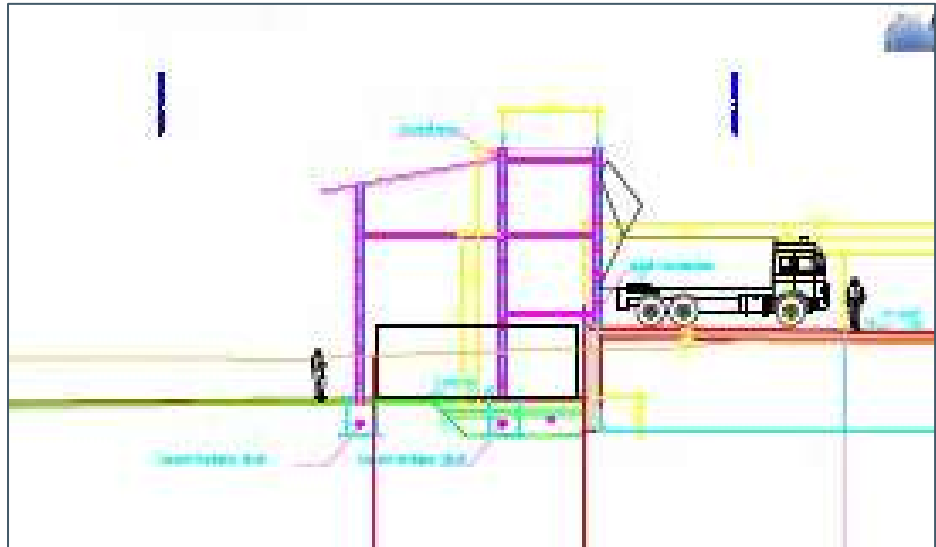
- > entrance area with weighbridge and operator office;
- > access road at both levels for collection trucks (upper) and for transfer trucks (lower);
- > 2-level ramp for tipping of waste from collection trucks into transfer containers;
- > 5 lanes at the lower level for containers to be filled up with waste delivered by collection vehicles and to be carried out by transfer;
- > a wall/fence and a vegetation belt along the TS area border.

A layout example for TS and a typical cross section for TS are shown in Figure 2.6 and Figure 2.7, respectively.



Source: Ircon s.r.o. and Sweco Hydroprojekt a.s.

Figure 2.6 Example visualisation of an unloading bay at TS



Source: GIZ/MSPL

Figure 2.7 Example of cross section for an unloading bay at TS

Fire extinguishers will be located in the weighing bridge, administrative building and transfer ramp. The power supply of the transfer station can be covered by connection to an existing power line, as the additional electricity consumption is low (only for the weighbridge and lighting system). The transfer station area will be fenced (the fence height is at least 2.50 m) and accessible through the gate only during the TS opening hours. The TS staffing could include 5 employees: 2 operators, 1 foreman and 2 drivers of long-distance trucks.

The technical details regarding the proposed transfer of recyclables to the regional sorting station, the transfer of green waste to the regional composting station and of residual waste to the regional landfill will be clarified at the later stage of the Project. However, within the proposed IWMS all waste collected in WMZ-1 will be transported to the Waste Management Centre for centralised treatment and disposal and Cahul site.

2.5 Description of proposed Waste Management Centre

The proposed Waste Management Centre (WMC) for WMZ-1 will include the following new facilities established in Cahul Rayon:

- > regional sanitary landfill (Cell 1 with capacity of 289,000 m³ constructed in 2025-2026) having the total capacity of 1,084,000 m³ and planned for operating with 3 Cells for about 20 years),
- > waste sorting station (constructed in 2025-2026, capacity 6,000 tons/year), and
- > composting station (constructed in 2026, open windrow composting, capacity 1,600 tons/year).

2.5.1 Regional sanitary landfill

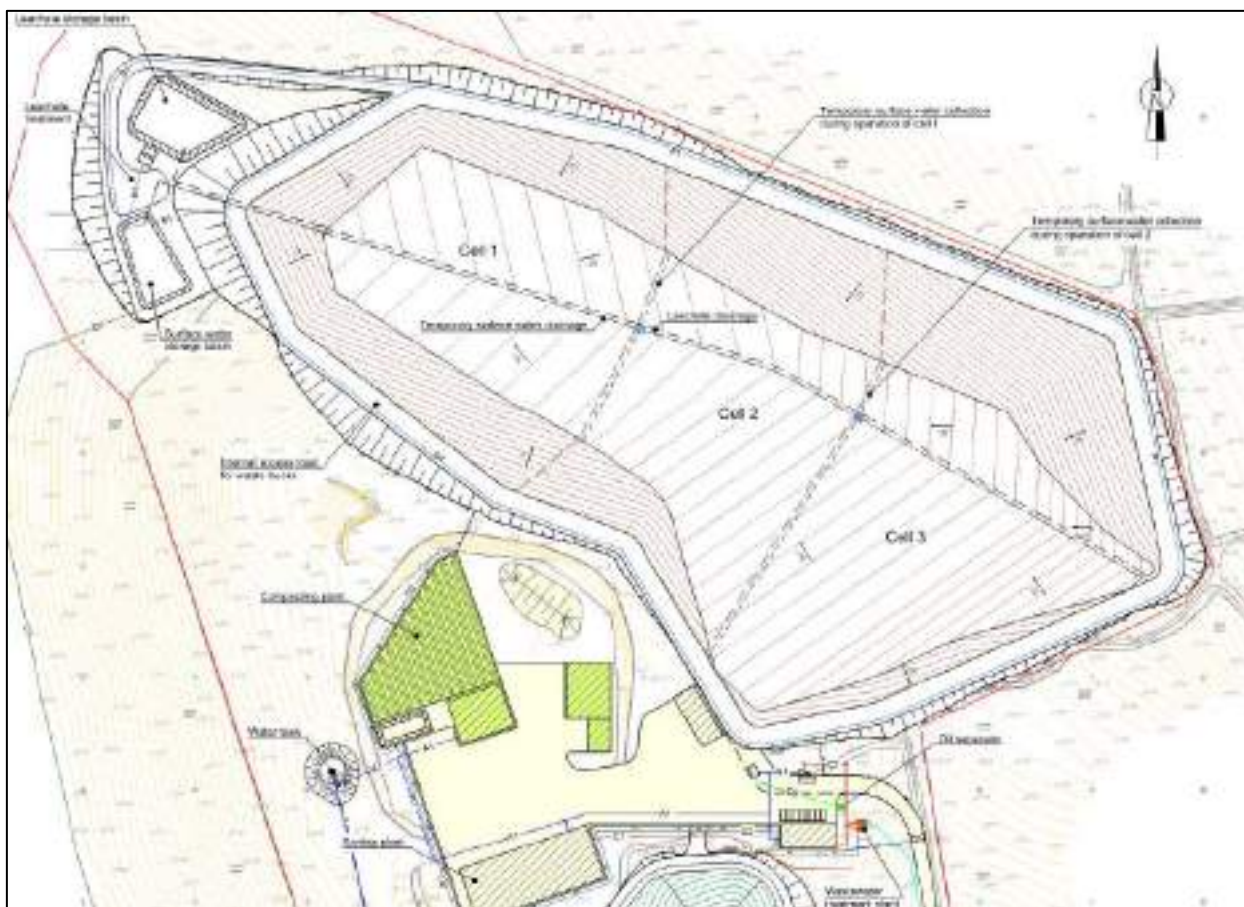
The proposed landfill will have sufficient capacity for disposal of waste generated in WMZ-1 during up to 20 years. Assuming a compact waste density of 1 t/m³ the total required volume of the landfill is approximately 1,084,000 m³ that will have a total weight of about 1,084,000 tons, i.e., the average daily amount of waste disposed at the landfill opened 360 days a year throughout 20 years would be about 150 tons. The landfill will be constructed in three phases (Cells 1, 2 and 3). Construction of Cell 1 will constitute as an initial investment. The Cells will be designed in such a way that construction efforts (and investments) are distributed equally.

It is planned that the new regional landfill will be designed, constructed, operated and, after reaching its designed capacity, capped/remediated, in accordance with the EU landfill directive and include the following key elements:

- > waste registration system (including a weighbridge);
- > base/bottom system including mineral and synthetic materials to protect soil and groundwater from contact with waste, leachate and landfill gas;
- > infrastructure (roads, berms, ramps) for deliveries and unloading of waste, its regular compaction and covering with soil throughout planned gradual filling of landfill cells, installation of temporary cover at each cell upon reaching its design capacity;
- > leachate management system;
- > landfill gas management system;
- > final cover system;
- > buildings (workshop, office, premises for staff);
- > perimeter ditch and surface runoff draining system, fence with a gate, onsite roads, wheel-wash area, signs, lighting system, parking areas, etc.

A qualified contractor will be selected for detailed design and construction of the landfill. The staff of the Regional Operator will be supported by the consultants engaged to ensure the RO's capacity for development, updating and implementation of the Landfill Operation Plan (LOP, including, inter alia, the environmental, health and safety management system), the staff capacity building program (CBP), e.g., as an element of a corporate development programme (CDP) and a stakeholder participation programme (SPP).

The general layout of the regional landfill for WMZ-1 proposed within the Project is presented in Figure 2.8.



Source: GIZ FS 2015

Figure 2.8 Proposed layout of regional landfill for WMZ-1 (at Cahul site)

The proposed landfill will have a total waste disposal area footprint of 6.3 ha and the capacity sufficient for disposal of waste generated in WMZ-1 for 20-21 years. Part of the site planned for landfill is filled with waste and shall be remediated. Access road to the landfill shall be constructed/upgraded. The Cahul municipal dumpsite located south of the landfill site will be closed and remediated as soon as the regional landfill is operational.

Capacity, area, and operation time of the landfill's Cells assuming approximately 5% capacity for intermediate covers are described in Table 2.5.

Table 2.5 Waste disposal cells of the proposed regional landfill for WMZ-1

Cell	Capacity (m ³)	Area (m ²)	Operation time (years)
1	289,000	19,800	6
2	362,500	17,000	8
3	432,500	26,000	7

Cell	Capacity (m ³)	Area (m ²)	Operation time (years)
Total	1,084,000		21

Source: GIZ FS 2015

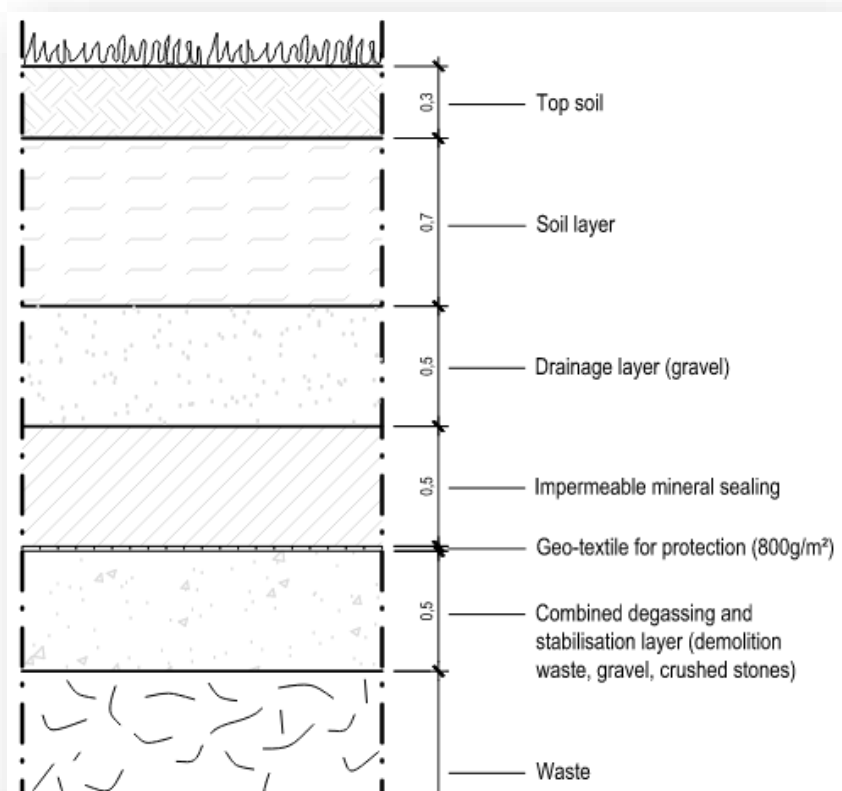
The proposed final layout of the regional landfill after its closure upon 20-21 years of operation is presented in Figure 2.9.



Source: GIZ FS 2015

Figure 2.9 Proposed final layout of regional landfill in WMZ-1 after its closure

An overview of layers comprising the proposed top sealing system (to be constructed above the waste after closure of the landfill) meeting the requirements of the EC Landfill Directive is presented in Figure 2.10 where the approximate thickness of layers is indicated in meters.



Source: COWI on the basis of GIZ FS 2015

Figure 2.10 Proposed structure of top sealing system for regional landfill in WMZ-1 after its closure

Leachate management system

Leachate at landfills and composting plants is generated due to percolation of surface water (from precipitation, surface runoff) and due to decomposition of somewhat humid waste. As leachate contains pollutants posing risks for the environment, the waste management facilities shall include procedures and installations for reducing percolation of surface water into waste body, for collection and treatment of leachate. The proposed infrastructure for leachate management at FW site will include Leachate management system at the landfill and within the associated waste sorting station and composting station.

Leachate management system at the landfill will include leachate collection system (perforated pipes installed in a drainage layer above the synthetic bottom liner) diverting the leachate from waste disposal cells to an open basin ("leachate pond") lined with impermeable synthetic material. Leachate accumulated in the basin could be evaporated and or sprayed/recirculated over the cells. An estimate of precipitation and evaporation balance during the Feasibility Study (2015) provided a basis for planning the capacity of the leachate pond and of the leachate treatment plant. Using the reverse osmosis (RO) process is proposed for treatment of leachate which is the aqueous solution of organic and inorganic contaminants. The RO process allows extracting the clean water ("permeate") from the leachate and leaving the "concentrate" of contaminants. The permeate

could be discharged into the environment and concentrate could be disposed at the landfill.

It is assumed that in case the capacity of the leachate treatment plant is temporary not sufficient due to extraordinary heavy rainfalls or longer operation breaks or other emergency cases, the landfill is constructed in a way that the leachate outflow pipe can be closed by a valve and the leachate can be temporary stored in the landfill, which acts like a retention basin.

Leachate collected from waste sorting station and composting station will be directed to the leachate pond of the landfill and treated together with leachate generated within the landfill.

Stormwater management system

Diversion of surface water runoff from contact with waste contributes to minimisation of leachate generation. Stormwater management system including a network of ditches and berms shall prevent clean water from surrounding areas from entering the areas occupied with waste. This will be valid during operation of facilities, but also after capping of the landfill cells.

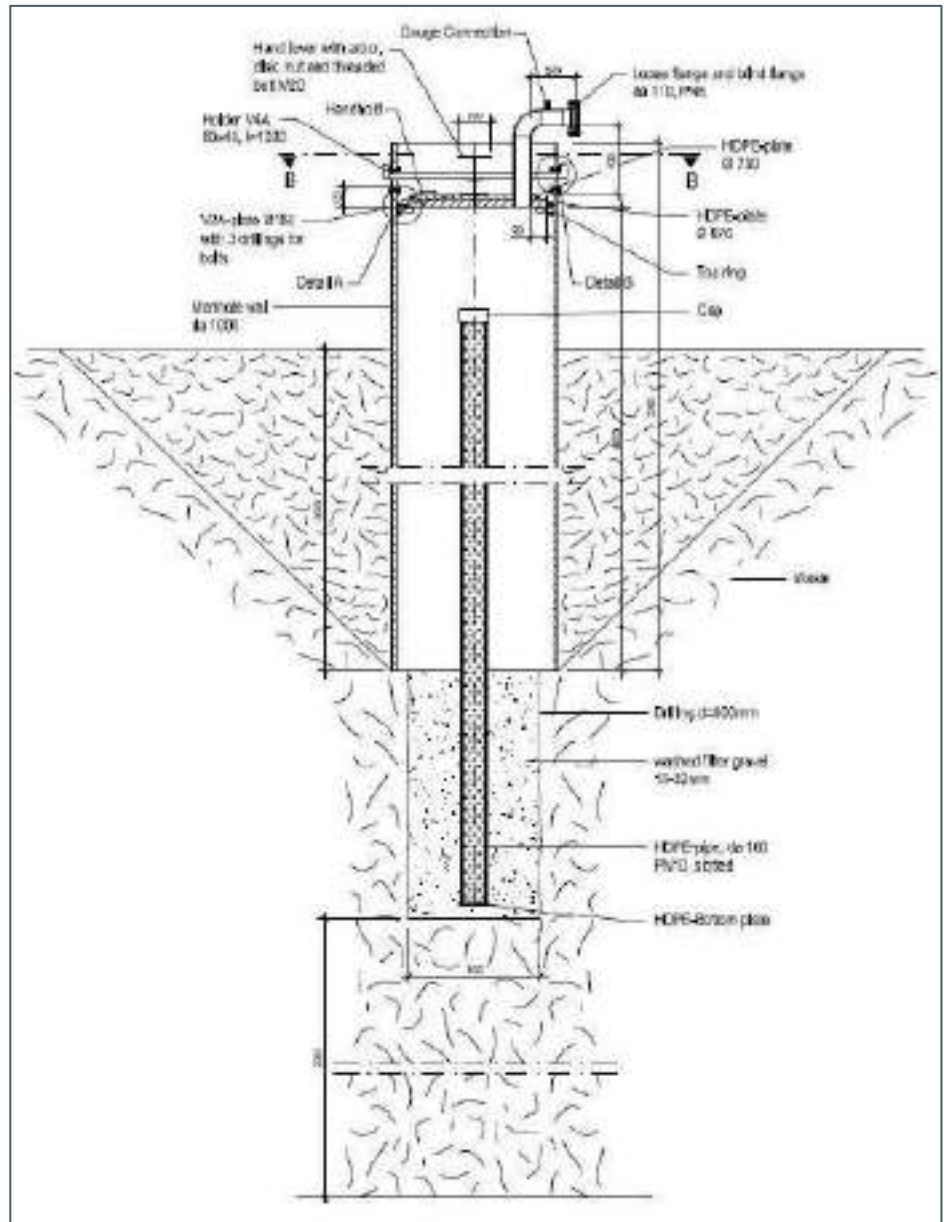
Stormwater will be directed to a storage basin established at the lowest point of the WMC site. The water can be infiltrated through the basin bottom, but could also be stored for fire protection, watering the roads and vegetation, maintaining the optimal humidity of compost, cleaning of vehicles leaving the WMC area, etc.

Landfill gas management system

According to the FS, the carbon content in waste is estimated at 150 kg per 1 m³ of waste. The landfill gas generation will increase gradually. The highest generation of methane would be reached about 20 years after the landfill operation start. The maximum annual emission rate will be about 119 m³/h. During further 20 years, the landfill gas generation will gradually decrease. For 20 years of waste disposal period and 20 years of post-closure period with the realistic landfill gas collection rate of 60% of total generated gas quantity (24.3 million m³), the total amount of collected landfill gas is estimated 14.6 million m³.

The FS assumes that the extracted landfill gas will be directed to a gas flare for combustion. The degassing system will be constructed in a way that a gas engine for production of electricity can be included at a later stage, after having reliable information about gas quality and long-term quantity.

Landfill gas generation usually starts 6-12 months after the start of landfill, depending on the type and amount of waste. A network of gas collection wells could be established by gradually building up the vertical perforated metal or plastic (HDPE) pipes while placing of waste into a Cell. To protect each gas collection well from being clogged by waste, a column of gravel will be filled up around the perforated pipe. An example of design elements for a landfill gas collection well are presented in Figure 2.11



Source: GIZ/MLPS, GOPA

Figure 2.11 Design elements of a landfill gas collection well

Water supply, wastewater management, power supply for regional WMC

Drinking water supply (for the estimated maximum daily consumption of 15 m³) is planned via connection to public network or deliveries by tanker truck. Connection point to the nearest public drinking water supply network is pumping station № 5 located near Cahul town at a distance of 6 km from the regional WMC site. According to the FS, the connection would assume pumping of 3 m³/hour with a pumping height of 120 m and a PE100 pipe with a diameter of 63 mm. This option assumes that construction and operation of a pipeline and a pumping station shall be included in the Project.

To assure a stabile water pressure during the operation of the facility an elevated water tank with a capacity of 50m³ will be placed within the reception area.

Water for process needs (compost moistening, spraying the areas for dust suppression, watering of green areas, vehicle wash) will be taken from wastewater storage at composting station and from the surface water storage basin (cap. 1,400m³).

Wastewater generated only in staff premises will be cleaned in a small, prefabricated wastewater treatment plant with biological cleaning by aeration. Purified wastewater will be discharged to the stormwater ditches for infiltration or further transportation to the stormwater basin. The prefabricated system should have sufficient capacity for 30 persons and include decantation and anaerobic treatment, biological treatment and disinfection.

Wastewater from the cleaning of equipment and wheel washing is estimated to 100 vehicles per week as a maximum with a water consumption of up to 100 l per washing process. This water will be directed to the wastewater treatment plant after passing an oil separator.

2.5.2 Proposed sorting station

Recyclable materials collected separately will be transported via the transfer stations to the sorting station (indicated as Sorting plant in the landfill layout in Figure 2.8) within the WMC in Cahul. The sorting station capacity is 6,000 tons/year.

At the station, the materials will be sorted into the following fractions:

- Paper
- Cardboard
- Metals
- Green plastic bottles and the like
- White plastic bottles and the like
- Other plastics.

The sorting procedure will consist of the following steps:

- > A front loader will fill the recyclable waste in a feed bunker, from where it will then be transported on a conveyor for manual sorting of fractions;
- > Sorting workers will select and dispose of the materials in large bags or plastic containers placed next to the conveyor;
- > Materials sorted in bags and containers will be pressed and/or baled;
- > Pressed/baled recyclables will be stored under a roof and will be taken for recycling agents;
- > The residues remaining on the conveyor will be transported to the landfill.

Some operations at the sorting station could involve automatic equipment. The number of workers, the operation schedule and shifts will be planned according to the flow of recyclables and capacity of the available equipment.

The layout drawing prepared within the FS of 2015 for a sorting station at Cahul site is included in Figure 2.12.



Source: GIZ FS 2015

Figure 2.13 *Sorting station cross section A-A*

SECTION B-B

The diagram illustrates the layout of the conveyor system in Section B-B. It shows a hopper (5) at the start, a conveyor (6) running diagonally upwards, and a discharge unit (7) at the end. The conveyor is supported by a series of vertical legs. The discharge unit is positioned at the top of the conveyor's incline.

- 1 Feeding bunker
- 2 Conveyor
- 3 Manual sorting conveyor
- 4 Sorting cabin
- 5 Feeding bunker
- 6 Ascending conveyor
- 7 Baler

Figure 2.14 Section B-B and legend for sorting station drawings for WMZ-1 (Cahul site)

2.5.3 Proposed composting station

The composting station will be located on the territory of the Cahul WMC and will treat green waste, collected separately, from all Rayons of WMZ-1. The capacity of the composting station will be 1,600 t/year. An open, passive, aerated composting with static piles (windrows) and a regular turning has been selected.

The total area required for composting station is 5,200 m². The composting station area will be paved and include the following key components: 1) waste reception area; 2) composting and curing area; 3) drainage system, 4) sifting, shredding and storage area.

To provide enough oxygen to the microorganisms and to cool the piles during the intensive treatment phase, the waste in piles will be frequently mixed using a turning machine (see Figure 2.15).



Source: GIZ/MSPL, <http://www.qujerinnotec.com>

Figure 2.15 Compost turning machine

2.6 Organisation of the Project implementation

The following organisations are the key actors of the institutional set-up for the Project:

- > The international financing institutions (IFI), namely, the EBRD and the EIB, as well as the international donors providing soft loans and grants to the Project implementation.
- > The Ministry of Finance (MoF) and the Ministry of Environment (MoEnv) of the Republic of Moldova basing on the loan agreement.

- > The National Office for Implementation of Environmental Projects (NOIEP, former EPIU) of the MoEnv will be in charge of the management of projects implemented in all WMZs and will act as the Contracting Authority for the works, goods and services.
- > The LPAs will enter into the Project Support Agreement (PSA) and the inter-municipal cooperation agreement (IMCA) and establish the IMJSC.
- > The IMJSC (Regional Operator) will be established by the largest LPAs of WMZ-1, comprising Cahul Town, Cantemir Town, Comrat Town, and Taraclia Town, and will act as the beneficiary for the Project implementation and the cosignatory to the contracts for the works, goods and services. The IMJSC will assign staff to share Project implementation responsibilities with the NOIEP (MoEnv). The IMJSC will take over the right of use of the regional assets from the State and LPAs and undertake the operation of the regional infrastructure.
- > The ownership of land plots where the SWM infrastructure will be built will be transferred by LPAs of Cahul, Cania (in Cantemir Rayon), Taraclia and Comrat to the state.

Other LPAs, depending on the decisions of municipal councils, will join the IMCA or at least enter into public service agreements with the service providers of WMZ-1.

2.7 Technical Assistance consultants

EBRD envisages to make two Technical Assistance consultants available to support the Operators, LPAs and beneficiary communities for implementation and management of the Project.

The technical assistance component of the Project will be split in two contracts typical for the EBRD projects after signing the loan agreements – one focusing mainly on the engineering design and procurement tasks and the second focusing on the corporate development of the local SWM service provider organisation and the stakeholder participation programme.

The tasks of the **Project Implementation Support, Engineering Design and Contract Supervision Consultant** will consist of at least the following:

- > Coordination of project activities among the different partners (LPAs, Operator, contractors, executive agencies, etc.);
- > Update and development of design documentation for the facilities;
- > Preparing technical specifications for the supply of equipment;
- > Support the contracting authority in the preparation of Terms of References and tender dossiers for procurement contracts; and support in the evaluation and contract award to ensure contracting quality;

- > Monitoring of the project performance of contractors in respect of approved components in the work plan, and ensuring compliance with EBRD loan and policy requirements;
- > Construction supervision and assistance during commissioning of facilities;
- > Preparation of regular reports on the status of projects activities as agreed in the Work Plan;
- > Participation in Steering Committee and other meetings with stakeholders.

The tasks of the **Corporate Development and Stakeholder Participation Programme (CDSPP) Consultant** will consist of at least the following:

- > Assistance in coordination of project activities among the different partners (LPAs, Operator, contractors, executive agencies, etc.);
- > Improve/support the development of commercial, operating and environmental performance of the regional operators;
- > Development of Corporate Development Plan for the Operators;
- > Updating and support for the implementation of ESAP with preparation of the Annual Environmental and Social Report (AESR) to the EBRD;
- > Update and support for the implementation of Stakeholder Engagement Plan, develop and help implement a Stakeholder Participation Programme (SPP), including public awareness campaign, if applicable;
- > Assistance to the Operators in the calculation and to local authorities in setting up user charges, developing SWM plans and regulations;
- > Assistance in financial management and reporting, drafting requirements for the uniform billing system;
- > Development and assistance in the signing of Public Service Contracts between LPAs, the Operator and operators of collection services;
- > Participation in Steering Committee and other meetings with stakeholders;
- > Preparation of regular reports on the status of the Project activities as agreed in the Work Plan.

2.8 Funding of the improved SWM services

The SWM services will be funded by the user charges⁵ calculated according to the methodology which is currently under development with the support of the USAID-funded program "Comunitatea Mea". It is anticipated that the calculation

⁵ It is recommended to use the term "a user charge" or "a charge", instead of the term "a tariff". There is experience that in the Republic of Moldova the term "tariff" is understood as the payment collected by service providers, as opposed to taxes collected by LPAs. However, by definition, a tariff is a tax on imported goods. In some studies, "a tariff" still refers to a payment for public services. Yet, in the English language it should be replaced by a correct term, such as "a charge" defined as a price asked for goods and services.

methodology for user charges will be completed and adopted on the national level. In the process of the regional SWM planning, the SWM data will be collected, measures for the future development will be determined for the purpose of achieving the targets of the national strategy and the investment and operating costs of the future regional SWM system will be calculated to form basis for the calculation of the SWM charges. The size of the charges will be approved by the councils of each LPA. The billing systems will be decided and established by the LPAs. User charges may be collected either by the LPAs or by the providers of the SWM services, depending on the council decisions. The introduction of the uniform system for collection of user charges in all LPAs would be an advantage. It is recommended to include the development of requirements for the implementation of the uniform billing system in the Corporate Development and Stakeholder Participation Program (CDSPP).

Due to enhanced responsibilities of the LPAs in the SWM sector (ref. Article 11 of the Law on Waste), in particular in relation to the SWM planning (ref. Article 35 of the Law on Waste), it is recommended to maintain the LPAs as the only authorities for adopting of SWM user charges. In practice, the inter-municipal joint stock company (IMJSC) will make the calculations of user charges and submit the applications to the LPAs who will adopt the user charges. The commitment of the LPAs to adopt user charges of the required level will be included in the EBRD Loan Agreement, as well as the corresponding Project Support Agreement (PSA) and in the inter-municipal cooperation agreement (IMCA).

Low financial capacities of the LPAs and affordability constraints may impede the cost coverage of the regional SWM systems (for example, the operational cost of the regional landfill according to the environmental standards, development cost, such as the construction of new landfill cells in the future, maintenance, repairs etc.). If the affordability of the population (the capacity to pay for the services) is too low, the charges of the required level may not be set by the LPAs, and the collected revenue may not be sufficient for proper operation and development.

In such cases municipal subsidies may apply. However, if the financial capacities of the LPAs are too low, the sources for municipal subsidies will be insufficient. In this case state budget allocations will be required.

Deficiencies of local governance in the field of SWM (the lack of local and regional planning and regulation) may impede the sustainability of the future SWM system development.

3 Project alternatives considered

A number of alternatives for the proposed Project were considered during elaboration of the Feasibility Study in 2015 and its update in 2022. The key alternatives differing in terms of environmental and social aspects of activities planned at the FS stage are discussed below.

Alternative without the Project – "business as usual"

If the Project is further delayed for many years or cancelled, this would mean continuation of the current practices with low coverage by regular waste collection services, particularly in rural areas, and general lack of investments in infrastructure and equipment resulting in dumping and open burning of waste with the associated impacts on the environment and public health. Rejection of this alternative is a background for the ongoing active preparation of the proposed Project.

Alternative service area for WMZ-1

The original planned SWM system planned in the FS (GIZ, 2015) was designed to cover a population of almost 300,000 people located in Cahul, Cantemir, and Taraclia Rayons and two Rayons from ATUG (Ceadir-Lunga and Vulcanesti). However, after the population update according to new population census data and the population development forecast, the population in the considered original area is expected to decrease to about 231,000 (for the year of 2027, just before the updated SWM system shall start operation). With the inclusion of Comrat Rayon of ATUG into WMZ-1, the population to be covered amount to 279,000 people (in 2027, just before the beginning of operation of the updated SWM system). Hence, the original planned SWM system in the FS is valid even if Comrat Rayon of ATUG is included into WMZ-1. Including Comrat Rayon in the project area for WMZ-1 could be an advantage in terms of the economy of scale as well as in terms of including all three Rayons comprising the ATUG into service areas of the same regional SWM system and into one investment Project.

Alternative options of future waste management system

The following table presents an overview of three main options of WMS considered during the FS in 2015 with details for each element of the future SWM system. All system options contain similar provisions with regard to collection of recyclables, collection of residual waste and composting. The key differences between the alternative options are the treatment of residual waste fraction in specialized sorting plant or MBT. With regard to waste landfilling, the options include different disposal capacities.

- > System Option 1 is based on a "baseline" scenario with construction of new sanitary landfill next to the current disposal site of Cahul and extended waste collection service. This option assumes that all MSW collected from WMZ 3 will be collected and transported to the landfill for final disposal, either directly or through transfer stations in Cantemir and Taraclia.
- > System Option 2 introduces separate collection of recyclables in all urban area. The recycling system will be supplemented by a sorting station for separately collected recyclables. In addition, the option envisages biological

treatment of separately collected green waste from urban areas and introduction of home composting on a pilot scale.

- > System Option 3 differs from Option 2 with regard to a more extended separate collection of recyclables, which will cover not only the whole urban area, but also all villages above 1,000 residents. Thus, between 75% and 85% of the total rural population will be provided with separate waste collection service.
- > System Option 4 envisages a system whereby all municipal waste is collected mixed and is then subject to mechanical-biological treatment (MBT) at a centralised facility at the landfill.
- > System Option 5 also relies on MBT but includes also separate collection of recyclables on the same scale as Option 2.
- > System Option 6 is similar to Option 2; the only difference is the establishment of a second sorting station at Taraclia transfer station for separately collected recyclables from the towns of Taraclia, Tvardita and Ceadir-Lunga.

The considered alternative options also included the implementation of home composting programme for family houses and rural areas in WMZ-1 to prevent open burning of green waste. No collection of green waste from private gardens is envisaged within the proposed system.

Alternative containers for waste collection

The experience in Moldova revealed that simple 1.1 m³ containers currently used for the collection of recyclables are not efficient, as people do not place the recyclables in the appropriate containers if the containers for recyclables are not very different from containers for residual waste even if the containers have proper labels clearly indicating the recyclables to be placed in.

An option of see-through containers is preferred taking into consideration the need for better motivating the inhabitants for separate collection of recyclables and residual waste. Variety of see-through containers available in the market could be proposed by suppliers, but the general idea is to get containers that could be handled by the same types of vehicles in WMZ-1 and, if possible, in more than one WMZ.

Alternative equipment at waste collection points

Containers for collection of recyclables and for mixed waste could be installed below or above the ground level, as stand-alone or in groups. Wheeled containers installed on paved or unpaved surfaces in public areas could be moved from place to place but are typically installed within a fixed established structure that could include a floor, a roof, a fence/wall with a door, etc. To establish good surface for handling of wheeled containers and at the same time to ensure the possibility for later adjustments in the location of some specific waste collection points and

number of containers in them, the option of placing containers on prefabricated concrete slabs was selected as the most suitable.

Alternative trucks for waste collection

The FS recommended the procurement of collection trucks with diesel engines. The alternatives considered included CNG or electric trucks. In several European Union countries more and more diesel-driven collection trucks are replaced by electric trucks (if financially supported by the Government) or by trucks using CNG or biogas. The revised Clean Vehicles Directive (EU Directive 2019/1161) promotes clean mobility solutions in public procurement tenders, providing a solid boost to the demand and further deployment of low- and zero-emission vehicles. The new Directive defines "clean vehicles" and sets national targets for their public procurement. However, in Eastern European countries like Moldova the infrastructure for electric cars or trucks or CNG is not available. Even for CNG there are no filling stations on territory of WMZ-1.

Besides of lacking infrastructure, the investment cost even for CNG trucks are 30-50 % higher than for diesel trucks, while for electric collection trucks they are 2-3 times higher, the capacity, size and replacement costs of batteries, lack of O&M experience in Moldova, no potential suppliers interested in procurement of electric trucks in a small lot for WMZ-1 pose additional limitations. When the new purchased collection vehicles need to be replaced in the future, the replacement by electric or CNG driven trucks should be strongly considered, based on the infrastructure available and cost implications at that time.

Alternative collection of green waste

Green waste originates from maintenance of public parks and other green areas. It is currently transported separately to the dumpsites. The green waste in WMZ 5 could be treated by relatively simple methods, like chipping of tree cuttings and composting that requires a minimum of pre-processing and which will result in the highest quality of final product.

Collection of green waste generated in relatively small quantities in private gardens mainly during spring to autumn could be arranged using various methods:

- › kerb-side collection, in the same way as bulky waste,
- › house-to-house collection on specific dates,
- › regular collection from green waste containers (7 to 10 m³) or amenity sites;
- › on call, several times a year free of charge, further collections at a certain fee, etc.

Alternative composting of green waste

Green and market waste composting is usually carried out in windrows in the open, given that green waste causes low odour emissions. This allows composting at relatively low costs provided that green waste is quite clean in terms of heavy metals and unwanted waste.

Composting of separately collected green waste includes unloading of throughput in a designated site, shredding it and placing it windrows. For aeration purposes, the material needs to be regularly turned by a heap turner, or specially designed equipment as shown in Figure 3.1.



Source: GIZ/MLPS FS (2015)

Figure 3.1 Equipment for turning of compost in windrows

The following three options for the composting of green waste were considered:

- > **Option 1:** Composting of separately collected green waste from public areas in centralized composting facility situated at the regional landfill site.
- > **Option 2:** Organizing composting of green waste in each Rayon. Composting facilities receiving green waste from public areas to be established – one at the regional landfill to serve Cahul Rayon and other facilities next to TS in Taraclia and TS in Cania. Each facility would be equipped with wheel loader, shredder, tractor with trailers, tractor driven self-propelled turner, compost refining screen.
- > **Option 3:** As alternative to Option 2 composting will be organized directly on agricultural land at several sites in each individual rayon. In this case only mobile composting equipment will be provided. The amount composted at each site shall not exceed 150 – 200 tonnes/year.

As the quantities of waste designated for composting in WMZ-1 are lower than the actual capacity of the proposed equipment on each of the sites, the costs per tonne of waste for all options are higher than the usual costs of green waste composting. Implementation of Option 1 would result in the lowest unit costs. For that reason, Option 1 was recommended for further implementation.

Alternative types of infrastructure facilities

Several options for location of landfills, waste treatment facilities and transfer stations for the future SWM system in WMZ-1 were considered. It was decided to reject the option with several similar facilities in different locations (for example, with a sorting station next to a transfer station in addition to the sorting station next to the regional landfill) and to enlarge the waste treatment capacity in one location, as this would bring the economy of scale advantages – make investments

in waste treatment equipment more feasible (e.g. in terms of required land, energy, manpower, logistics) and result in higher quality/value of materials recovered from waste, so that more waste could be sold for recycling.

Alternative sites for regional landfill

The process of identification of the sites for the regional landfill in the area earlier defined as WMZ-3 (consisting of Cahul Rayon, Taraclia Rayon and Cantemir Rayon in South Development Region) currently included as part of WMZ-1, was carried out in phases starting from March 2014. In total, the local authorities with the support of the GIZ experts have shortened the list of potential sites to 3 most promising sites indicated as green dots (2 in Cahul Rayon and one in Cantemir Rayon) on the map in Figure 3.2.

Cahul city, representing about 65% of the urban population of the area and about 17% of the total population of the area, was considered as the centre of gravity of municipal solid waste generation.

A detailed report on the site selection for regional landfill is presented in Annex 6 to the Feasibility Study report and in Annex 1.1 to the EIA report prepared by the GIZ team in 2015.

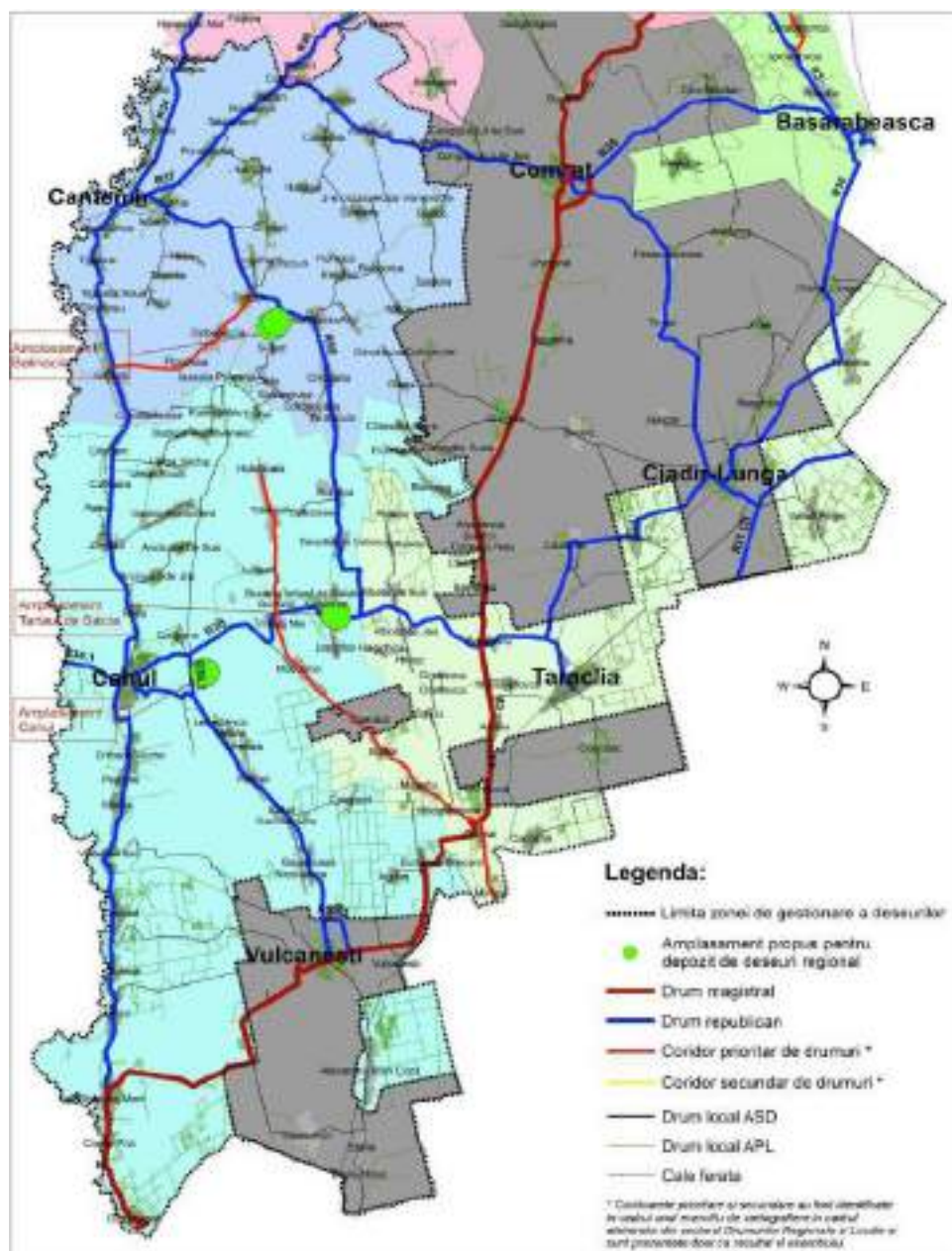
Following the preliminary assessment, the following conclusions were drawn:

- > Cahul site (next to the existing waste disposal site) – meets all the criteria, except that an extension is required within public land and about 1.25 of privately owned agricultural land;
- > Baimaclia site – meets two criteria, namely: the distance from the center of gravity for waste generation (the site is 45 km from Cahul) and the required area (current area available is 13.8 ha). However, the area consists of two plots that cannot be unified - the land needed for potential extension currently has a high agricultural value;
- > Tartaul de Salcia site – does not meet the criteria as the site is located at 440 m from the river and is connected to the water protection area.

It was concluded that out of the three sites evaluated for the location of the regional landfill in WMZ-3 in the South Development Region, the Cahul site represents a preferred location. Its advantage would be the public acceptance because it includes the already existing and operated waste disposal site.

It is necessary to extend the site by acquisition of public-owned land as well as of 1.246 ha of privately-owned agricultural land (5 owners).

As a result of the multi-criteria analysis, the Cahul site located in the Cahul Rayon, public property of Cahul Town was selected as the preferred site for construction of the regional landfill in WMZ-1.



Source: GIZ/MLPS, 2015

Figure 3.2 Sites considered for location of regional landfill for WMZ-1

An overview of the preliminary assessment of the seven sites presented in the EIA of 2015 is included in Table 3.1. The preliminary assessment was succeeded by the detailed multi-criterial evaluation. The selected Cahul site is located within more than 500 m distance from the nearest residential areas. Presence of clay deposits suitable for construction of a base/bottom system for the landfill have been encountered within the site.

The site selection report was prepared, and selection of the preferred site in Cahul was approved by the Local Council of Cahul on 1 August 2014.

Table 3.1 Preliminary assessment overview of site selection for regional landfill in WMZ-1

Evaluation criteria	Shortlisted sites			Remarks
	Cahul site in Cahul Rayon	Baimaclia site in Cantemir Rayon	Tartaul de Salcia site in Cahul Rayon	
Infrastructure and operation criteria				
Maximum distance from the main road network – 10 km	1.5 km	Plot 1: 1.1 km from, Plot 2: 1.8 km from R-56 road, Cantemir-Baimaclia	0.1 km	All sites meet the criterion.
Maximum distance from the center of gravity of waste generation – 20 km	Less than 10 km	47 km from Cahul city	22.5 km from Cahul city	Only the Cahul site meets the criterion.
The minimum area of the site to ensure a minimum capacity for 20 years – 14 ha	10.7 ha with the possibility of extending up to 18 ha	13.8 ha with the possibility of extending up to 6.3 ha	20 ha	Tartaul de Salcia site meets the criterion. The other two sites require an extension.
Hydrogeological and hydrological criteria				
Minimum depth to groundwater – 3-5 m	30 m	< 15 m	-	All sites meet the criterion
Minimum distance from groundwater wells/springs – 500 m	There are no water wells/springs in the area	A well is located within the site, but it is not functional.	There are no water wells/springs in the area	All sites meet the criterion
Minimum distance from rivers, water basins and streams - 500 m and 15 m from the streams	In the region there are no rivers, water basins or streams.	There are no rivers, water basins or streams in the region	440 m to the west is the River Salcia Mica. Northern part of the site is within catchment of 5 rivers draining a forest area.	Tartaul de Salcia site does not meet the criteria.
Physical planning criteria				
Minimum distance from the houses – 500 m	2.6 km	1.2 km	0.5 km	All sites meet the criterion
Minimum distance from archaeological sites and cultural monuments - 500 m	No archaeological sites and cultural monuments in the region	No archaeological sites and cultural monuments in the region	No archaeological sites and cultural monuments in the region	All sites meet the criterion
The minimum distance from the protected areas - 100 - 1,500 m, depending on the protected area type	No protected areas in the region	No protected areas in the region	No protected areas in the region	All sites meet the criterion
Soil quality – minimum value of 60 points	26 – 85 points (on average, below 60)	The existing site - 24 points, the potential extension 75 – 94 points	25 – 46 points	All the sites meet the criterion, but the Baimaclia site has a high value of the potential extension lands.

Source: COWI on the basis of GIZ/MLPS, 2015

Alternative design of regional Waste Management Centre

A number of options could be considered for optimal combination of landfill, waste sorting station and composting station as a single facility to ensure efficient management of manpower and other resources. The WMC infrastructure elements like access road, waste registration system, parking area, wheel cleaning area, workshop, staff building, garage, water supply, power supply, etc. could be common.

Alternative sites for transfer stations

A number of options for locations of transfer stations in the concepts with more than one landfill were considered within the studies performed for separate parts of the area currently defined as WMZ-1. For example, Comrat Rayon was included in WMZ-2. However, according to the waste management concept for this zone (and including ATUG) developed by Ircon and SWECO in 2017, the waste from all waste from all municipalities of Comrat Rayon was to be transported to the planned regional landfill near Cimislia Town in WMZ-2 via a transfer station (TS) that was planned to be located near Comrat. For other part of current WMZ-1, which was during the FS (2015) considered as WMZ-3, the options included (i) three transfer stations - Cahul, Cantemir and Taraclia, where Taraclia TS serves also Ceadir-Lunga Rayon; and (ii) two transfer stations - one in Cantemir and one in Taraclia, assuming direct transport to the planned Cahul landfill from all residential areas of Cahul Rayon and Vulcanesti Rayon.

The site proposed for Comrat TS location is described in the waste management concept prepared by SWECO and IRCON in 2017. The site location is presented in Figure 3.4 and in . The site proposed for the TS has an area of 2.3 ha and is located within the privately owned land. The site is part of a larger privately owned land designated for construction purpose. It is located just next to the main road R35 (Comrat-Basarabeasca). Once being a part of a large livestock farm, the land plot is now covered by grass.



Source: SWECO/IRCON, 2017

Figure 3.3 Location of Comrat TS site proposed in 2017



Source: COWI on the basis of www.moldova-map.md, 2022

Figure 3.4 Aerial image of the site proposed for Comrat TS in 2017

The site considered in 2017 was rejected in 2022, when the Comrat LPA identified a publicly owned site preferred for the TS establishment.

Alternative schedule for closure of existing dumpsites

It was alternatively proposed to include in the PIP only the closure and remediation of the two largest waste disposal sites: as part of the Cahul landfill establishment in Cahul Rayon and of the Cania TS establishment in Cantemir Rayon. Further use of other existing dumpsites in WMZ-1 could be prohibited by decisions of authorities as soon as the new regional landfill in Cahul is operational, and then all dumpsites could be closed within several years. However, it was decided to include closure of all dumpsites in the PIP and plan that all dumpsites in WMZ-1 could be closed as soon as the regional landfill is operational – to ensure that all waste is taken to the EU compliant regional landfill and other SWM facilities established within the Project.

An alternative with setting up transitional dumpsites (to reduce the total number of dumpsites) is a provision of the National Waste Management Strategy. This type of activity was supposed to start long time ago, as it needs a lot of planning and discussions with LPAs. However, the setting of transitional dumpsites in WMZ-1 has not been started. The process of selecting the suitable transitional dumpsites would take time, and preparations for their operation would require EIA with public consultation. Transportation of waste to a number of transitional dumpsites (thus the bigger dumpsites will be further enlarged) would mean transportation costs and

additional emissions. This could also increase environmental and health risks posed by the bigger dumpsites and will make their remediation more complicated/costly even in terms of engineering surveys and design for the adequate measures.

Moreover, the experience from other projects (e.g., GIZ projects in Floresti and Soldanesti) indicates that LPAs do not accept the idea of setting up transitional dumpsites on their territories.

According to the FS (2015) the closure activities for small dumpsites (about 130 identified in the former WMZ-3) could include just compaction of waste and simple coverage with soil, while the closure activities for larger dumpsites (which serve 4,000 and more residents) shall include more sophisticated measures in compliance with EU Directive on the landfill of waste.

In general, there is a difference between the process of closing the existing dumpsites and the process of remediating the areas of closed dumpsites.

Closure of dumpsites in WMZ-1 would mean that the existing dumpsites will stop receiving the *newly generated waste*. This could be achieved by regulatory and management measures – all the generated waste will be regularly collected by the SWM service providers (within the extended service area of waste management system) and transported to the SWM infrastructure facilities established within the Project. Performance of SWM service providers will ensure that no newly generated waste comes to dumpsites. These arrangement with regard to each specific dumpsite would require mainly information, management and enforcement measures.

Remediation of areas that were used as dumpsites and have been receiving waste during some years typically means a scope of surveys, engineering design and contractor works, i.e. requires time and resources (investments) focused on lowering the environmental and health risks posed by the *earlier accumulated waste*. A number of options for remediation of dumpsites were considered in the FS and EIA for WMZ-1. The international experience shows that covering a dumpsite with soil does not necessarily result in reducing the environmental and health risks, as well as does not always allow for safely using the former dumpsite area for other purposes.

The monitoring of SWM operations (by NOIEP) and enforcement for taking all new waste to the regional SWM infrastructure facilities shall provide a basis for planning and implementation of the remediation works at the existing dumpsites per the selected optimal time schedule to ensure efficient use of the Project resources.

The proposed PIP of project in WMZ-1 will allow for reducing the major environmental and social risks and for using the largest sites earlier polluted with waste. Tender, detailed design and civil works for construction of the regional landfill will take about 2 years. Until the landfill's commissioning, the waste in WMZ-1 will continues being disposed at dumpsites. The dumpsites will be closed and remediated as soon as the regional landfill is operational. The design and civil works for closure of the dumpsites will be performed as part of the PIP components including establishment of waste transfer stations.

With the operation of the regional landfill, the dumping of waste at the dumpsites within WMZ-1 shall not be allowed; local council decisions shall be enforced on this issue. Also, MoEnv shall enforce/control that the local dumpsites are not used after the regional landfill is in operation. Considering that there are about 100 dumpsites (with an average area of 1.3 ha) in the WMZ-1, the civil works for the closure of these dumpsites shall be carried out during a period of about 1-2 years, just after the start of operation of the regional landfill. The funds for the closure of these dumpsites are included into the priority investments.

Alternative approach to closure of all existing dumpsites

Various types of considered activities depending on the size of dumpsite and estimated risk to environment and human health included: (1) Closure by simply cover; (2) Clean up before simple cover; (3) Relocation of waste.

Selecting a type of activity for closure/rehabilitation of the dumpsite, it is important to choose the type of measures based on data regarding risks posed to underground water, soil, quantities of generated landfill gas, proximity to water source, resident areas, arable lands, etc.

An alternative approach with relocating the already accumulated waste from all or from some of existing dumpsites could result in a clean-up of many sites adjacent to residential areas, but would be very costly, keeping in mind that many of the existing dumpsites just represent currently visible parts of larger areas which were during many earlier years used as dumpsites, got gradually covered with some soil and vegetation, but anyhow remain being polluted with waste and not actually suitable for other use. Site investigations and engineering design will require some time and resources for proper planning of remediation works at all existing dumpsites in WMZ-1. The works should be performed to support the implementation of the proposed Project.

Other alternatives

More specific alternatives could be considered at further stages (e.g., engineering design, procurement) of the Project preparation and implementation. For example, there is an alternative to drill gas collection wells after waste cell is filled up and covered. However, given that special heavy equipment will be required for drilling through the landfilled waste and this approach could be associated with certain risks potentially posed by the emissions of gas, it is recommended in the FS that landfill gas collection wells are gradually developed in parallel with filling of waste in a cell.

Feasibility of various alternatives for management of landfill gas (e.g., in "biocover", flaring, biological oxidation, utilisation for heat/electricity generation, etc.) could be considered at a later stage depending on the actual generation of landfill gas within the landfill, keeping in mind that it is planned to direct to composting station some of waste that would otherwise contribute to generation of landfill gas. An option with on-site utilisation of landfill gas could include heating and supply of hot water for personnel needs in administrative building and other premises. Adjustments in a landfill gas management (collection and treatment) system would typically be required following the landfill gas flow changes throughout the landfill lifetime.

An alternative waste management system could include production of RDF from mixed waste. This would be a pre-treatment of waste prior to landfilling. A separate facility/sorting line shall be established for this. Compared to sorting stations for separately collected recyclables, the sorting line for production of RDF from mixed waste would include additional automatic (energy consuming and expensive) equipment for sorting of different waste fractions. A covered storage (and drying) area for the produced RDF need to be constructed, the designated logistics established. Options for production and sales of RFD could be considered basing on cooperation of WMZ-1 with other WMZs that would allow certain economy of scale - reducing the RDF production costs. However, the market conditions are currently not known.

An alternative waste management system with production of RDF would require a separate feasibility study including at least the following aspects:

1. Analysis of regulatory framework for production and use of RDF.
2. The market assessment for RDF in Moldova, which shall include the identification of possible consumers/users of RDF, capacity requirements and schedule for RDF supply, calorific value and quality of the RDF needed, the cost for municipalities (WMZ-1, and other zones) to transport RDF to the clients, the cost (if any) imposed by RDF users on municipalities who send RDF to them, etc.
3. Detailed composition analysis of waste (urban, rural) to understand the calorific value of the mixed waste and potential RDF.
4. Feasibility assessment (option analysis, comparison of CAPEX and OPEX) of various technologies for production and use of RDF taking into consideration the economy of scale in case of production in more than one WMZ.
5. EIA for the RDF system/project and obtainment of environmental permits for including RDF as fuel if changes are required at the facilities/installations for using the RDF.

The feasibility study should provide a basis for a decision regarding the best option for RDF production from mixed waste in WMZ-1 or in more WMZs. If this is proved feasible, then the RDF system can be later added at the Regional Landfills, not only for WMZ-1 but for other zones (the analysis might show that the quantity of RDF that can be produced exclusively in WMZ-1 is so small that the RDF users could not consider it as a reliable alternative fuel for their day-to-day operations and a background for modification of their fuel feeding systems and flue gas cleaning systems).

At the design stage of the regional landfill (in WMZ-1 and/or other WMZ) it could be recommended to consider allocating an area for the potential RDF production and storage facilities.

4 Policy and legislative context of the ESA

Policy and legislative context for many activities in Moldova are being developed in line with the EU-Moldova Association Agreement, which includes a Deep and Comprehensive Free Trade Agreement (AA/DCFTA) leading to much closer political and economic ties with the EU within the framework of the Eastern Partnership⁶.

4.1 Policy documents of the EU

The EU strategy on adaptation to climate change adopted in February 2021 aims at making Europe more resilient to climate change. It supports coordination and information-sharing, and by ensuring that adaptation considerations are addressed in all relevant EU policies and funding programmes. The EU circular economy action plan (CEAP) adopted in March 2020 as an element of the European Green Deal aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible, sets targets to improve waste management, innovative recycling and reduced landfilling.

The Industrial Emissions Directive (IED) 2010/75/EU is the main EU instrument regulating pollutant emissions from industrial installations. The IED aims to achieve a high level of protection of human health and the environment by reducing harmful industrial emissions across the EU, through application of BAT.

The permit contains conditions set in accordance with the principles and provisions of the IED. Operations of MSW landfill and MRF in the EU Member States fall under Annex I of the IED and are the subject of environmental/ Integrated Pollution Prevention and Control (IPPC) permits granted by the appropriate regulatory authorities.

The Waste Framework Directive 2008/98/EC sets basic waste management definitions, such as waste, recovery and disposal systems and when recovered material ceases to be a waste; the waste hierarchy, support for waste prevention, recycling and recovery; producer responsibility, permitting and inspection for non-landfill waste management activities. The principle of “waste management hierarchy” integrated into the Directive indicates that certain measures should be taken at the state level to encourage the implementation of such a hierarchy. Further, waste management methods are arranged in their priority order as follows:

- > Prevention of waste generation (at source)
- > Minimization of waste generation;
- > Reuse (use of material potential);
- > Other recovery, in particular, energy recovery;
- > Disposal.

The Landfill Directive 1999/31/EC regulates waste management of landfills, defined as waste disposal sites for the deposit of waste onto or into land, in the EU.

⁶ https://eeas.europa.eu/diplomatic-network/eastern-partnership_en

According to the waste management hierarchy, landfilling is the least preferable option and should be limited to the necessary minimum. Where waste needs to be landfilled, it must be sent to landfills which comply with the requirements of the Directive.

The objective of the Directive is to prevent, or reduce as far as possible, negative effects on the environment, including the effects on surface water, groundwater, soil, air, and on human health from the landfilling of waste.

The Landfill Directive defines the different categories of waste (municipal waste, hazardous waste, non-hazardous waste and inert waste) and applies to all landfills, defined as waste disposal sites for the deposit of waste onto or into land. Landfills are divided into three classes:

- > Landfills for hazardous waste;
- > Landfills for non-hazardous waste; and
- > Landfills for inert waste.

A standard procedure for the acceptance of waste in a landfill is laid down so as to avoid any risks, including:

- > waste must be treated before being landfilled;
- > hazardous waste within the meaning of the Directive must be assigned to a hazardous waste landfill;
- > landfills for non-hazardous waste must be used for municipal waste and for other non- hazardous waste;
- > landfill sites for inert waste must be used only for inert waste;
- > criteria for the acceptance of waste at each landfill class must be adopted by the Commission in accordance with the general principles of Annex II.

The following wastes may not be accepted in a landfill:

- > liquid waste;
- > flammable waste;
- > explosive or oxidising waste;
- > hospital and other clinical waste which is infectious;
- > used tyres, with certain exceptions; and
- > any other type of waste which does not meet the acceptance criteria laid down in Annex II.

The Directive sets up a system of operating permits for landfill sites. Applications for permits must contain the following information:

- > the identity of the applicant and, in some cases, of the operator;
- > a description of the types and total quantity of waste to be deposited;
- > the capacity of the disposal site;
- > a description of the site;
- > the proposed methods for pollution prevention and abatement;
- > the proposed operation, monitoring and control plan;
- > the plan for closure and aftercare procedures;

- > the applicant's financial security;
- > an impact assessment study, where required under Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

The EU Member States are required to ensure that existing landfill sites do not continue to operate unless they comply with the provisions of the Directive.

The regional landfill proposed within the Project shall be designed for municipal waste and therefore should only be permitted to accept non-hazardous wastes. To remain compliant with the Landfill Directive, it cannot accept waste that is mixed with waste from other classes (hazardous waste or inert waste).

Directive 2014/52/EU amending the EIA Directive 2011/92/EU³⁶. The Directive sets the principles and a list of projects for mandatory EIA (Annex I) and EIA screening (Annex II). All projects listed in Annex I are considered as having significant effects on the environment and require an EIA. The Project is categorized as EBRD category A project and listed in Annex II (11 b) of EU EIA Directive and is a subject of EIA screening.

Aarhus Convention Regulation (EC) No. 1367/2006 lays down rules to apply the provisions of the Convention to Community institutions and bodies, in particular by: (a) guaranteeing the right of public access to environmental information received or produced by Community institutions or bodies and held by them, and by setting out the basic terms and conditions of, and practical arrangements for, the exercise of that right; (b) ensuring that environmental information is progressively made available and disseminated to the public in order to achieve its widest possible systematic availability and dissemination; (c) providing for public participation concerning plans and programmes relating to the environment; (d) granting access to justice in environmental matters at Community level under the conditions laid down by this Regulation.

4.2 EBRD Environmental and Social Policy

The proposed Project should meet the EBRD Performance Requirements (PRs) defined in the EBRD Environmental and Social Policy (ESP 2019) summarised in Table 4.1:

Table 4.1 Summary of EBRD Performance Requirements relevant for the Project

Performance Requirement	Scope of the Project promoter responsibilities
PR1 E&S Appraisal and Management	Identify all applicable laws, legislations, standards and best practice. Through appraisal activities such as risk assessment, auditing, or ESIA/EIA consider in an integrated manner the potential environmental and social issues and impacts associated with the proposed project. Identify mitigating measures to avoid, or where avoidance is not possible, minimise, mitigate, offset or compensate for adverse impacts and enhance E&S performance. Establish ESAP, enhance E&S performance through auditing, monitoring, evaluation.
PR 2 Labour and Working Conditions	Establish and maintain a sound worker management relationship. Promote the fair treatment, non-discrimination and equal opportunity of workers (freedom of association & collective bargaining). Promote compliance with any collective agreements to which the client is a party, national labour and employment laws and the ILO (International Labour Organization) conventions. Offer wages, benefits and conditions of work offered comparable to those offered by equivalent employers in the relevant region and sector concerned. Promote the health of workers, especially by promoting safe and healthy working conditions. Assure for the entire supply chain compliance with ILO 's core labour standards: (e.g. abolishment of child labour and the elimination of forced labour). Provide a grievance mechanism for employees. Adopt a clear human resources policy.
PR 3 Pollution Prevention and Abatement	Avoid or minimise the release of pollutants. Consider resource conservation and energy efficiency measures. Minimise waste generation. Promote the reduction of project-related greenhouse gas emissions.
PR 4 Community Health, Safety and Security	Avoid/minimise risks to and impacts on the health, safety and security of the local community (both routine and non-routine circumstances). Consider infrastructure and equipment safety rules. If necessary, develop plans to prevent or minimise potentials for community exposure to all the communicable diseases (resulting from project activities). Avoid or minimise natural hazards (landslides, floods, etc.) and other impact of the community natural resources. Prevent driving accidents. Exercise prevention and response plans at least on an annual basis. Report on the risks, potential impacts and benefits of the project and implementation of any action plans on a regular basis to the EBRD and to the affected communities.

Performance Requirement	Scope of the Project promoter responsibilities
PR 5 Land Acquisition, Involuntary Resettlement and Economic Displacement	Avoid or at least minimize involuntary resettlement. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition or restriction of access to natural resources. Carry out a census and a socio-economic baseline assessment. Mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land by providing compensation for loss of assets at replacement cost; ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected; improving or, as a minimum, restoring the livelihoods and standards of living of displaced persons to pre-project levels. Develop and implement the necessary plans (Resettlement and/or Livelihood Restoration Framework/Plan)
PR 6 Biodiversity Conservation and Sustainable Natural Resource Management	Protect and conserve biodiversity to avoid, minimise and mitigate impacts on biodiversity with the aim of achieving no net loss or a net gain of biodiversity. Avoid natural and critical habitats' conversion or degrade and act in a consistent manner with defined protected areas' management plans. Promote the sustainable management and use of natural resources, sustainable resources supply chains and procurement policy. Foster the development of pro-biodiversity business that offers alternative livelihoods in place of unsustainable exploitation of the natural environment.
PR 8 Cultural Heritage	Support the conservation of cultural heritage. Promote the awareness of and appreciation of cultural heritage where possible. Protect cultural heritage from adverse impacts of project activities. Screen for risks/impacts on cultural heritage. Develop a chance find procedure. In case there are adverse impacts, establish mitigation measure in a Cultural Heritage Management Plan. Minimize adverse landscape and visual effects during construction and operation activities.
PR 10 Information Disclosure and Stakeholder Engagement	Outline a systematic approach to stakeholder engagement that will help clients build and maintain a constructive relationship with their stakeholders, in particular the directly affected communities. Promote improved environmental and social performance of clients through effective engagement with the project's stakeholders. Promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that meaningful environmental and social information is disclosed to the project's stakeholders. Ensure that grievances from affected communities and other stakeholders are responded to and managed appropriately.

The following EBRD Performance Requirements are not relevant in context of the proposed Project:

PR 7 Indigenous Peoples, PR 9 Financial Intermediaries.

4.3 Environmental and Social Standards of EIB

The EIB is committed to supporting the Republic of Moldova following the June 2014 signature of the EU-Moldova Association Agreement and the framework of the Eastern Partnership⁷.

The EIB Statement on Environmental and Social Principles and Standards sets the policy context for the protection of the environment and human well-being. The EIB standards outline the promoters' responsibilities on the projects with the EIB financing.

Table 4.2 An overview of EIB Environmental and Social Standards

EIB E&S Standard	Description
1. Assessment and management of environmental and social impacts and risks	The standard underscores the importance of managing environmental and social impacts and risks throughout the life of a project through the application of the precautionary principle. The standard's requirements allow for the development of an effective environmental and social management and reporting system that is objective and encourages continual improvements and developments. The standard includes requirements for stakeholder engagement and disclosure throughout the life of the project.
2. Pollution prevention and abatement	The objective of the standard is to avoid and minimise pollution from EIB-supported operations. It outlines a project-level approach to resource efficiency and pollution prevention and control in line with best available techniques and internationally disseminated practices.
3. Biodiversity and ecosystems	The EIB acknowledges the intrinsic value of biodiversity and that its operations may have a potential impact on biodiversity and ecosystems. This standard outlines the approach and measures the promoter has to take to protect and conserve all levels of biodiversity. The standard applies to all habitats (marine and terrestrial) whether or not previously disturbed or legally protected. It focuses on major threats and supports the sustainable use of renewable natural resources and the equitable sharing of benefits from the project's use of natural resources.
4. Climate-related standards	EIB financing as a whole is aligned with EU climate policies, which should be taken into account at all stages of the project cycle, in particular regarding the assessment of the economic cost of greenhouse gas emissions and the climate vulnerability context. Specifically, project promoters must ensure that all projects comply with appropriate national and, where applicable, EU legal requirements, including multilateral agreements, related to climate change policy.
5. Cultural heritage	Through its projects, the EIB recognises the central role of cultural heritage within individual and collective identity, in supporting sustainable development and in promoting cultural diversity. Consistent with the applicable international conventions and declarations, this standard aims at the identification, management and protection of tangible and intangible cultural heritage that may be affected by project activities. It emphasises the need for the implementation of a "chance-find procedure", which outlines the actions to be taken if previously unknown cultural heritage is encountered.
6. Involuntary resettlement	EIB projects sometimes necessitate land acquisition, expropriation and/or restrictions on land use, resulting in the temporary or permanent resettlement of

⁷ https://eeas.europa.eu/diplomatic-network/eastern-partnership_en

EIB E&S Standard	Description
	people from their original places of residence or their economic activities or subsistence practices. Standard 6 is rooted in the respect and protection of the rights to property and to adequate housing, and of the standard of living of all affected people and communities. It seeks to mitigate any adverse impacts arising from their loss of assets or restrictions on land use. It also aims to assist all affected persons to improve or at least restore their former livelihoods and living standards and adequately compensate for incurred losses.
7. Rights and interests of vulnerable groups	The EIB seeks to protect all vulnerable project-affected individuals and groups, whilst seeking that these populations duly benefit from EIB operations. The standard requires that there is full respect for the dignity, human rights, aspiration, cultures and customary livelihoods of vulnerable groups including indigenous peoples. It requires the free, prior and informed consent of affected indigenous groups.
8. Labour standards	Good labour practices and the use of appropriate codes of conduct are important to ensure the fair treatment, non-discrimination and equality of opportunity of workers. This standard aims at ensuring that promoters of EIB projects comply with the core labour standards of the International Labour Organisation and with national labour and employment laws. The standard also requires the establishment, maintenance and improvement of worker-management relationships.
9. Occupational and public health, safety and security	The EIB expects promoters to protect and secure public and occupational health, safety and security and promote the dignity of the affected community in relation to project-related activities, with particular attention to vulnerable groups. The standard also requires promoters to adhere to the international norms and relevant human rights principles when using security services.
10. Stakeholder engagement	As a public institution, the EIB actively promotes the right to access to information, as well as public consultation and participation. Standard 10 requires promoters to uphold an open, transparent and accountable dialogue with all project-affected communities and relevant stakeholders in an effective and appropriate manner. The value of public participation in the decision-making process is stressed throughout the preparation, implementation and monitoring phases of a project. The right to access to remedy, including through grievance resolution, is actively required.

An EIB Environmental and Social Handbook provides an operational translation of the 10 standards. In order to achieve sustainability objectives, the EIB relies to a large extent on activities undertaken by the borrowers and project promoters in the countries of its operations.

4.4 Policy and legislative context for waste management and EIA in Moldova

The development of policy and legislative context for waste management and EIA in Moldova is based on the harmonisation with the strategic documents and legislation of the EU.

4.4.1 Framework for waste management in Moldova

The Association Agreement between the Republic of Moldova and the European Union ratified by Law No. 112 of 02.07.2014 contains in Chapter 16 Environment a sub-chapter on waste and resource management with three directives to be transposed into the national law, namely:

- > Waste Directive 2008/98/EC (repealing certain directives);
- > Directive 1999/31 /EC on landfills as amended by Regulation (EC) No 1882/2003;
- > Directive 2006/21/EC on the management of waste from extractive industries and amending Directive 2004/35 / EC.

The respective Law No. 209 on waste of 29.07.2016 and in force from 23.12.2017 transposes the directives and outlines legislative basis, state policy and measures necessary to protect the environment and the health of the population by preventing or reducing adverse effects caused by the generation and management of waste and by reducing the general effects of the use of resources and increasing the efficiency of their use.

Article 14 of this Law presents objectives of state policy on waste reuse and recycling with the following timeframe:

- > by 2018 – introduction of separate collection systems for paper, glass, metals and plastics;
- > by 2020 – preparation for the reuse and recycling of waste, such as, at least, paper, glass, metals and plastics from household products and possibly from other sources, in so far as these waste streams are similar to waste from household consumption, shall be increased to a minimum of 30 % by total mass;
- > by 2020 – preparation for re-use and other material recovery operations, including backfilling operations, which use waste to replace other substances, non-hazardous waste from construction and demolition activities, with the exception of natural geological surveys, shall be increased to a minimum of 55% of the total weight.

The Law includes provisions on the extended producer responsibility (EPR). The following flows will be primarily subject to the EPR principle: batteries and accumulators, electric and electronic equipment, vehicles, oils, packaging. The implementation mechanism of the EPR scheme for each flow is to be determined by means of specific normative acts approved by the Government.

In order to achieve the state policy objectives set out in the local public administration authorities, initial waste producers and waste holders will be obliged to:

- > To ensure the initiation of activities to introduce separate collection systems for paper, glass, metals and plastics;
- > To carry out waste re-use and recycling activities in accordance with the objectives specified in paragraph 1. (1) (.b) and (c);

- Every three years, the central environmental body of public administration, in collaboration with the other authorities involved in waste management, submits reports to the Government on the state of achievement of the objectives.

Approval of the Waste List for further development of the regulatory framework for the implementation of Law was proposed via transposing the EC Decision (2000/532/EC) of 3 May 2000.

In order to develop the infrastructure and services needed to adequately protect the global environment, national and local effects associated with waste management generated by citizens, enterprises and institutions, as well as to establish the legal and institutional framework necessary to support the gradual alignment of the practices of the Republic of Moldova for waste management with those of the European Union, the Government of Moldova issued the Decision No. 248 of 10.04.2013 on the approval of the Waste Management Strategy in the Republic of Moldova for 2013-2027.

Waste Management Strategy refers to all types of waste and defines a framework for the development and implementation of an integrated and efficient system for sustainable development of waste management sector based on controlled management to limit the environmental impacts caused by waste disposal in the short term, and in the medium and long term to be socially acceptable and economically feasible.

Through this Strategy, the Government of the Republic of Moldova has committed itself to develop a new legal and institutional framework for regulating waste management at the level of internal standards, including for the regulation of various waste streams and their recycling, recovery and disposal operations, the establishment of an effective institutional and administrative system for the management, monitoring, enforcement and compliance with environmental legislation, attracting investment.

The National Strategy defines general objectives as well as specific ones. The general objectives are the following:

- Developing the integrated municipal waste management systems by harmonizing the legislative, institutional and normative framework with EU standards, based on a regional approach (geographical position, economic development, the existence of access roads, soil and hydro-geological conditions, the number of inhabitants, etc.) and dividing the country into 8 waste management zones;
- Developing the regional infrastructure of municipal waste landfills and transfer stations;
- Developing the collection and treatment systems of specific waste flows (packaging waste, WEEE, tires, batteries, etc.) by promoting and implementing the "Extended Producer Responsibility principle" and for hazardous waste (medical waste, used oils, etc.) by setting up one collection point for each region.

The following principles will be based on the activities of establishing adequate waste management at national level:

- the principle of the protection of natural resources, formulated in the broader context of the concept of sustainable development, which establishes the need to minimize the amount of waste and to make the use of primary resources, especially non-renewable ones, more efficient, with a focus on the use of secondary raw materials;
- the principle of preliminary measures, linked to the principle of the best available techniques which do not entail excessive costs, which establishes that for any activity (including waste management), account must be taken of the following main aspects: the current state of the development of technologies, the requirement for the protection of the environment, the choice and application of those economically feasible measures;
- the principle of prevention, which establishes the ranking of waste management activities, in descending order of importance: waste prevention, waste preparation for re-use, recycling, including composting, recovery, including energy recovery and storage;
- the polluter pays principle, linked to the principle of the responsibility of the producer and that of the responsibility of the user, which establishes the need to create a legislative and economically appropriate, so that the costs for waste management are borne by the generator;
- the principle of substitution, which establishes the need to replace hazardous raw materials with non-hazardous raw materials, thus avoiding the generation of hazardous waste;
- the principle of proximity, correlated with the principle of autonomy, which establishes that waste must be treated and disposed of as close as possible to the source of generation; in addition, the export of hazardous waste is only possible to those countries which have adequate disposal technologies and only if the requirements for international trade in waste are met;
- the principle of subsidiarity, also linked to the principle of proximity and the principle of autonomy, which establishes the granting of competences, so that decisions in the field of waste management are taken at the lowest administrative level compared to the source of generation, but on the basis of uniform criteria at regional and national level;
- the principle of integration, which establishes that waste management activities are an integral part of the social-economic activities that generate them.

Considering the three development regions, the Strategy defines 8 areas (Waste Management Zones) for the integrated management of municipal waste.

The Action Plan is set out in Annex 1 to the Strategy, defining for every general and specific objective the actions to be taken, the deadlines for completion, the responsible institutions, the estimated costs, the source of funding, and the indicators of monitoring.

In 2018, by GD 501 of 29.05.2018, the Instruction on keeping records and transmitting data and information on waste and its management was approved. This Instruction establishes the manner of keeping records and transmitting data and information on waste and its management, in accordance with art. 32 of Law no. 209/2016 on waste.

The Strategy implementation is supported by the Government Decision no. 99/30.01.2018 regarding waste categorization and the following other regulations approved by the Government Decisions:

- On Packaging and Waste of Packaging Waste, GD No. 561 of 31 July 2020 (transposing the provisions of Directive 94/62/EC of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste).
- The Waste Disposal Regulation, developed with the aim of creating the legal framework for the waste disposal facilities, their operation, monitoring, closure and post-closure follow-up of landfills under conditions of environmental protection, population health and alignment with the provisions of the EU Landfill Directive 1999/31/EC, as subsequently amended in accordance with Regulation (EC) No 1882/2003 of the European Parliament and of the Council of 29 September 2003.
- The Regulation on batteries and accumulators and waste batteries and accumulators transposes the provisions of Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators (DBA) and Directive 2013/56/EU of the European Parliament and of the Council of 20 November 2013 amending Directive 2006/66/EC of the European Parliament and of the Council on batteries and accumulators and waste batteries and accumulators, as regards the placing on the market of portable batteries and accumulators containing cadmium and intended for use in wireless electrical tools and low-mercury button batteries, and repealing Directives 91/157/EEC – the Regulation on the management of batteries and accumulators, waste batteries and accumulators, approved in the Government meeting of 30.07.2020 According to art. 13 of this Regulation, producers and third parties of BA must achieve the minimum collection target of 45% by 2025. At the same time, Annex no. 7, outlines the requirements for recycling and recovery of BA waste. Thus, by 2025, recycling processes must achieve the targets for recycling and recovery of 65% of the average weight of BA with lead acid; 75% of the average weight of BA with nickel cadmium and 50% of the average weight of other BA waste.
- In order to ensure the implementation of the legislation in force, the Concept of the automated information system “Waste Management” was approved, GD 682 / 11.07.2018 (https://www.legis.md/cautare/getResults?doc_id=108814&lang=ro). The general objective of the AIS is to form an information resource on information on waste in the Republic of Moldova in order to implement the European Classifier of the List of wastes, including hazardous waste.

- > Other regulations adopted and entered into force in order to align the national legislation with the provisions of the Association Agreement between the Republic of Moldova and the European Union, and the EU Directives include the Regulation on waste electrical and electronic equipment (WEEE), GD 212 / 07.03.2018; Annex No 5 to the WEEE Regulation sets out the minimum annual collection targets to be met by producers. Thus, by 2025, the annual collection rate must be increased to a minimum level of 30% of the total weight;
- > Sanitary Regulation on the management of waste resulting from medical activity, GD. no. 696 / 11.07.2018. The regulation stipulates the way of collecting, storing, transporting, treating and disposing of medical waste.

Objectives set out in the Regulation on packaging and waste of packaging waste approved by GD 561 of 31.07.2020 in its Article 11 sets the following targets regarding the recovery and recycling of packaging waste, that must be achieved at national level, in stages, according to Annex no. 2, no later than 2029:

- > recovery of at least 50% of the weight of packaging waste;
- > recycling of at least 45% of the total weight of packaging materials contained in packaging waste, with the achievement of the following minimum values for the recycling of each type of material contained in packaging waste:
 - > 45% by weight for glass;
 - > 50% by weight for paper / cardboard;
 - > 40% by weight for the metal;
 - > 10% by weight for wood;
 - > 20% by weight for plastic, considering only the recycled material in the form of plastic.

In order to achieve the objectives, administrative-territorial units and economic agents shall be responsible for packaging which has become waste in the national territory. The draft regulation stipulates the categories of economic operators responsible for the entire quantity of packaging placed on the national market and their obligations.

The provisions of the Waste Disposal Regulation shall apply to any landfill. Landfills for waste are classified in this Regulation and are mentioned as acceptable waste and not accepted for storage. The new regulation stipulates:

- > Specific requirements under the procedure for issuing environmental permits for waste management at landfills;
- > Procedures for the acceptance of waste in the landfill;
- > Procedures for control and follow-up at the landfill operation phase;
- > Procedures for the closure of landfills and their post-closure follow-up;
- > Provisions on existing waste disposal sites.

⁸ https://www.legis.md/search/getResults?doc_id=122773&lang=en

4.4.2 Framework for EIA in Moldova

The Law No. 86 of 29.05.2014 on environmental impact assessment entered into force in Moldova on 04.01.2015 partially transposes Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment. The law describes in detail the procedures and modalities applied in the process of assessing the environmental impact of public and private projects or of some types of planned activities that may have a significant impact on the environment.

Law No. 1515 of 16.06.1993 on environmental protection constitutes the basic legal framework for the elaboration of special normative acts and instructions in the particular problem in the field of environmental protection in order to:

- > Provide every man with the right to a healthy and aesthetically pleasing environment;
- > Achieving the ultimate responsibility of each generation for the protection of the environment in the face of future generations;
- > Obtaining the widest possible range of use of natural resources without exceeding the permissible limits, avoiding their depletion and degradation, the risk to human health and other undesirable and unpredictable consequences;
- > Protection of soil and subsoil, water and air from chemical, physical and biological pollution, from other actions that disrupt the ecological balance;
- > Preservation of biodiversity, integrity of natural systems, historical and cultural national values;
- > Restoration of ecosystems and their components affected by anthropogenic activity or natural calamities.

Law No. 851 of 29.05.1996 on ecological expertise establishes, in accordance with the provisions of the Constitution of the Republic of Moldova, the Law on environmental protection and other legislative acts in force, the purposes, tasks and principles of ecological expertise, as well as the basic rules regarding its organization and execution.

Other Laws of the Republic of Moldova relevant to the process of carrying out the assessment of the impact of the environment at national level are:

- > Law No. 94 of 05.04.2007 on the ecological network;
- > Water Law No. 272 of 23.12.2012;
- > Law No. 440 of 27.04.1995 on areas and strips for the protection of water from rivers and water basins;
- > Law No. 1422 of 17.12.1997 on the protection of atmospheric air;
- > Law No. 1538 of 25.02.1998 on the fund of natural areas protected by the State;
- > Law No. 1236 of 03.07.1997 on the regime of products and substances harmful;
- > Law No. 1347 of 09.10.1997 on production and household waste;
- > Law No. 1540 of 25.02.1998 on the payment for environmental pollution;
- > Law No. 10 of 03.02.2009 on state supervision of public health;

- > Law No. 439 of 27.04.1995 on the animal kingdom;
- > Law No. 239 of 08.11.2007 with regard to the vegetable kingdom;
- > Law No. 1102 of 06.02.1997 on natural resources;
- > Law No. 325 of 15.12.2005 on the Red Book of the Republic of Moldova;
- > Law No. 721 of 02.02.1996 on quality in construction;
- > Law No. 591 of 23.09.1991 on the green spaces of urban and rural settlements;
- > Law No. 1402 of 24.10.2002 on public communal household services;
- > Law No. 436 of 28.12.2006 on Local Public Administration;
- > Forest Code No. 887 of 21.06.1996;
- > Land Code No. 828 of 15.12.1991.

Moldova is a party to the key international environmental conventions and agreements relevant for the environmental and social impact assessments.

4.5 Policy for reducing GHG emissions

The low-emission development programme of the Republic of Moldova by 2030 sets sectoral targets for reducing greenhouse gas emissions (GHGs) compared to 1990 for the following sectors: energy; industry; waste; transport; agriculture; buildings; land use, land use change and forestry, as well as identify key actions to reduce GHG emissions in those sectors. Achieving the objectives set out in the Programme will be achieved through the Action Plan by 2030. The implementation period of the Programme covers the years 2021-2030, and the coordinating institution on its implementation process is the MoEnv (former MARDE).

In 2020, the Republic of Moldova was one of the world leaders by taking more ambitious targets to reduce greenhouse gas emissions, by updating and presenting its National Determined Contribution to the Paris Agreement. This was due to the joint effort of the Ministry of Agriculture, Regional Development and Environment, UNDP Moldova and the European Union, through the EU4Climate project as the first step in achieving the Paris Agreement's goal of keeping global warming below 2 degrees Celsius above pre-industrial levels, with decarbonisation of the economy and the improvement of resilience to climate change.

The energy intensity in Moldova (total primary energy per unit of GDP) is 5.7 times higher than the average in the European Union, and the intensity of CO₂ emissions is among the highest between the countries of Central and Eastern Europe – 0.91 kg CO₂/USD of GDP.

According to Christian Ballarò, Head of Energy programmes and climate change at the EU Delegation to the Republic of Moldova⁹, *the EU is committed to achieving climate neutrality by 2050 and intends to expand its climate targets for 2030 by reducing its greenhouse gas emissions by at least 55% compared to 1990. In this respect, the Fit for 55 package is almost ready to launch to ensure that these ambitions translate into effective action. In this context, a low-emission*

⁹ <https://eu4climate.eu/2021/06/17/moldova-sets-sectoral-targets-for-reducing-greenhouse-gas-emissions-with-the-support-of-the-european-union/>

development programme is an essential element for Moldova to join the EU's efforts for a transition to a climate-neutral society.

The energy sector is responsible for more than 68% of GHG emissions, i.e. the focus on reducing emissions has been on it. By 2030, emissions in the energy sector are expected to fall by 81% compared to 1990, in the transport sector – by 52%, buildings – by 74%, industrial – by 27%, agricultural – by 44%, waste – by 14%, and carbon capture from land use, changing the category of land use and forestry would increase by up to 10%. Specific measures and actions are proposed for each sector, in line with the sectoral policies previously developed. The total cost of these measures for the 10-year period is nearly \$11 billion.

The amendments to the Government Decision on the MRV system and the draft law on the suppression of hydrofluorocarbons or F-gases were developed with the support of the EU4Climate project, funded by the European Union and implemented by UNDP¹⁰. Thereby, the monitoring, reporting and verification system on mitigation policies and measures will be complemented with the reporting requirements of the progress made in implementing the National Determined Contribution (NDC) and the Long-Term Low Carbon Development Strategy. Simultaneously, the Republic of Moldova will undertake to present the biennial report on the Paris Agreement Implementation every two years until 31December 2023 and a biennial transparency report, every two years, starting with 1 January 2024. Those modifications transpose the Acquis Communautaire into national law, and the preparation of these reports will be supported by the Global Environment Facility. The changes that are currently affecting the planet's climate are transforming the world.

The draft law on F-gases or hydrofluorocarbons contains regulations on the authorisation system for the import of these substances and the equipment that operates on them, leak prevention, introduction of training and certification programs for enterprises and staff, reporting data on the import and consumption of these substances. The law is an instrument for fulfilling the country's obligations under the Montreal Protocol/Kigali Amendment, which stipulates the obligation of the Republic of Moldova to freeze F-gases consumption at the base level between 2024 and 2028, and then the gradual reduction of consumption by 80% until 2045. F-gases do not affect the ozone layer but have a global warming potential up to 14,000 times higher than CO₂. Removing them from cooling and refrigeration systems will reduce global warming by up to 0.5 degrees Celsius. The EU4Climate initiative is funded by the European Union and implemented by UNDP. It will help Eastern Partnership countries integrate low-emission and climate resilience targets into development policies and plans, to improve and strengthen climate policies and legislative alignment.

Approval of the Low Emissions Development Programme is one of the conditions that would open up access to funding from the Green Climate Fund. The document

¹⁰ <https://www.md.undp.org/content/moldova/ro/home/presscenter/pressreleases/2020/republica-moldova-ii-intrete-capacitile-de-atenuare-i-adaptare-l.html>

has been subject to public debate with stakeholders and is to be promoted for approval by the Government. MARDE together with development partners, civil society, academia and the private sector identified priority sectors and their development directions in the discussions to achieve greenhouse gas emission reductions (GHGs) and to implement the National Determined Contribution (NDC).

On 17 June 2021, a consultation workshop was held in Chisinau on the Moldova Low Emissions Development Programme by 2030 and the Action Plan for its implementation. The objective was to analyse the impact and risks of the implementation of the Programme, to estimate the necessary investments, to establish the procedures for reporting results, and to harness the gender component in the implementation process.

The Low Emissions Development Programme is to change the public policy perspective stakes in the Republic of Moldova by focusing them on population's interests and aspirations. The strategic document focuses on the measures and principles of the green economy: energy efficiency, the development of renewable energy sources, the use of high-performance technologies for cement and glass production, conservation agriculture, afforestation and efficient waste management.

4.6 Framework for labour and OHS management

Chapter 4 (Employment, social policy and equal opportunities) of the EU-Moldova Association Agreement underlines the need to create sound policy frameworks at the national levels, based on pro-poor and gender-sensitive development strategies, to support investment in poverty eradication actions. Employment is a key source for poverty eradication and rising living standards. Nevertheless, currently, the employment rate in Moldova is one of the lowest in the region, and there is a need to ensure conditions for decent work and to eliminate any form of discrimination practices employment.

Moldova is a party to a number of the ILO Conventions and has adopted the following key national legislation documents relevant for management of labour relations and the Occupational Health and Safety (OHS) management:

- > Code 154/2003 – Labour Code;
- > Code 985/2002 – Criminal Code;
- > Law No. 186-XIV/2008 regarding health and safety in the workplace;
Government Decision no 95/2009 Methodological norms for Law 186/2008.
- > Law No. 22/ 23.02.2018 regarding day labour;
- > Government Decision 80/2012 security and safety regulations for temporary and mobile sites;
- > Government Decision no 353/05.05 2010, regarding health and safety conditions for workplaces (transposes the EU Directive 1989/654/CEE);
- > Government Decision 603/11.08.2011, regarding the use of protection equipment by workers on workplaces (transposes the EU Directive 2009/104/EC);

- Government Decision 362/27.025.2014, regarding working conditions under noise risk (transposes the EU Directive 2003/10/CE).

Other documents relevant for labour and employment conditions in Moldova include:

- National Strategy on Employment (2017-2021)
- Strategy to Ensure the Equality between Women and Men (2017-2021)
- National action plan on human rights (2018-2022)
- Strategy for SMEs sector development (2012-2020)
- Roadmap on mainstreaming ageing in policies and Action Plan on implementation of Roadmap on mainstreaming ageing in policies (2014-2016)
- National Strategy to Prevent and Stop Human Trafficking for 2017-2020
- Child Protection Strategy (2014-2020) and its Action Plan (2016-2020)
- National Programme on Sexual and Reproductive Health and Rights (2018-2022).

The issues related to inclusive economic growth, employment and decent work for all in Moldova are relevant for the Project preparation and implementation.

4.7 Policy on gender equality

4.7.1 EBRD Strategy for the Promotion of Gender Equality

Gender issues are related to the characteristics of women, men, girls and boys that are socially constructed and reflected in norms, behaviours, roles and relationships associated with being a woman, man, girl or boy. As the social constructs, the norms, behaviours, roles and relationships vary from society to society and can change over time.

The universal advantages of gender equality have been well-documented, and several international frameworks have affirmed its centrality to human rights and sustainable development. The Beijing Declaration and Platform for Action, for example, unanimously adopted by 189 countries in 1995 and still the strongest global consensus for advancing and protecting girls' and women's equality and justice, recognizes that persistent inequalities pose "serious consequences for the well-being of all people." However, progress towards gender equality has been slow and dramatically undermined by the COVID-19 pandemic.

Whilst women make up over half of the population in the EBRD's Countries of Operation, they do not have equal access to opportunities for formal employment, finance or services. Labour markets and decision-making abilities are still divided along gender lines. Women still face significant wage differentials with respect to their male peers and there is still discrimination in the labour market.

The EBRD Strategy for the Promotion of Gender Equality (SPGE) sets out how the Bank will continue to work to prevent gender discrimination, and to promote gender

equality within its mandate. SPGE seeks to increase women's economic empowerment and equality of opportunities in EBRD's Countries of Operation. In order to effectively promote gender equality, SPGE ensures that there is no disproportionate advantage for either men or women, and importantly recognises that engaging men will be a key requirement to ensure success.

The SPGE 2021-2025 builds on the lessons learnt under the previous SPGE, with a focus on consolidating and strengthening gender-responsive results while taking into consideration the impact of the Covid-19 crisis on women's access to economic opportunities. The SPGE 2021-2025 aims to continue to strengthen the EBRD's gender-responsive investment culture across sectors and countries of operations.

The SPGE 2021-2025 sets out to scale up the EBRD's operations to enhance gender equality. It integrates four new thematic lenses as cross-cutting priorities that reflect new megatrends as well as persistent challenges: (1) Gender equality in the green economy, (2) Gender equality in the digital economy, (3) Gender equality in the care economy, and (4) Gender equality by supporting voice, agency and addressing gender-based violence and harassment (GBVH).

4.7.2 Policy context to promote gender equality in Moldova

The Republic of Moldova has made international and national commitments to promote gender equality and the empowerment of women, in particular by ratifying the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and various ILO Conventions¹¹. Since the adoption in 2006 of Law No. 5 on Equality of Opportunities for Men and Women, a series of national strategies and action plans have promoted gender equality. In 2016, a law on temporary special measures introduced a 40% quota for each gender in cabinets and electoral lists, and provisions for paternity leave together with a ban on sexist advertising.

Significant progress was achieved during the past decades in Moldova ensuring that women and men benefit from equal opportunities in all areas of their activity. Moldova committed to the 2030 Sustainable Development Agenda and adopted the 'Moldova 2030' strategy paper addressing, inter alia, a number of gender equality issues, even though the respective national commitments are not defined clearly. Several public policy documents on gender equality were developed and approved in Moldova to adopt measures aiming to integrate the principle of equal opportunities in all public policies and special measures promoting women:

- > The 2017-2021 Gender Equality Strategy and the Action Plan for its implementation.
- > The 2018-2023 National Strategy to Prevent and Combat Violence against Women and Domestic Violence and the 2018-2020 Action Plan for its implementation.
- > The 2018-2023 National Strategy to Prevent and Combat Trafficking in Human Beings and the 2018-2020 Action Plan for its implementation. The

¹¹ the ratification status and related statistical indicators are presented on

<https://genderstats.un.org/#!/countries>

documents are developed in line with the Council of Europe Convention on Preventing and Combating Violence Against Women and Domestic Violence (Istanbul Convention).

- > The 2018-2021 National Program on the United Nations Security Council Resolution 1325 on Women, Peace and Security and the Action Plan for its implementation.
- > The 2018-2022 National Program on Sexual and Reproductive Health and Rights.
- > The 2017-2021 National Employment Strategy.
- > The 2018-2023 National Action Plan on Human Rights.

These and other adopted policy documents are focused on empowerment of women and providing equal opportunities for women and men, by ensuring a complex approach on combating stereotypes in society and promoting nonviolent communication, on preventing phenomena of violence against women and family violence, consolidating institutional and legal mechanisms to promote women in decision-making process and to ensure equitable approach in social insurance policies, in social assistance and health services. However, implementation of gender equality measures is hindered by many challenges. Discrimination and inequality of women in social, economic and political life and their representation in Moldavian politics and decision-making at various levels remains below international benchmarks.

SDG 5 is correlated with the provisions of article IV of the EU-Moldova Association Agreement. Targets related to the elimination of discrimination against women and men and to gender equality are reflected in Chapter 4 (Employment, social policy and equal opportunities) of Title 4, by which the Republic of Moldova committed to implementing the principle of equal treatment among women and men regarding labour, access to and delivery of goods and services and social security. At the same time, the target which is focused on the elimination of violence against girls and women, as well as that which is focused on elimination of early and forced marriages with children, corresponds to the provisions of Article 4 (Domestic reform) of Title II, Article 12 (Rule of law) of Title III and Chapter 27 (Cooperation in the protection and promotion of the rights of the child) of Title IV. Only for one target, which is related to the universal access to sexual and reproductive health-care services, there is no correlation with the Association Agreement.

As gender equality and empowering women has a direct influence on the development of the society and economic growth, there are four evident priority targets having a direct influence on other SDGs and various spheres of activities including, inter alia, the development of municipal infrastructure and housing services. The targets and examples¹² of related issues that should be addressed at the policy level are presented below:

¹² ADAPTING THE 2030 AGENDA ON SUSTAINABLE DEVELOPMENT TO THE CONTEXT OF THE REPUBLIC OF MOLDOVA, UNDP, 2017

- > Target 5.1 – End all forms of discrimination against all women and girls
 - The wage of men is by 12.4% higher than the average wage of women;
 - Employment rate of women is lower than employment rate of men (37% vs 42%) even if the share in total population is the same;
 - Only 5% of men benefit of allowances for raising children, compared to 94% of women;
 - 78% of teachers are women;

- > Target 5.2 - Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation
 - As inequality is a basis for violence, trafficking and exploitation, an integrated approach addressing violence and gender equality could be presented in the same policy document.

- > Target 5.4 - Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate
 - Employment rate of women is lower than employment rate of men (37% vs 42%) even if the share in total population is the same;
 - Employment rate is lowering when women have children (57,8% - no children, 51,4% - one child, 47,6% - 3 and more children);
 - 27% of women are involved in informal jobs;
 - It is necessary to improve the policy framework for families which have children in order to ensure involvement of parents in raising children.

- > Target 5.5 - Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life
 - The gender equality related Millennium Development Goals were not achieved in Moldova, even closely;
 - Share of women involved in political life is lower than MDG objective for 2015 (20% in Parliament instead of 30%; 35% in local councils instead of 40%; 18% in Rayon councils instead of 25%);
 - Only two out of ten women in public functions have managing positions;
 - Less than 26% of managers in business are women.

Insufficient disaggregation of data

Some targets put special emphasis on gender equality and empowerment of the people with disabilities, youth and/or migrants (SDG targets 8.5, 8.6, 8.7 and/or 8.8), whereas the domestic policies tend to remain at a more aggregated level, with some prioritization of particular groups of the population. A relevant example in this case is the Vocational Education and Training Development Strategy 2013-2020, whose one of the objectives is to increase the attractiveness and access to vocational education and training, so that the number of enrolled students will grow by 10% until 2020, without any mentioning about the age, gender or other profiles of the students.

In some cases, the disaggregation proposed in the global agenda is not as relevant for Moldova. For example, disaggregation by sex in the context of education as the rate of enrolment for girls is higher compared to boys. This disaggregation is rather relevant for the access to labour market and decent jobs. However, in this context more emphasis on vulnerable groups would be appropriate in case of Moldova, as problems of integrating the poor and persons with disabilities is still an issue to be solved.

Insufficient data disaggregation (according to gender, age, income or health conditions) of policy beneficiaries is a general challenge for the national policy planning documents. For example, the SDG targets 11.2, 11.5 and 11.7 focus on women, children, older persons, poor and persons with disabilities. However, the national strategies and other policy documents do not highlight the indicated priorities basing on various levels of data disaggregation.

Specific education and labour market barriers, persistent patriarchal attitudes limit educational choices and employment options for females. Significant wage disparities, segregation into lower-paying occupations, unequal sharing of work and family responsibilities and limited access to childcare, to bank loans and to the governmental programmes for entrepreneurship development remain being the challenges in the country.

Many national and international organisations acknowledge that more systematic collection and review of sex-disaggregated data are required to ensure that the national policy documents could be focused not only on enhancing normative and institutional framework for promotion of gender equality, but also on reduction of gender inequality/discrimination itself.

The quality of the gender statistics produced by the National Bureau of Statistics (NBS) of the Republic of Moldova is ensured by observing the Fundamental Principles of Official Statistics (approved by the UN Economic Commission for Europe in 1992 and the UN / Statistics Commission in 1994), as well as through the Law on Official Statistics.

A compartment in the Statistical Data Bank of the NBS is dedicated to dissemination of gender statistics, which are part of the minimum set of gender indicators developed by the UN Statistics Commission.

To ensure better understanding of work with data disaggregated by sex, the Guide for Gender Statistics User was elaborated by the National Bureau of Statistics.

The gender statistics is presented on the GenderPulse application platform, where the data extracted from the Statistical Data Bank¹³ of the National Bureau of Statistics of the Republic of Moldova are viewed as interactive infographics. The statistical indicators are grouped into 5 thematic areas relevant for gender issues' analysis (see Figure 4.1):



Source: GenderPulse¹⁴

Figure 4.1 Groups of gender statistics indicators on GenderPulse information platform

These statistical indicators are part of the minimum set of gender indicators developed by the UN Statistics Commission. GenderPulse represents a tool for interactive and easy to understand graphical viewing of gender-sensitive statistical indicators. Studying of gender equality is important, as it is frequent a source and criterion of vulnerability, inequity or marginalization. The data for review basing on the gender statistics indicators on the platform are currently available for the national level, but not for the regional or the municipal levels.

Many international organisations working in Moldova provide assistance targeted for women. For example, UN Women Strategy for Moldova 2018-2022 focuses on three main areas: 1) strengthening women's participation in politics and decision-making, 2) economic empowerment of women and 3) ending violence against women and girls. To achieve progress in these areas, UN Women works with a variety of national and international partners, as part of different national and regional initiatives.

UNDP Moldova has launched an Institutional Capacity Development Programme in 2020 planned until 2023 with financial support from Sweden under the UNDP-SIDA "Sustainable Resilient Communities through Women Empowerment" Project¹⁵. The aim is to strengthen NGOs' organizational capabilities to be actively involved in promoting and implementing climate resilience measures and environmentally friendly practices at the local level in pilot areas including, inter alia, the ATUG.

¹³ <https://statbank.statistica.md/pxweb/pxweb/ro/?rxid=2345d98a-890b-4459-bb1f-9b565f99b3b9>

¹⁴ <https://genderpulse.md/en/about>

¹⁵ <https://www.md.undp.org/content/moldova/ro/home/projects/sustainable-resilient-communities-through-women-empowerment.html>

4.8 Cities included in the National Programme for growth poles in Moldova for 2021-2027

The cities of Cahul (located in South Development Region) and Comrat (located in ATUG) are among the six cities¹⁶ included in the National Programme of Development of the Cities – Poles of Growth. The six cities were selected through a development potential assessment procedure considering a set of more than 20 indicators and presented in Appendix 2 to the mentioned Programme. The Programme approved by the Government of Moldova on 16.12.2020 is supposed to facilitate more rapid development of the selected regional urban centres as well as their suburban surroundings with the objective to balance the ongoing growth of Chisinau and Balti agglomerations.

Within this Program, development projects of the designated municipalities for growth pole cities and rural localities in their area of influence are expected to be financially supported at the level of the following components:

- Connectivity and urban mobility, focused on the modernisation of road infrastructure and urban public transport services.
- Competitiveness and support for economic activities, focused on developing infrastructure to support private sector development and attract foreign investment.
- Urban revitalization and development of infrastructure of public spaces, focused on satisfying the most stringent aspects of the quality of life in cities.
- Modernisation of the technical-urban infrastructure and public utilities networks, focused on the adequate provision of the population with water, sewerage, sanitation and street lighting services.

Being an element of regional development policy, the Programme focuses on the objective of sustainable economic growth.

As indicated in the Programme, even though waste collection services in the selected cities per 2019 cover more than 75% of population, there are 5 out of the 6 selected cities that lack the authorized sites for waste disposal and due to this fact face the environmental challenges.

The six cities included in the Programme adopt and implement their operative plans coordinated within the Programme. Waste management improvements are not reflected in the operative plans. Thus, they are supposed to be addressed within the investment projects planned per the National Waste Management Strategy (2013-2027).

¹⁶ The other four cities are Orhei, Ungheni, Sorooca and Edinet

4.9 Regional policy framework

Regional policy framework is outlined in the National Strategy for Regional Development (NSRD) of the Republic of Moldova for 2022-2028 developed in accordance with the objectives of the National Development Strategy “Moldova 2030”.

At the regional level, the NSRD for 2022-2028 envisages the replacement of Regional Development Strategies and Regional Operational Plans with Regional Operational Programs aimed at improving the effectiveness of the process of prioritizing interventions at the regional level.

The Regional Operational Program is seen as the main policy document at the level of the development region, which is designed to ensure consistency between the NSRD for 2022-2028 and the activities planned at the regional level.

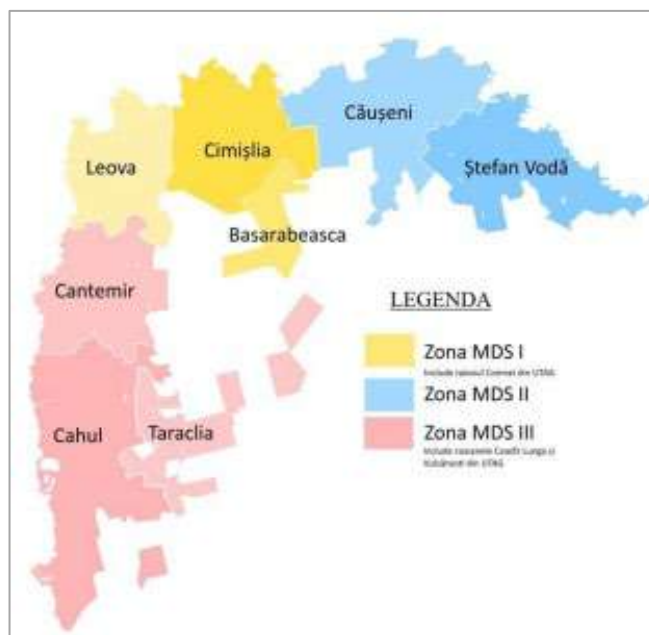
The proposed project for WMZ-1 will involve the municipalities administratively belonging either to the South Development Region (SDR) or to the ATU Gagauzia (ATUG). Information about these two development regions in comparison with other regions of Moldova is presented in the following table:

Table 4.3 General data on the Development Regions of Moldova, 2020

Indicators	Development Regions					Moldova
	Chisinau	North	Center	South	ATUG	
Population (2019), thousand	832.9	974.6	1,047.7	525.9	161.7	3,542.7
Share of population, %	23.5	26.7	29.5	14.8	4.6	100
Rural Population (2019), %	9.1	63.4	80.2	73.3	59.2	56.9
Urban population (2019), %	90.9	36.6	19.8	26.7	40.8	43.1
Area, km2	568	10,015	10,636	7379	1,848	30,446
Regional GDP (2018), mln. lei	114,309.7	31,866.3	28,289.2	13,734.3	4,308.9	192,508.6
Share of GDP, %	59.4	16.6	14.7	7.1	2.2	100
GDP per capita, thousand lei	137.2	32.7	27.0	26.1	26.6	54.3
Industrial production (2019), mln. lei	30,095.6	13,066.3	11,603.2	2,585.2	1,982.8	59,333.1
Share of industrial production, %	50.7	22.0	19.6	4.4	3.3	100
Number of enterprises (2019)	35,445	7,287	9,174	3,107	1,701	56,714
Investments in fixed assets (2019), mln. lei	20,962.1	3,559.0	4,037.8	1,896.4	797.9	31,253.2
Volume of investments per capita, thousand lei	25.2	3.7	3.7	3.6	4.9	8.8
Average monthly salary (2020), lei	9,537.8	6,538.2	6,466.6	6,197.1	5,936.7	8,107.5

Source: Regional Operational Program of the Development Region ATUG 2022-2024

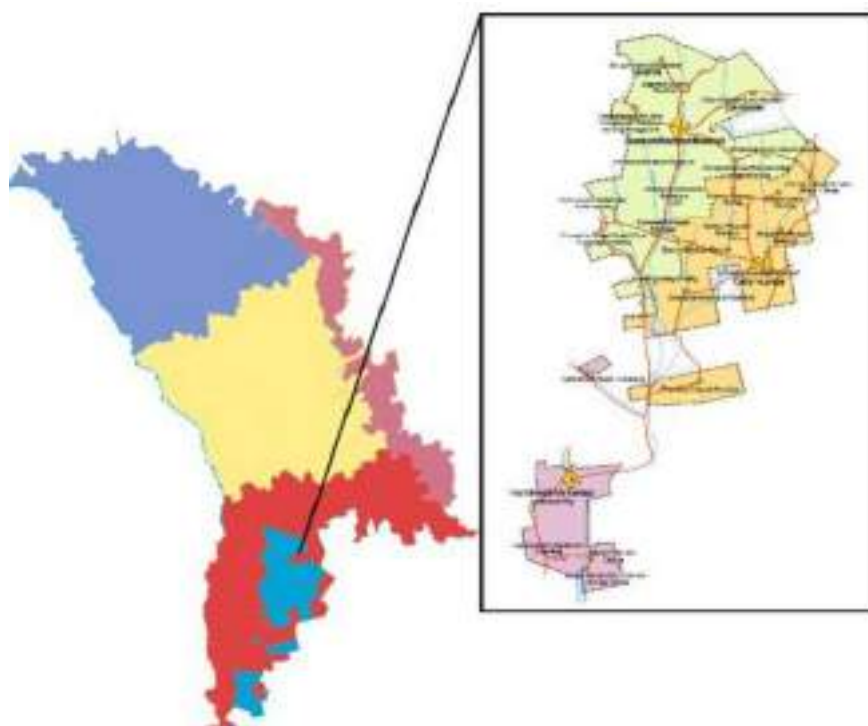
Administrative territories of eight Rayons comprising the SDR are indicated on the map in Figure 4.2. The administrative centre of SDR is the city of Cimişlia.



Source: Regional Action Plan 2017–2020, South Region Development Agency, 2016

Figure 4.2 A schematic map of Rayons comprising the South Development Region

Only Cahul, Cantemir, and Taraclia Rayons of SDR are included in the WMZ-1 together with the three Rayons administratively belonging to ATUG (see Figure 4.3).



Source: adrgagauzia.md

Figure 4.3 Location of Rayons administratively belonging to ATUG

As the regional policy programmes are separately developed and implemented in the SDR and the ATUG, they are described in the separate sections below.

4.9.1 Policy framework in SDR

Compared to other development regions and environments by country, the Southern Development Region has the lowest degree of industrialization. The land is one of the main natural resources, the area of agricultural land constituting 74% of the total land area.

There are 528 thousand people living in the region, which make up 15% of the country's population. Among the regions of Moldova, the SDR is characterized by the lowest population density – 72 inhabitants/km². The majority of the inhabitants of the region, 73%, are resident in rural areas.

In accordance with the National Program for the development of growth pole cities in the Republic of Moldova 2021-2027, Cahul municipality, along with other 5 municipalities on the territory of the other development regions of the country, was de jure declared as a growth pole with the potential to become a regional growth pole, benefiting in perspective from investments from programs with both national financing, as well as external. From the demographic perspective, Cahul is the largest city in the SDR by population, holding, at the same time, the 3rd place by the population number in the list of urban localities of the Republic of Moldova.

In 2018-2021, within the project "Support to the administration of the Republic of Moldova in the implementation of the National Strategy for Regional Development for the years 2016-2020 through integrated and sustainable urban development", the urban revitalization approach in the Republic of Moldova was piloted. As a result, 2 urban centers, Cimislia and Causeni have developed and developed urban revitalization programs of cities, subsequently having the opportunity to gain access to different financing funds for projects in the field of urban revitalization. In 2022, the city of Cimislia was updating the program, and the cities of Leova and Cahul were in the process of finalizing and approving the Urban Revitalization Programs.

According to the Water Supply and Sanitation Strategy 2014-2030, the target for the period 2020-2024 regarding the operation with the water supply and sewerage / sanitation infrastructure in Moldova for the urban area is 80% and for the rural area is 75%. In 2019, Chisinau and ATUG had the highest level of connection to the public water supply system (88.6% and 78.1%), while the level in SDR was 60.2%¹⁷. Based on the available statistical data, it has been established that in SDR this objective for the urban population in large residential areas is already achieved, but further measures are needed to ensure that all rural areas are covered with water supply services.

The level of development of centralized sewage systems is much lower compared to water supply systems. The largest share of localities with access to the public sewerage system was registered in Chisinau (71.4%) and ATU Gagauzia (15.6%),

¹⁷ DRS Regional Operational Program 2022-2024

while the localities from the South Development Region and North Development Region have the lowest access rates (5.4% and 4.7%, respectively). At the national level, the rate is 7.6% (data for 2019).

The rural localities from the Rayons Basarabeasca, Cantemir, Leova, Causeni do not have access to the centralized sewerage system at all. The lack of public sewerage service in the vast majority of rural localities, as well as in most of the private sector in urban localities, represents a challenge, which, not being solved in the near future, will continue to have negative effects on both groundwater, surface water and soil.

The "Water Supply and Sanitation Strategy 2014-2030" states that the centralized sewerage systems will be developed only for agglomerations of more than 5 thousand inhabitants, which implies that most of the rural communities in the region do not comply and should collaborate with the neighboring local public authorities. The increase of resource allocations in infrastructure projects, as well as the inter-community cooperation between LPAs in accordance with the national policy of regionalization of services, is expected to contribute to increasing the access of the population to the infrastructure elements that define the quality of life.

The South Region Development Strategy for 2016-2020 adopted in 2016¹⁸ mentioned the negative effects on the state of the environment generated by the mismanagement of solid waste generated in SDR among very high impacts with very high probability of occurrence.

The Operational Development Program for 2022-2024 approved in 2022 stated that waste collection service was provided to all residents of the urban areas, while in rural localities it was managed by a sufficiently small number of local public administration authorities (LPAs). Thus, in 2020, 40.1% of the total LPAs of level I provided the waste collection service (with an increase of 13.9% compared to 2019), of which urban LPAs covered 100% of their administrative areas, and among rural LPAs the figure increased by 14.8% in 2020 compared to the previous year, reaching the value of 36,4%. The highest coverage rate of the households by the solid waste collection service is observed in Taraclia Rayon (58.1%), followed by Basarabeasca Rayon, which demonstrated an increase of 24.9% reaching the coverage level of 37.8%. The situation is very difficult in rural localities, especially in Stefan Voda Rayon, where no inhabitant benefits from this type of service.

In line with the National Strategy of Regional Development 2022-2028, the strategic vision of SDR development is formulated as: *Supporting the increase of competitiveness and sustainable development of the Southern Development Region, adjusting disparities and increasing the quality of life of citizens.*

An overview of the SDR Operational Development Program 2022-2023 is presented in Table 4.4.

¹⁸ Its update could be expected in accordance with the National Strategy for Regional Development 2022-2028 approved by the Government of Moldova in January 2022, www.gov.md

Table 4.4 Objectives and measures of North Regional Development Strategy

Objective	Priority directions for achieving the objectives via specific projects
1. Increasing the competitiveness and employment of the South Development Region	1.1. Strengthening the role and functions of cities in enhancing the competitiveness of the region 1.2. Improving the entrepreneurial environment in the region 1.3. Identifying and promoting smart specialisation in the region 1.4. Regional and cross-border cooperation
2. Increasing territorial cohesion and preventing exclusion	2.1. Improving the technical infrastructure basic utilities in the region 2.2. Development of support infrastructure for business 2.3 Supporting the region's adaptation to climate change, preventing risks and disaster resilience
3. Improving the mechanisms and instruments for implementing regional development policy	3.1. Operational efficiency of the process of implementation of the regional development 3.2 Strengthening the financing mechanism of the regional development projects 3.3. Capacity building of regional actors in areas relevant to regional development policy

Source: COWI on the basis of the SDR Operational Development Program 2022-2024

Result indicators specified in the Program as Targets for 2024, inter alia, include:

- > Development Cahul City as a regional growth pole city (based on the National Program for the development of cities – poles of growth)
- > Supporting the development of the basic urban infrastructure (water supply, sewerage and wastewater treatment, waste management) by promoting regionalization and inter-community cooperation (interventions for areas with an impact of at least 20 thousand inhabitants)

- > To support the gradual transformation of the public utility operators acting in Rayon centers into regional operators that will cover with services the adjacent rural localities within a radius of 5-30 km from the Rayon centers.
- > Population coverage rate by SWM services (minimum 26%)

4.9.2 Regional policy framework in ATUG

Legal acts outlining the special status of ATUG in Moldova are presented on the official website of the People's Assembly of Gagauzia¹⁹. Capacity of ATUG for elaboration and management of the region's development policy in good integration with the national regional development policy has been strengthened by a number of international technical assistance projects including, *inter alia*, the project **Technical Assistance for the integration of ATU Gagauzia in the national framework for regional development** funded by the EU and implemented in 2017-2019.

The overall main objective of the Regional Operational Program 2022-2024²⁰ is formulated as follows: Supporting the growth of competitiveness and sustainable development of the Development Region of ATUG, eliminating inequality and improving the quality of life of residents. Specific targets and corresponding measures included in the Program are presented in the following table:

Table 4.5 Targets and measures of ATUG Regional Operational Program 2022-2024

Target	Measures for achieving the targets via specific projects
1. Increasing the competitiveness of the economy of the DR of ATUG	1.1. Strengthening the role and functions of cities as driving forces for increasing the competitiveness of the DR of ATUG 1.2. Improvement of the business environment in the DR of ATUG 1.3. Identification and promotion of smart specialization priorities in the DR of ATUG 1.4 Support for regional and cross-border cooperation
2. Improvement of the regional infrastructure of socio-economic and spatial development	2.1. Improvement of the basic technical and communal infrastructure in the DR of ATUG 2.2. Development of business infrastructure in the DR of ATUG

¹⁹ <https://halktoplushu.md/index.php/ulozhenie-gagauzii> (assessed 09.08.2022)

²⁰ www.adraug.md (assessed 14.02.2023)

Target	Measures for achieving the targets via specific projects
	2.3. Support the adaptation of the DR of ATUG to climate change and increase resilience to disasters
3. Improve instruments for the coordination and implementation of national policies for regional development	3.1. Improving the effectiveness of regional development institutions 3.2. Optimization of the financing mechanism for regional development projects

Source: COWI on the basis of the Regional Operational Program of the DR of ATUG 2022-2024

Measure 2.1 assumes the activities two main directives: (1) water supply and sanitation and (2) improvement of SWM services.

The first direction under this measure is to improve the infrastructure and coverage of water supply and sewerage systems, as well as to improve the quality and efficiency of these services. The step-by-step approach established by the sectoral National Strategy for Water Supply and Sanitation (2014-2028) is to be adhered. One of the problems that needs to be addressed as a matter of priority in the region is the lack of sewerage systems in most villages of the region, as well as in the private housing sector in large cities. Almost all existing systems require urgent intervention in terms of their renovation, rehabilitation of existing or construction of new wastewater treatment facilities. The solution of this problem will eliminate the environment pollution caused by wastewater.

As stated under this Measure, in addition to the infrastructure part, it is necessary that the investment projects contain elements allowing to integrate the planning of this sector development at the local level, increasing the efficiency of the service operator, inter-municipal cooperation to ensure the quality of service, as well as actions to inform the community.

The second direction within the framework of this Measure includes projects aimed at improving the efficiency of solid waste management through the development of the SWM infrastructure, the creation of an effective management system through inter-municipal cooperation, the practice of promoting separate waste collection and improving the quality and efficiency of regional operators. As a platform for the planned initiatives is the "Waste Management Strategy in the Republic of Moldova for 2013-2027".

The goals and performance indicators of ATUG for this Measure are as follows:

- > Equipping houses with communal water supply from safe water sources by 80% by 2024;

- > Equipping houses with communal sewerage of at least 25% until 2024;
- > Access of the population to garbage collection systems is minimal 65%.

The policy framework documents in ATUG also include, *inter alia*, the following recently adopted programmes²¹ accompanied by the respective action plans:

- > Program of activities of the Executive Committee of ATUG for 2019-2023;
- > Target programme for tourism development in ATUG in 2021-2025;
- > Target programme for development of small and medium enterprises in ATUG in 2022-2025.

Information about public consultations regarding the programmes, reports on progress in implementation of the programmes and activities included in the action plans are published on the website²². For example, the public consultations regarding the programme for support and development of small and medium enterprises for 2022-2025 in ATUG were arranged by the Chief Department for Economic Development and Tourism of ATUG and held on 11 January 2022 (in online mode due to COVID-19, as illustrated in Figure 4.4).



Figure 4.4 A screenshot example from an online public consultation on the target programme for development of SMEs in the UTAG

The regional programmes in ATUG are developed and being implemented with support from GIZ/BMZ, EU and other international organisations, e.g. the programme regarding SMEs was developed with financial support from Germany within the project "Economic policy advice to Moldovan Government – Measures to promote sustainable SMEs in ATUG".

Municipal strategies/programmes of socio-economic development are adopted by all municipalities of ATUG. One of the most detailed strategies for 2020-2025 is available for Vulcaneshti city. It was elaborated with support from USAID in 2020 as an update of the strategy for 2017-2022 adopted by the city in 2016.

²¹ econutag.md/strategii/ (accessed 24.06.2022)

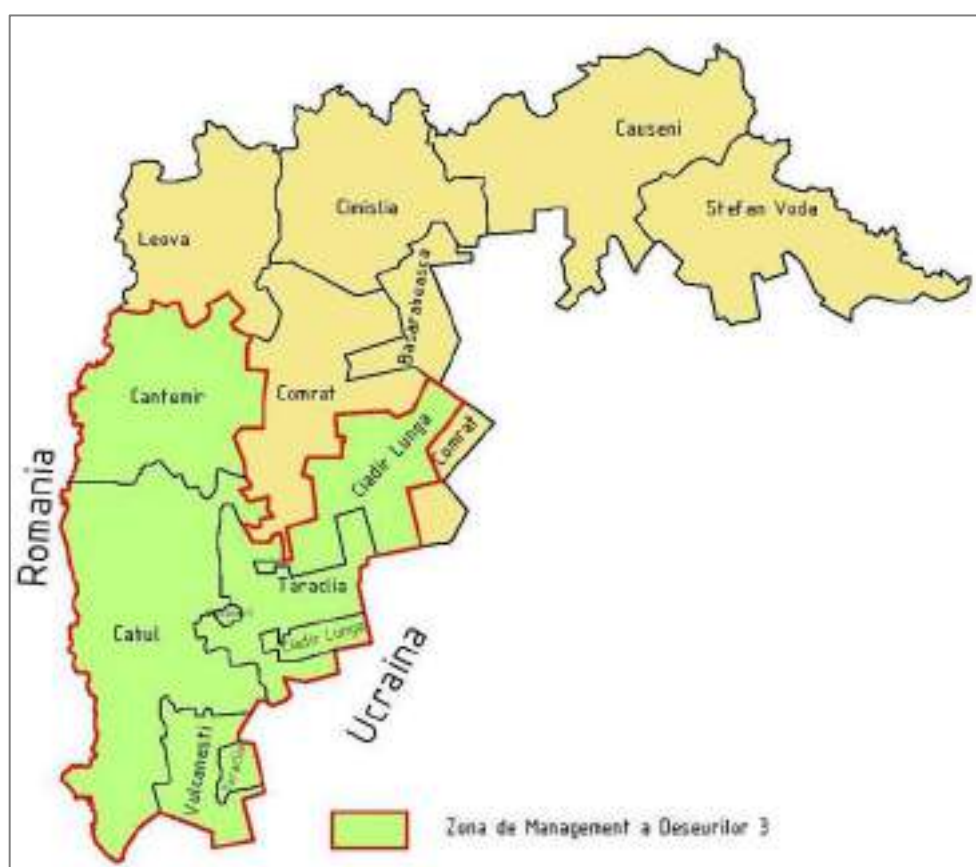
²² <https://econutag.md/otchety-o-deyatelnosti/> (accessed 24.06.2022)

The city strategy includes the following five parts: (i) diagnostic analysis (including SWOT analysis); (ii) the overall framework of the strategy (vision and directions of development); (iii) action plan; (iv) the implementation phases and monitoring of the strategy implementation; (v) a portfolio of priority projects.

5 Environmental baseline conditions in WMZ-1

The description of baseline conditions for the proposed Project in WMZ-1 includes the data from the following key sources:

- > Feasibility study with the respective EIA performed in 2015-2016 by GOPA etc. with financial support from GIZ for the area including the former WMZ-3 (initially including Cahul, Cantermir and Taraclia Rayons) extended with Vulcanesti Rayon and Ceadir-Lunga Rayon, i.e., corresponding to the current area of WMZ-1, but without the area of Comrat Rayon as indicated in green color in Figure 5.1,
- > Waste Management Concept prepared in 2017 by IRCON and SWECO for the region including Leova, Cimislia and Basarabasca Rayons, as well as a number of settlements in ATUG (Comrat, Avdarma, Besalma, Bugeac, Chioselia Rusa, Chirsova, Cioc-Maidan, Congaz, Congazcicul de Sus, Congazcicul de Jos, Dudulesti, Cotovscoe, Dezghinghea, Ferapontievca) – the concept assumed construction of the temporary landfill for Cimislia city until the regional landfill is established, and
- > Information collected by COWI during the FS update in 2021-2023.



Source: GOPA/GIZ, 2015

Figure 5.1 Area of WMZ 3 covered by the FS and ESIA performed in 2015-2016

5.1 Project area

The area to be covered by the SWM system improved as the result of the proposed Project for WMZ-1 in Moldova includes six Rayons (Districts): the Rayons of Cahul, Cantemir, Taraclia located in the South Development Region (SDR) and the Rayons of Comrat, Ceadir-Lunga and Vulcanesti comprising the ATUG.

The Rayons included in WMZ-1 comprise 4 towns (2 of them are located in Taraclia Rayon) and 98 villages. Villages in the project area are organized in 57 communes. Numbers of localities (towns and villages) for the Rayons included in WMZ-1 are presented in Table 5.1.

Table 5.1 Administrative-territorial setup of WMZ-1 and Moldova per 01.01.2021

	Municipalities	Cities	Localities in cities (municipalities)	Villages-residences ²³	Localities in the composition of the municipalities ²⁴	Total localities
Republic of Moldova	13	53	41	916	659	1,682
Rayons of SDR:						
Cahul	1	-	1	36	17	55
Cantemir	-	1	-	26	24	51
Taraclia	-	2	-	13	11	26
ATUG	2	1	1	23	5	32
WMZ-1	3	4	2	98	57	164

Source: COWI on the basis of NBS²⁵

The Project area is located in the South and South-East of the Republic of Moldova. At the South-West border, the region borders Romania and the South-East border with Ukraine. The SDR is composed of 8 Rayons: Basarabeasca, Cahul, Cantemir, Causeni, Cimislia, Leova, Stefan-Voda and Taraclia. The administrative center of SDR is Cimislia city. ATUG includes 3 Rayons (Comrat, Ceadir Lunga and Vulcanesti) and has Comrat city as the administrative center.

Access between the main centres of the region is via road and railway arteries, which ensure freight and passenger traffic.

SDR has a direct connection with the European Union through Romania. The connection is ensured through the 2 customs points: Cahul-Oancea and Giurgiulesti-Galați and the railway route – the Cantemir-Fălcu crossing point. To the East SDR has a connection with Ukraine through 4 customs points: Palanca-MaiakiUdobnoe, Tudora-Starokazacie, including two railways: Basarabeasca-

²³ Village where the village council has its headquarters.

²⁴ Except for village-residence

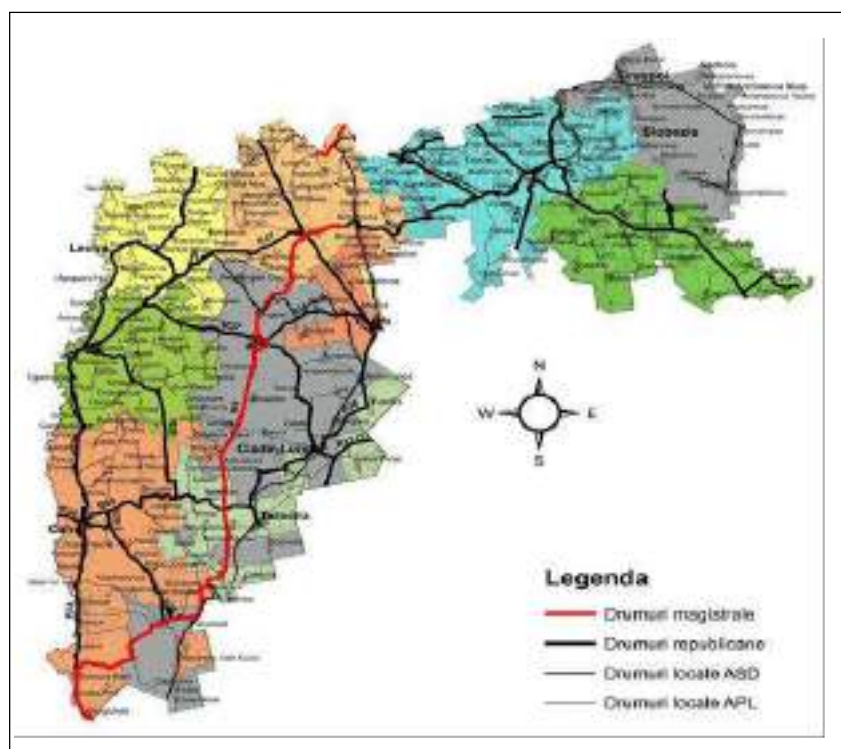
²⁵ Statistica Territoriala 2020, Table 1.1

Serpneve and Giurgiulesti–Reni and 7 road crossing points for which simplified regime applies.

The Rayons in the area are part of three euroregions: "Dunărea de Jos", "Siret – Prut" Dniester" and the "Black Sea" Euroregion. The geographical positioning of the area and its proximity to Romania and Ukraine, as well as its membership in the 3 Euro-regions, benefit the area by giving it access to EU funds through cross-border programmes.

The strategic advantage of area in terms of location is the exit/access to the Black Sea through the Giurgiulesti International Free Port (GIFP) on the Danube, the only port in the Republic of Moldova accessible for maritime vessels. The Danube river itself and the Rhine-Main-Danube canal create a river transport link between the Black Sea, the North Sea and 14 European states including a network of international railways and roads.

Road transport is widely used in area. The density of public roads is lower than in other regions of Moldova. The available road infrastructure is closely linked to the economic development of the regions and the standard of living of the population. Development of the road network (see Figure 5.2) is among priorities of the development strategies of SDR and ATUG.



Source: Regional Development Strategy for South Development Region 2016-2020, Cimislia, 2016

Figure 5.2 Public road network in SDR and ATUG

A long-term programme of investments in regional and local road infrastructure in SDR has been elaborated with support from GIZ in 2015. Allocation of funds for

construction, rehabilitation and modernization of roads is managed at the national level.

The EU-Republic of Moldova Association Agreement and the Deep and Free Trade Agreement with the EU positively influence the development of the region by creating opportunities for the establishment on its territory of major European transport lanes to the east, which can increase the importance of regional economic development.

The landscape features of plateaus and plains are typical in the southern part of Moldova. The Prut River floodplain (1- 1.5 km wide) with meadows is located in the western part of the area.

The area is crossed by a series of small valleys having the widths of about 100 to 300 m. Cantemir Rayon is crossed from north-west to south-west by two small valleys with slopes inclined 3- 5° to 5- 7°. Cahul Rayon includes the Tigheciului Hills in the northern part and the Cahulului Plain in the central part of the area. The valleys of rivers Cahul, Salcia and Ialpug may be found to the east of Cahul Rayon and in the Taraclia Rayon.

The "Prutul de Jos" scientific bio-reserve is located in the region; it was declared a natural protected area. Furthermore, the reserve area is famous for location of Beleu natural lake, the largest in the Republic of Moldova, as well as a network of ponds, which form a unique ecosystem.

5.2 Location of the Project sites

5.2.1 Cahul site

Site proposed for establishment of the regional waste management center (WMC), including a regional landfill, a sorting station and a composting station (see Figure 5.3), is located east of Cahul city within the land including the currently operated and guarded waste disposal site of Cahul municipality. The planned footprint of the waste body is estimated 20 ha. The currently designated area of 10.7 ha (includes a land plot of 9.1 ha owned by Cahul LPA and two privately owned land plots that are to be expropriated) could be extended. The site is surrounded by grassland and shrubland and is accessible from the main road via a gravel paved road.

The adjacent terrain is hilly and includes a ravine (depth 20-25 m) to the east and northeast. The existing waste disposal site is located at an elevated plateau having an altitude of about 140 m.a.s.l. and the surrounding slopes of 10-15°.



Source: COWI, February 2022

Figure 5.3 View from west to east over the site selected for regional WMC in WMZ-1

As stated in the FS (2015), the site has a possibility for expansion to 18 ha. The area of existing waste disposal site (10.7 ha of degraded land) and of required expansion (6.05 ha of pastures and arable land) is in public ownership of Cahul LPA. Additional part of the required expansion area (1.246 ha of gardens) is the private property of 5 owners.

Geographical coordinates of the site are as follows:

- > Latitude: 47°54'30.11" N
- > Longitude: 28°16'17.5" E

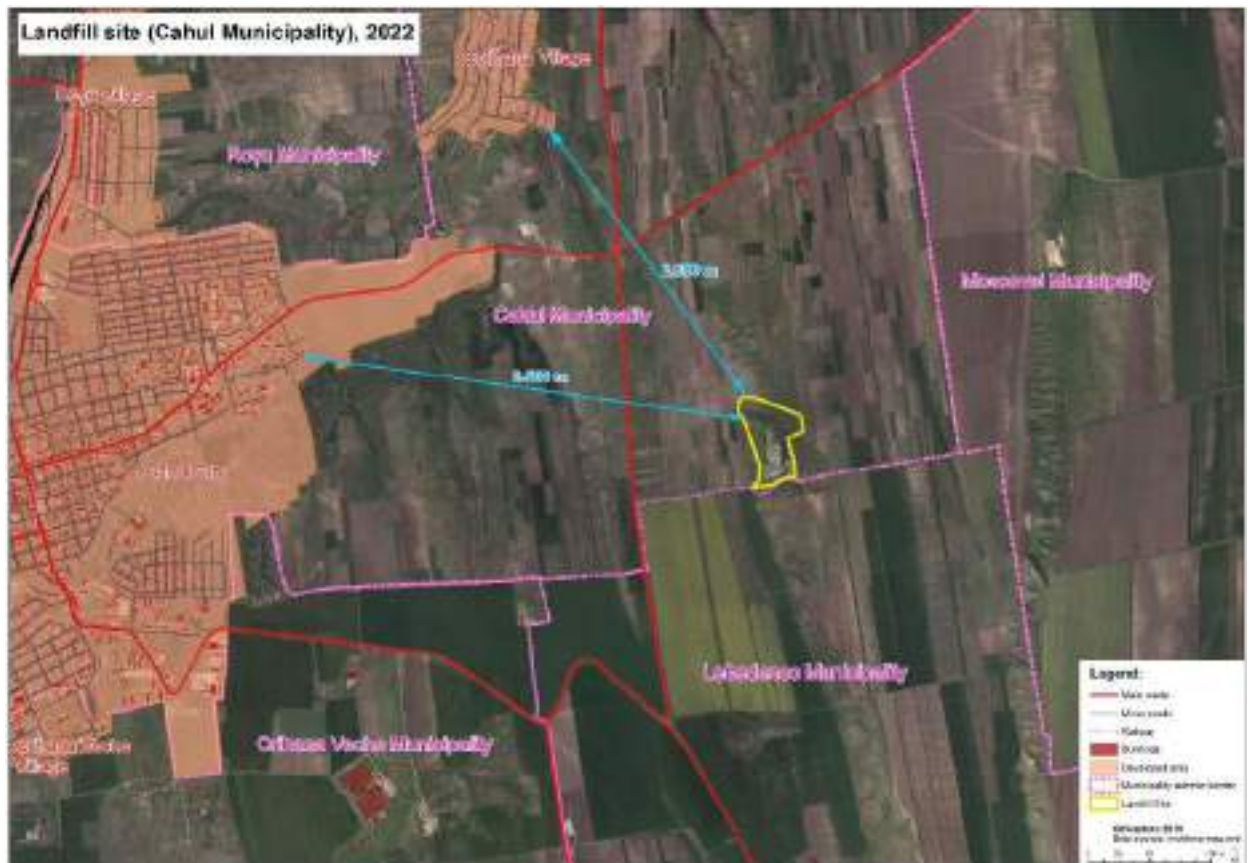
View from the central part of the site towards South, where the area is planned for establishment of sorting station and composting station, is included in Figure 5.3.



Source: COWI, 2022

Figure 5.4 View of the area planned for sorting station and composting station within the regional WMC in WMZ-1

Distances from the site borders to the nearest residential area (Cotihana village) is 2.6 km, to the residential area of Cahul city is 3.5 km. Schematic maps indicating the distances from the site borders is included in Figure 5.5. and Figure 5.6.



Source: COWI on the basis of moldova-map.md

Figure 5.5 Overview map of the Cahul site location in WMZ-1



Source: COWI on the basis of moldova-map.md

Figure 5.6 A detail of the Cahul site location map



Source: COWI on the basis of moldova-map.md and FS (2015)

Figure 5.7 A detail of the Cahul site with the indicated layout of proposed regional sanitary landfill for WMZ-1



Source: COWI, 2022

Figure 5.8 View over the waste disposal area at the Cahul municipal dumpsite located south from the site selected for regional landfill of WMZ-1

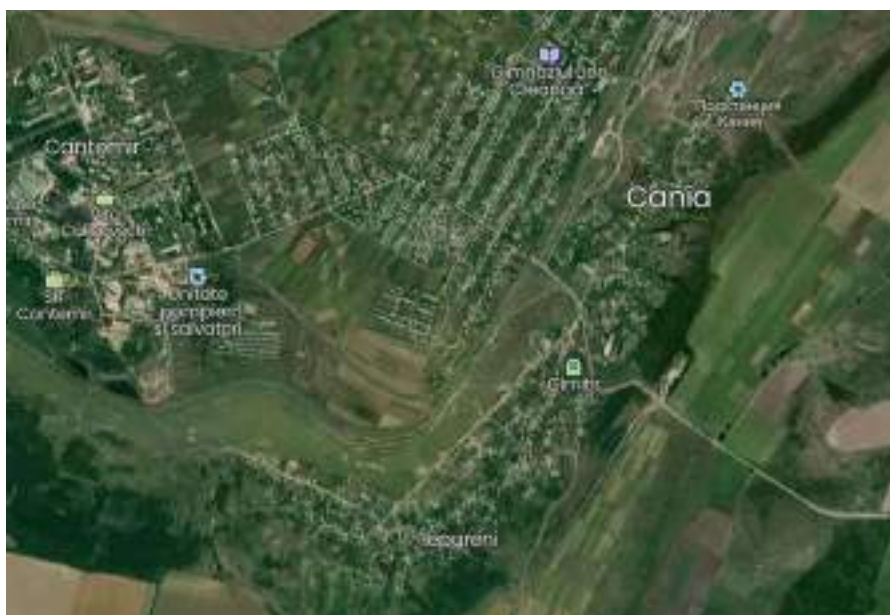


Source: COWI, 2022

Figure 5.9 View over the waste reception area and security booth at the Cahul municipal dumpsite located south from the site selected for regional landfill in WMZ-1

5.2.2 Cania TS site

The site proposed for the Transfer Station is located in the western part of the Cantemir Rayon (see Figure 2.4) at about 50 m from the national road R56 and about 5.4 km from Cantemir city. Location of Cania village and Cantemir city is presented in Figure 5.10.



Source: mapcarta.com

Figure 5.10 Location of Cania village close to Cantemir city

The site proposed for Cania TS establishment has an area of 1.78 ha (cadastral number 21142070182) and is owned by the Cania LPA. The distance from the site border to the nearest residential area is 1.3 km, the distance to the Tigheci River is 1.85 km. The site is currently used as pasture (see Figure 5.13) and is surrounded by agriculture lands. The landscape features could be seen in the two photos below.



Source: COWI, 2022

Figure 5.11 Overview map of the proposed Cania TS site location in WMZ-1



Source: COWI, 2022

Figure 5.12 View over the proposed Cania TS site at the National Road R56 (towards Cania village, in the eastern direction from the site)



Source: COWI,2022

Figure 5.13 View over the proposed Cania TS site at the National Road R56 (towards Baimaclia village in the western direction from the site)

5.2.3 Taraclia TS site

The site has an area of 1.74 ha (land cadastral nr. 8701104.862) and is owned by the municipality of Taraclia town. The site territory has a grass cover and includes remains of a former livestock farm. The site overview map is included in Figure 5.14



Source: COWI on the basis of moldova-map.md

Figure 5.14 Situational map of the proposed Taraclia TS site location in WMZ-1



Source: COWI 21.10.2021

Figure 5.15 View towards south from northern border of Taraclia TS site proposed in WMZ-1

5.2.4 Comrat TS site

The site proposed for the TS for Comrat is located next to the existing municipal dumpsite and close to the main road R35 (Comrat-Basarabeasca). The land is owned by Comrat Town Municipality and has an area of 0.369 ha. The site has a grass cover. The site is about 1,200 m away from residential area (Comrat Town). The site is bordered by Comrat Dumpsite (East) and cultivated lands (South-West). A quarry and some abandoned farm buildings can be observed within a distance of about 200 m from the site. A tailing pond (without any water at the moment of the site visit performed by COWI on 08.09.2022) is located at about 200 m from the site.



Source: COWI on the basis of Moldova-map.md, 2022

Figure 5.16 Location of site proposed for establishment of Comrat TS

The site location details could be seen in Figure 5.17. A photo included in Figure 5.18 shows the view indicated as view 2 in Figure 5.17.



Source: COWI on the basis of Moldova-map.md, 2022

Figure 5.17 Location details of site proposed for establishment of Comrat TS



Source: COWI (photo 2 per the location details)

Figure 5.18 Location details of site proposed for establishment of Comrat TS

5.3 Climate conditions in WMZ-1

The climate of the Republic of Moldova is moderate-continental and is characterized by mild and short winter, with a little snow and long-lasting warm summer with a low amount of precipitation. Information from meteorological stations is presented in the five tables below.

Table 5.2 Average monthly and annual air temperature, degrees Celsius

	The station and the years of observation								
	Briceni			Chişinău			Cahul		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Monthly average									
Jan	-1,6	-3,8	0,1	-0,8	-2,6	1,5	-0,1	-1,6	1,1
Fed	-3,0	1,6	2,5	-1,3	2,3	4,4	0,0	2,9	4,9
Mar	-0,3	5,8	5,8	0,8	7,4	8,4	2,3	8,4	8,6
Apr	14,4	10,0	10,0	15,1	10,5	11,8	15,2	10,5	11,6
May	17,9	15,3	12,7	19,4	17,0	14,4	19,3	17,1	15,4
Jun	19,7	21,7	20,0	21,9	23,5	21,8	22,1	22,6	21,7
Jul	20,5	19,8	20,5	22,2	22,1	23,7	22,3	22,8	23,9
Aug	21,8	21,0	21,6	24,6	23,8	24,0	24,5	24,0	24,5
Sep	16,3	16,1	17,8	17,9	18,6	20,8	18,3	18,9	21,0
Oct	11,3	10,5	12,8	13,3	12,3	14,6	13,7	12,8	15,3
Nov	1,8	6,5	4,1	2,1	7,9	4,8	3,8	9,3	5,6
Dec	-1,8	2,1	1,0	-0,8	3,5	1,8	-0,5	3,8	3,6
Annual average	9,8	10,6	10,7	11,2	12,2	12,7	11,7	12,6	13,1

Source: Resursele naturale şi mediul în Republica Moldova, 2021

Table 5.3 Maximum monthly and annual absolute air temperature, degrees Celsius

	The station and the years of observation								
	Briceni			Chişinău			Cahul		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Absolute monthly maximum:									
Jan	8,7	4,7	9,0	11,5	6,7	12,3	10,8	12,0	10,0
Fed	8,8	15,0	15,9	9,9	15,3	18,6	13,2	16,3	19,4
Mar	14,9	22,5	19,2	20,0	21,3	21,9	20,5	23,2	23,0
Apr	26,4	24,3	25,1	28,2	23,9	25,8	29,0	24,8	25,5
May	30,2	27,2	29,0	31,0	29,1	29,1	31,3	28,1	30,7
Jun	30,3	31,4	31,6	32,5	33,8	32,8	33,0	32,1	33,0
Jul	30,8	33,7	31,5	32,4	34,2	35,1	32,3	34,6	36,6
Aug	31,1	33,7	34,2	33,2	34,0	35,4	34,1	34,7	36,2
Sep	31,0	31,9	32,3	32,5	33,1	33,7	33,3	33,8	34,6
Oct	24,0	24,6	23,7	24,1	27,5	25,7	24,7	26,7	27,0
Nov	17,1	22,0	11,7	15,7	24,3	14,0	17,3	22,8	13,9
Dec	4,6	15,2	11,5	6,2	17,1	13,2	6,4	15,7	13,9
Absolute annual maximum	31,1	33,7	34,2	33,2	34,2	35,4	34,1	34,7	36,6

Source: Resursele naturale şi mediul în Republica Moldova, 2021

Table 5.4 Minimum monthly and annual absolute air temperature, degrees Celsius

	The station and the years of observation								
	Briceni			Chişinău			Cahul		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Absolute monthly minimum:									
Jan	-15,4	-14,5	-10,0	-11,2	-10,9	-5,2	-12,0	-10,5	-7,5
Fed	-19,4	-7,6	-9,3	-14,7	-9,1	-6,9	-13,1	-8,4	-6,9
Mar	-21,0	-7,3	-6,7	-13,8	-7,2	-3,9	-13,8	-4,4	-3,8
Apr	-0,9	-1,5	-5,5	1,6	1,2	-2,1	2,7	0,7	-4,9
May	6,3	1,4	0,2	9,1	5,0	4,4	7,0	6,3	6,2
Jun	6,7	10,7	4,3	9,1	13,7	7,2	10,2	12,8	7,9
Jul	9,5	10,3	9,9	11,3	12,9	12,4	13,5	12,5	12,6
Aug	10,9	11,3	10,1	16,1	13,4	14,3	14,8	13,6	14,3
Sep	1,2	3,0	4,4	2,9	5,8	9,5	4,0	4,3	8,1
Oct	2,1	-3,1	3,1	4,1	1,3	3,3	4,2	3,1	5,7
Nov	-14,8	-5,8	-4,7	-10,5	-7,3	-2,9	-10,8	-4,0	-2,9
Dec	-13,1	-7,2	-7,0	-11,6	-6,5	-6,8	-9,0	-5,8	-4,2
Absolute annual minimum	-21,0	-14,5	-10,0	-14,7	-10,9	-6,9	-13,8	-10,5	-7,5

Source: Resursele naturale şi mediul în Republica Moldova, 2021

Table 5.5 Monthly and annual amount of atmospheric precipitation

	The station and the years of observation								
	Briceni			Chişinău			Cahul		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Monthly amount of precipitation, mm:									
Jan	16	46	8	32	83	9	22	31	5
Fed	40	22	41	55	29	23	63	12	28
Mar	69	17	25	103	1	19	50	5	15
Apr	28	30	29	4	34	4	4	37	5
May	31	204	72	18	34	69	29	77	45
Jun	217	136	91	151	82	86	33	93	122
Jul	65	25	61	121	33	85	81	23	33
Aug	5	36	27	1	47	5	10	29	6
Sep	33	22	89	53	10	75	13	94	32
Oct	22	7	114	2	20	81	6	26	82
Nov	49	30	10	47	6	32	28	11	21
Dec	42	21	47	22	24	74	27	10	66
Annual amount of precipitation, mm	617	596	614	609	403	562	366	448	460
Number of days with precipitation 0,1 mm and more	120	137	128	114	110	102	97	84	103
Relative humidity of air, %	73	75	72	67	65	61	74	74	69

Source: Resursele naturale şi mediul în Republica Moldova, 2021

Table 5.6 Wind speed and sunshine duration

	The station and the years of observation								
	Briceni			Chişinău			Cahul		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
<i>Monthly average wind speed, m/s</i>									
Jan	2.5	2.2	2.1	2.6	3.0	3.0	3.1	3.3	2.9
Fed	2.4	2.8	2.5	2.7	3.4	3.8	3.5	3.2	4.1
Mar	2.6	2.7	2.4	2.8	3.6	3.5	3.2	3.5	4.4
Apr	2.7	2.9	2.1	3.3	2.9	3.2	3.6	3.9	3.5
May	2.2	2.3	2.1	2.6	3.1	3.4	2.9	3.4	3.9
Jun	1.9	1.7	1.7	2.5	2.7	2.3	2.8	2.9	2.6
Jul	1.7	1.7	1.5	2.4	2.6	2.7	2.1	2.7	2.8
Aug	1.6	1.6	1.9	2.3	2.5	2.5	2.6	2.8	3
Sep	1.8	1.8	1.9	2.9	2.7	2.8	3.0	2.9	3.2
Oct	2.0	1.4	1.4	2.7	2.2	2.2	2.8	2.5	2.9
Nov	2.5	2.3	1.8	2.3	3.1	2.2	3.5	4.1	2.3
Dec	2.2	2.5	2.9	3.2	3.3	2.8	2.9	3.8	4
<i>Annual average wind speed, m/s</i>	2.2	2.2	2.0	2.7	2.9	2.9	3.0	3.3	3.3
<i>Sun radiation duration, hours</i>	2,193	2,203	2,218	2,353	2,429	2,529	2,219	2,340	2,539

Source: Resursele naturale şi mediul în Republica Moldova, 2021

Due to the location of Moldova in the south-eastern part of Europe, the weather and climate aspects are determined by the Mediterranean cyclones, Siberian anticyclones, Azoric anticyclones and Scandinavian anticyclones.

Most of air masses reaching the country territory are largely dry. This explains the frequency of dry time virtually in all seasons. The annual amount of precipitation decreases from 620 mm in the north-western part of the country to 490 in the south-eastern part. The precipitation (rain showers) mainly occurs during warm months, only 10% of annual amount comes in the form of snow.

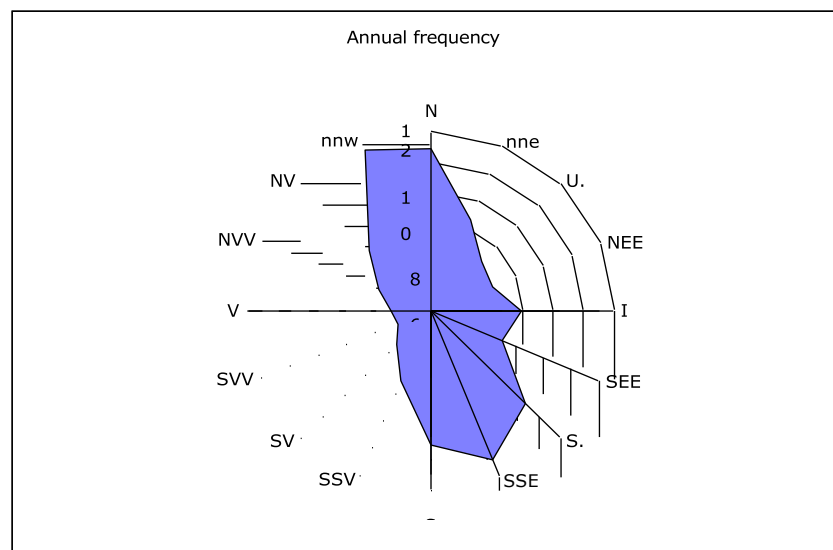
The landscape features introduce some heterogeneity of local weather and climate conditions. However, the variety is rather limited, because the advections that occur almost simultaneously throughout the country territory (including the area of the Codri Plateau) lead to dimming of any fluctuations.

As mentioned in the Regional Development Strategy²⁶, WMZ-1 is located within the warmest and most arid region of Moldova with daily temperatures being 2-3°C higher than in the other regions of the country. The absolute monthly maximum in the summer months (June, July, August) recorded in the southern region in 2012-2014 ranged from 32 to 39°C. Mild winters with a little snow and long, hot summers have been observed during the recent years. Temperatures above 20 °C begin in March and end in November. The climate is characterized by about 250 sunny days annually. The dry climate is characterized by absence of smog, the very low

²⁶ Strategia de Dezvoltare Regională Sud 2016-2020

frequency of fog and strong wind, but also by drought phenomena. The annual amount of precipitation in the period 2011-2014 varied between 590 and 716 mm. These climatic conditions influence the development and specialization of the area of agriculture, emphasizing the need to modernize agriculture through the development of irrigation systems and the growth of crops on protected land.

The main features of the general atmospheric circulation for the country territory are the relatively high frequency of slow temperature-oceanic air advections in the NW (predominantly in the warm season), the high frequency of temperate-maritime air masses in the SE especially in the cold season, but also the uncommon advections of Arctic air from N and tropical maritime from S and SE. The predominant wind is called Crivățul, which accounts for 29% of the annual frequency of winds. The second predominant wind is called Austre, the southern one, with a frequency of 16%, occurs mostly in summer and is quite dry. The wind rose for the South Development Region including the Cahul site is shown in Figure 5.19.



Source: EIA 2015

Figure 5.19 Wind rose for Cahul area

5.3.1 Climatic factors and climate change trends

Engineering design and operation plans for the proposed facilities should be prepared taking into consideration the trends towards higher frequency of extreme weather events in Moldova.

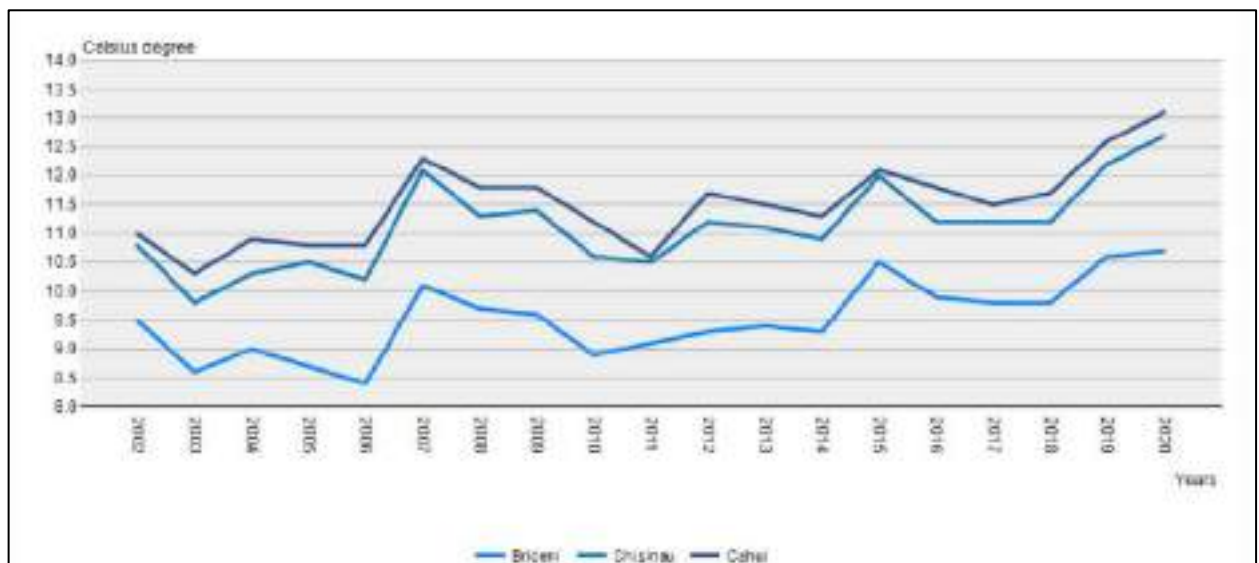
According to the Country Climate Risk Profile²⁷, the climate trends observed in Moldova from the 1980s to the present include:

²⁷

www.climatelinks.org/sites/default/files/asset/document/2017_USAID%20ATLAS_Climate%20Change%20Risk%20Profile%20-%20Moldova.pdf

- > Increase in temperatures of 0.58°C per decade (with warming most significant between March– August). Seven of the ten warmest years in Moldova’s history occurred within the past two decades.
- > Gradual decline in rainfall and shift in seasonal rainfall patterns, with rainfall levels increasing March–May and decreasing June–August.

The air temperature data for 3 meteorological stations located in Moldova presented in the figure below show a slight trend toward increase of annual average temperatures.



Source: Statistical Databank

Figure 5.20 Annual average air temperature in Moldova by meteorological station and years

Estimated changes in the climate conditions in Moldova include:

- > Increase in average temperature of 2°–3°C by 2050, with warming greatest from June– August.
- > Increase in the number of “hot” days (exceed current climate by 10 %) by 32 and “dry” days (zero precipitation) by 12 by 2050.
- > Changes in precipitation are uncertain; some projections suggest a mild reduction in annual precipitation by 2100, with drier summers (June– August), more humid winters (December–February) and more variable precipitation. Extreme precipitation events should be taken into consideration for design of leachate collection system for the landfill, as well as measures for surface runoff management at all sites planned for investments included in the Project.
- > Increase in the frequency and severity of extreme events such as droughts and floods.
- > Climate stressors and climate risks related to water resources include, *inter alia*, drought and reduced rainfall, reduced surface flows and water quality, increased scarcity of water resources for industrial use, reduced hydropower

production and heating/cooling potential (thus, increased energy costs), increased scarcity of water resources for irrigation, particularly during the summer growing season, exacerbation of uneven spatial distribution of water resources.

Moldova is highly vulnerable to climate change and variability, and the socio-economic costs of climate change related to hazards such as droughts, floods, late spring frost, hail are significant. Increasingly erratic weather patterns have resulted in loss of life and income through rising food and energy prices. The most vulnerable sectors are agriculture, human health, water resources, forestry, transport and energy.

Information available from the State Hydro Meteorological Service (SHMS) of Moldova²⁸ the year of 2019 was characterized by a high thermal regime and with the annual amount of precipitation within the norm. The average annual air temperature in the territory was +10.6 °C. + 12.6°C (fig.1), exceeding the norm by 2.1-3.2°C (figure 7 below) and on a large part of the territory it is reported for the first time in the entire observation period.

The temperature trends in last three decades are statistically significant for summer and annual temperatures (at a 95% confidence level) and for spring (at a 90% level). Further evidence of the acceleration of regional warming can be seen in the fact that seven years among the ten warmest in the history of instrumental observations in Moldova have been in the last two decades.

As for the precipitation, there is a change in the direction of some trends from 1887-1980 to 1981-2008: from a decrease to an increase in spring, and from an increase (about 6 mm per decade) to a decrease in the last thirty years (above 13 mm per decade) in summer. For autumn-winter and annual precipitation the previous slight increase is continuing. In 2019, the annual amount of precipitation that fell on the territory constituted 380-700 mm, or 80-120% of the norm, only isolated their amount did not exceed 340-370 mm (70-75% of the norm). During the autumn season on a large part of the territory continued to maintain a deficit of rainfall. The precipitation quantity during the season on 65% of the territory was 50-85 mm (40-75% of the norm), and in isolation (on 20% of the territory) their amount did not exceeding 35-45 mm (30-35% of the norm), which in the autumn period is reported on average once in 10-15 years. Significant deficit of precipitation was reported in November, when their monthly amount on 60% of the territory did not exceed 3-10 mm (10-30% of the monthly norm). The map below shows the quantity of precipitations for 2019 year and in comparison with the norm of precipitations.

The Report on Moldova Water Security Diagnostic and Future Outlook developed by World Bank states that the outcomes of various climate models generate different effects on temperature and rainfall patterns, the overall direction is that

²⁸ Moldova Water Security and Sanitation Project. Environmental and Social Management Framework. Chisinau, November 2021

temperatures will rise, and precipitation will become more variable, likely with a drying effect in the growing season²⁹.

In the last 20 years from 2000 to 2020 the Republic of Moldova has already experienced 6 years (2000, 2003, 2007, 2012, 2015, and 2020) with the devastating droughts. The worst drought in Moldova occurred in 2007, it caused almost \$987 ml in damage, with the 78% of affected territory. In 2012, 80% of Moldova's territory experienced drought, causing \$200.5 million in damage.

Beside above-mentioned sectors, the Climate Change Impact will be felt in other fields as well. The profile developed in 2017 by USAID emphasized that for the water resources the risks are mainly to decrease surface flows by 16–20 percent from 2020–2029. This is especially concerning given Moldova's limited groundwater reserves. Even without climate change, water shortages are expected in the next several decades due to increased demand. Regarding agriculture field Climate change and variability already impact the sector, with 3 percent of GDP lost annually on average as a result of drought, heavy rains and flooding. Increased demand for irrigation combined with reduced water supply overall are likely to lead to irrigation shortages, impacting irrigated crops as well. Higher temperatures and drought impact the livestock sector (primarily poultry, cattle and sheep) directly by compromising animal health, and indirectly by reducing feed availability and quality. Higher temperatures and variable rainfall also adversely affect production of feed crops and pasture across all regions. This trend is likely to continue as projections indicate a 4–7 percent decline in pasture productivity by 2040.

Climate change already imposes a number of direct and indirect effects on health outcomes in Moldova. Rising air temperatures exacerbate heart conditions and severe circulatory and respiratory diseases. Acute respiratory infections are already the second highest cause of death in children under five. Shocks to agricultural production, such as floods and droughts, have important consequences for health in terms of food security and malnutrition, particularly in rural communities, where 21 percent of households were food energy deficient in 2013.

The climate extremes, channelled through the hydrological cycle, impose large economic costs on the country. The average annual economic impact of floods is estimated at US\$100 million annually (0.1–0.2 percent of GDP), directly or indirectly affecting 70,000 Moldovans. Moldova's environment has suffered from neglect, specifically in the last 40- 60 years, when economic growth was prioritized over environmental goals.

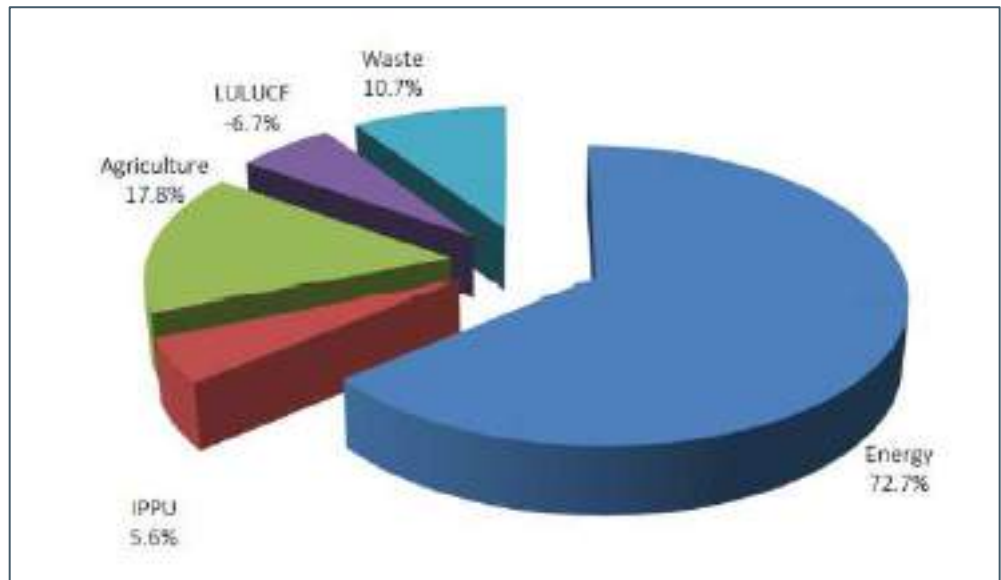
A detailed assessment of climate changes in Moldova and suggested climate resilience measures is presented in the updated Nationally Determined Contribution³⁰. This publication shows that, for example in 2016, about 72.7 per

²⁹Moldova: Water security Diagnostic and future outlook,
<https://openknowledge.worldbank.org/handle/10986/34809>, accessed
 06.23.2022

³⁰

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Republic%20of%20Moldova%20First/MO_Updated_NDC_final_version_EN.pdf

cent of the national net direct GHG emissions originated from the energy sector; other relevant direct GHG sources were represented by agriculture sector (17.8 per cent of the total), waste sector (10.7 per cent of the total) and Industrial Processes and Product Use (IPPU) sector (5.6 per cent of the total), while the share of the Land Use, Land-Use Change and Forestry (LULUCF) sector was -6.7 per cent (see Figure 5.21).



Source: Updated Nationally Determined Contribution of the Republic of Moldova

Figure 5.21 Breakdown of the Republic of Moldova's Net GHG Emissions by Sectors in 2016

To achieve the global temperature goal in line with the Paris Agreement (to limit global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels), Moldova and other countries aim to reduce growth of greenhouse gas emissions as soon as possible with further rapid reductions, based on the best available science, economic and social feasibility.

The effects of climate change in Moldova and neighbouring countries are noticed as increasing air temperatures, more frequent extreme weather events such as heat waves, droughts, floods and storms.

Diagrams for weather simulation time series available from meteoblue.com³¹ (using ERA5, the fifth generation ECMWF atmospheric reanalysis of the global climate, covering the time range from 1979 to 2021, with a spatial resolution of 30 km) included in Figure 5.22 and Figure 5.23 below provide an assessment of how climate change has already affected the region of Cahul and surroundings during the past 40 years.

³¹ https://www.meteoblue.com/en/climate-change/Cahul_moldova_618382 (accessed 15.02.2023)

The top graph shows an estimate of the mean annual temperature. The dashed blue line is the linear climate change trend indicating that it is getting warmer in Cahul over time due to climate change.



Source: meteoblue.com

Figure 5.22 Mean annual temperature change in 1979-2023 calculated for Cahul

In the lower part of Figure 5.22 the graph shows the so-called warming stripes. Each coloured stripe represents the average temperature for a year - blue for colder and red for warmer years.

Estimated annual precipitation change in Cahul and surroundings included as the top graph in Figure 5.23 includes the dashed blue line showing the trend for weather in Cahul becoming drier over time. In the lower part the graph shows the so-called precipitation stripes. Each coloured stripe represents the total precipitation of a year - green for wetter and brown for drier years.



Source: meteoblue.com

Figure 5.23 Mean annual precipitation change in 1979-2023 calculated for Cahul

As the proposed regional landfill is planned for being operated over about 20 years and then undergo the aftercare program, the climate change trends are to be verified and addressed at the design stage of the proposed Project, as well as during elaboration and implementation of the Landfill Operation Manual (LOM) and the Landfill Closure and Aftercare Manual (LCAM).

5.4 Emissions of pollutants to air

The statistical data on emissions of pollutants to air in whole Moldova, in ATUG (without breakdown by Rayon), as well as in SDR and its Rayons are presented in Table 5.7, where the data for Rayons included in WMZ-1 indicate that emissions in area in 2020 were at the level of about 7% of the total emissions in Moldova, where the amounts of emissions in Cahul and ATUG were the highest in WMZ-1. It could be noticed that the amounts of emissions in Cahul Rayon were not the highest in SDR - they were lower than the amounts of emissions in Causeni Rayon of SDR.

Table 5.7 presents statistical data on emissions by stationary sources in whole Moldova, in SDR and its Rayons and in ATUG for 2020 with a breakdown by specific pollutants. The data relevant for WMZ-1 are in bold.

Table 5.7 Emissions of pollutants in atmospheric air by stationary sources of economic agents in 2020, tons

	Emissions of pollutants to air in 2020, tons					
	Total	Solid	Gaseous and liquid	Sulphur dioxide	Carbon oxide	Nitrogen oxide
Whole country	14,905	2,261.8	12,643.4	506.5	4056.5	1,289.7
SDR	1,605.2	363.8	1 241.4	138.9	326.2	75.1
..Basarabasca	53.1	7.8	45.3	3.7	14.8	6.3
Cahul	357.2	22.5	334.7	8.5	56.6	22.4
Cantermir	75.0	38.5	36.5	3.1	14.0	3.4
Causeni	440.7	124.4	316.3	12.8	59.5	11.2
Cimislia	219.9	47.7	172.2	35.4	55.3	10.1
Leova	215.0	66.4	148.6	44.8	70.1	12.7
Stefan Voda	124.5	34.8	89.7	28.6	35.3	3.8
Taraclia	119.8	21.7	98.1	2.0	20.6	5.2
ATUG	498.8	79.3	419.5	4.2	204.2	19.0
WMZ-1 total, tons	1,050.8	162.0	888.8	17.8	295.4	50.0
WMZ-1 of whole country, %	7	7	7	4	7	4

Source: COWI on the basis of Statistica Teritoriala 2020

Outdoor air pollution is a mix of chemicals, particulate matter, and biological materials that react with each other to form tiny hazardous particles. It contributes to breathing problems, chronic diseases, increased hospitalization, and premature mortality.

Two sizes of particulate matter (PM) are used as indicators of air quality since they are most common and pose short-term and long-term impacts on the human health: fine particles with a diameter of less than 2.5 µm or PM2.5 and coarse particles with a diameter of less than 10 µm or PM10. PM2.5 particles are more concerning because their small size allows them to travel deeper into the cardiopulmonary system.

The World Health Organization's air quality guidelines recommend that the annual mean concentrations of PM_{2.5} should not exceed 10 µg/m³ and 20 µg/m³ for PM₁₀.

In accordance with the World Health Organization's guidelines, the air quality in Moldova is considered moderately unsafe - the most recent data indicates the country's annual mean concentration of PM_{2.5} is 16 µg/m³, exceeding the recommended maximum of 10 µg/m³³².

Contributors to poor air quality in Moldova include power generation, food processing, agricultural machinery, and vehicle emissions. City-specific air quality data is not available at this time.

In Moldova, the national air monitoring system is updated daily, using information from 17 monitoring stations (based on manual sampling). Only the cities of Chisinau, Balti, Bender, Tiraspol and Rybnitsa are covered by the respective monitoring system. Additionally, 2 automatic monitoring stations are located in Rezina and Leova. So, the country is not fully covered, and the information is not available for review as easy as this is in the neighbouring Romania.

A study covering the whole territory of Moldova for assessment of pollutant emission sources was conducted in 2020 as part of the project "COVID-19 Impact on Air Quality in Ukraine and the Republic of Moldova" performed by World from Space, s.r.o. (Czech Republic) for the United Nations Development Programme (UNDP) within the European Space Agency EO clinic framework. It contains modified Copernicus Atmosphere Monitoring Service data for 2017-2020 and modified Copernicus Sentinel data for 2018-2020, as well as data from OpenStreetMap contributors (openstreetmap.org).

The study carried out in cooperation with the European Space Agency (ESA) allowed to map the air pollution in Chisinau and the rest of Moldova, using earth observation data. The study was conducted during the COVID-19 lockdown, but it also covers rich historical datasets (2017 onwards). So, it is possible to assess the impact of COVID-19 on air pollution and whether the lockdown implies or not consistently lower levels of air pollution, particularly in dense urban and industrial areas.

Air quality is influenced by human activities, transport, industrial production and natural sources of pollutants and the historical trend is that air pollution was increasing with time, particularly in densely populated and industrial areas. The same trend was valid for Moldova's case - higher concentration of pollutants is observable only in the capital city and near large power plants. However, the overall situation of air pollution in Moldova revealed itself as a favourable one, specifically when compared to other European countries (and particularly in COVID-19 context), including Ukraine, Romania and others.

The research team used satellite data provided by Sentinel 5P – a cutting edge satellite technology equipped with latest technologies for atmospheric measurements, to analyse the main air pollutants: Ozone (O₃), Nitrogen dioxide

³² <https://www.iamat.org/country/moldova/risk/air-pollution>

(NO₂), Sulphur dioxide (SO₂), Particulate Matter (PM₁₀ and PM_{2.5}), thus revealing some interesting insights:

- > Overall, the **level of air pollution in Moldova, as seen from space, is relatively low** compared to other European countries and our neighbours, largely being within the limits of Air Quality Guidelines provided by the World Health Organization.
- > **Concentrations of nitrogen dioxide in Moldova are generally low.** This air pollutant comes mostly from cars and other motor vehicles, also oil and metal refining, electricity generation, manufacturing industries and food processing. It affects the respiratory system resistance towards bacterial and viral infections. Elevated values were observed in and around Chisinau, around the border with Ukraine, especially where the Kuchurgan power plant is located, and around the cities of Tiraspol and Ribnita. Chisinau, Bender, and Balti regions have the highest average pollution levels of nitrogen dioxide.
- > **Values of sulphur dioxide are generally low throughout the country, with only modest increase around the capital city.** This pollutant is mostly connected to coal-fired power stations, industrial processes or other fossil fuel burning activities. According to the research, the amount of sulphur dioxide in the air peaks during the winter period, is usually increasing five to ten times compared to summer, due to the heating season. In terms of impact on health, short exposure to high concentration of sulphur dioxide may cause severe breathing difficulties (most affected are asthma ill persons, children, older people and people with chronic respiratory diseases), while long exposure to low concentration may result in respiratory tract infections.
- > **The distribution of carbon monoxide is relatively similar across Moldova,** with Bender, Cahul, Glodeni and Chisinau regions having the highest average concentrations. The pollutant is a product of incomplete combustion in vehicles, heating, coal power plants, waste disposal, and biomass burning. The pollution in the Cahul area is explained by the presence in its proximity of the largest Romanian steel mill (Galati steel works). Carbon monoxide is a toxic gas, lethal in high concentrations by affecting respiratory and cardiovascular systems. At relatively low concentrations, it causes breathing difficulties, reduced physical capacity, migraines, nausea, among other symptoms.

While the study concludes that air pollution in Moldova is generally low in comparison to most European countries, it also highlights the fact that there are multiple pollutants that are not currently observed by Sentinel 5P satellite, that can be however spotted by in-site ground measurements, provided by the national air monitoring system.

To diminish the overall pollution levels and their impact in human health and quality of daily lives, it is recommended the reduction of coal plants and subsidizing fossil fuels, while focusing on green economy targets and programs aimed at achieving

them. While pollution is not always visible to the eye, it is however incorporated on a “drop by drop” basis by human bodies.

Sentinel-5P mission (S5P) is currently the most precise satellite in orbit devoted to atmosphere monitoring. It was launched in October 2017 as part of the EU Copernicus Programme³³. It carries the TROPOMI spectrometer measuring concentrations of nitrogen dioxide, ozone, formaldehyde, sulphur dioxide, methane, carbon monoxide and atmospheric aerosols with daily global coverage and a resolution of about 5.5 km x 3.5 km. The study is focused on the following three main atmospheric air pollutants: Nitrogen dioxide (NO₂), Sulphur dioxide (SO₂), Carbon monoxide (CO).

The study results are presented as a series of maps in colours indicating the key sources as pollution hotspots.

5.4.1 Nitrogen dioxide (NO₂)

Nitrogen dioxide (NO₂) is a key atmospheric pollutant produced by cars, coal power plants, oil and metal refining, electricity generation from coal-fired power stations, other manufacturing industries and food processing.

The hotspots are briefly described in the following table:

Table 5.8 Key hotspots of air pollution with nitrogen dioxide in Moldova

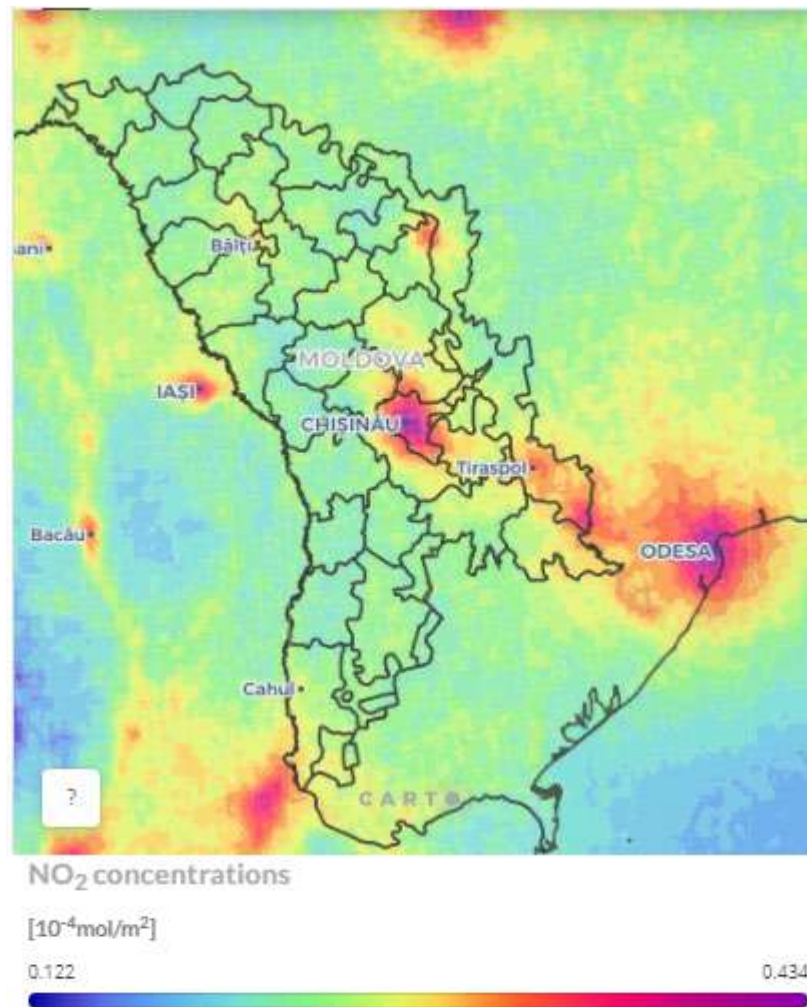
Pollution hotspot	Description
Chişinău	Economically, the city is by far the most prosperous in the country and is also one of the main industrial centres and transport hubs in the region. More information about air pollution in Chişinău could be found on Urban Pulse Moldova .
Kuchurgan power plant and Tiraspol	Kuchurgan is the largest power plant in Moldova, providing about 83% of Moldova's electricity. It burns natural gas, fuel oil and coal and has an installed capacity of 2,520 MW. Moreover, the air is also polluted due to the presence of Tiraspol, which is Moldova's second largest city.
Moldova Steel Works in Rybnitsa	Visible pollution near the city of Rybnitsa is most likely caused by the presence of the Moldova Steel Works factory. In 2018, it produced almost 502,900 tonnes of steel and 497,900 tonnes of rolled goods. It accounts for more than half of the Transnistrian industrial output.

Source: World from Space

³³ stories.worldfrom.space/air_pollution_md/

NO₂ pollution peaks during winter when it doubles the summer levels. Most polluted regions are Chişinău, Bender, Criuleni, Anenii Noi and Bălţi Rayons have the highest average pollution levels.

As indicated in Figure 5.24, there are three main hotspots of nitrogen dioxide emissions relevant for Moldova.



Source: World from Space

Figure 5.24 Map of air pollution with nitrogen dioxide (NO₂) in Moldova

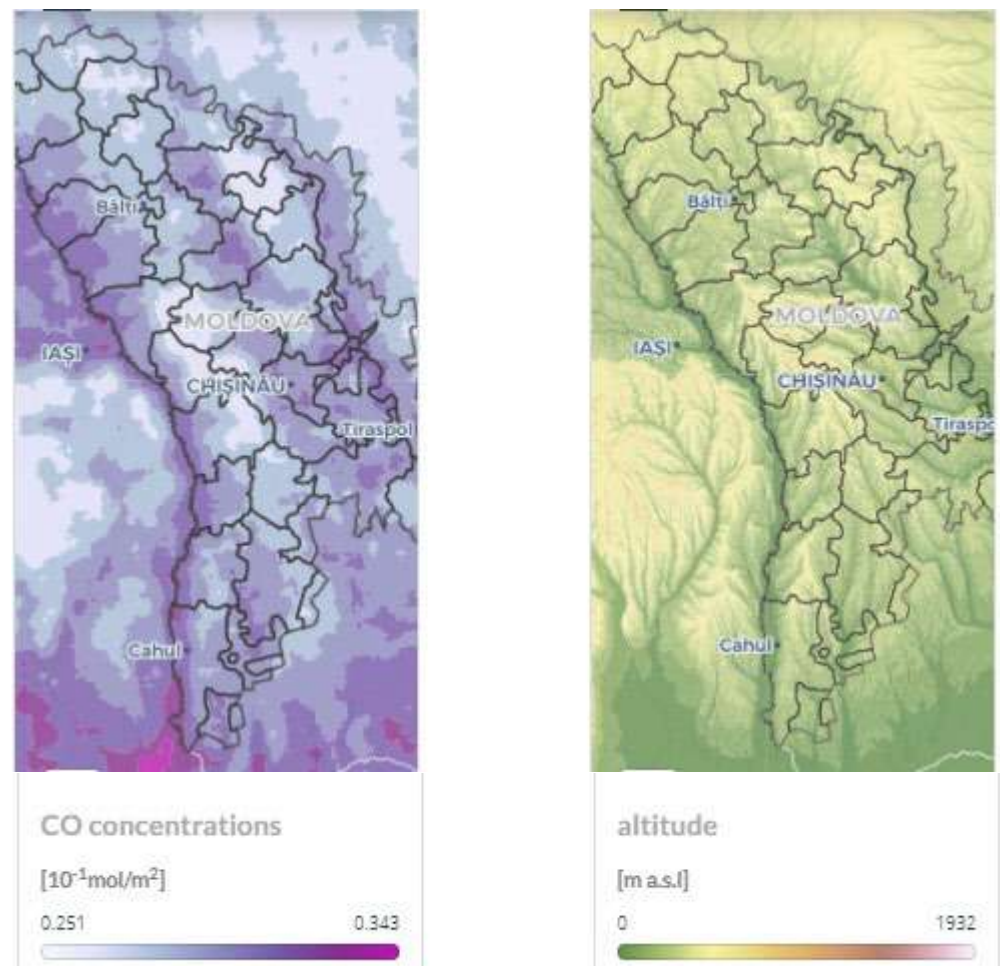
5.4.2 Sulphur dioxide (SO₂)

Only about 30% of SO₂ comes from natural sources, such as volcanoes. Human sources include coal-fired power stations, industrial processes or other fossil fuel burning (such as domestic heating). The amount of sulphur dioxide in the air also peaks during the winter. The values increase five to ten times compared to summer all across Moldova. Concentrations of SO₂ are very similar across Moldova. They are so low it is not possible to identify industrial hotspots. According to the satellite data, most affected regions include Leova, Hînceşti, Cantemir, Bălţi, Ialoveni and Ungheni Rayons show the highest mean levels of sulphur dioxide.

5.4.3 Carbon monoxide (CO)

It is a product of incomplete combustion in vehicles, heating, coal power plants, waste disposal, and biomass burning. Approximately 40% of CO comes from natural sources like volcanic eruptions, emission of natural gases and forest fires, and 60% comes from human activities.

Satellite monitoring shows us how the amount of CO in the atmosphere directly relates to altitude. Generally speaking, the higher you are, the lesser CO emissions are present. The distribution of CO is relatively similar across Moldova. Nevertheless, Bender, Cahul, Glodeni and Chişinău Rayons have the highest average concentrations. Interestingly, the situation in the Cahul region is caused mainly by the presence of the largest Romanian steel mill (Galaţi steel works), just across the border.



Source: World from Space

Figure 5.25 Map of air pollution with carbon monoxide (CO) in Moldova

According to information published by the Ministry of Environment³⁴, emissions of air pollutants have been rising in Moldova since 2010 – a trend that amplifies risks

³⁴ <https://mediu.gov.md/indicatori/capitol4en.html> (accessed 17.02.2023)

to the environment and human health. This trend is caused by the rapid increase in emissions of pollutants from road transport.

Road transport emissions have steadily risen, increasing from 146,500 tonnes to nearly 164,000 tonnes over 2010-2019 (Figure 5.26). In 2017, emissions reached about 300,000 tonnes, their highest level since 2010. Emissions from road transport are much higher than those from stationary sources. At the same time, emissions from stationary sources have been declining since 2010. Between 2010-2019, emissions from stationary sources dropped from 15,000 tonnes of pollutants to just over 14,000 tonnes.

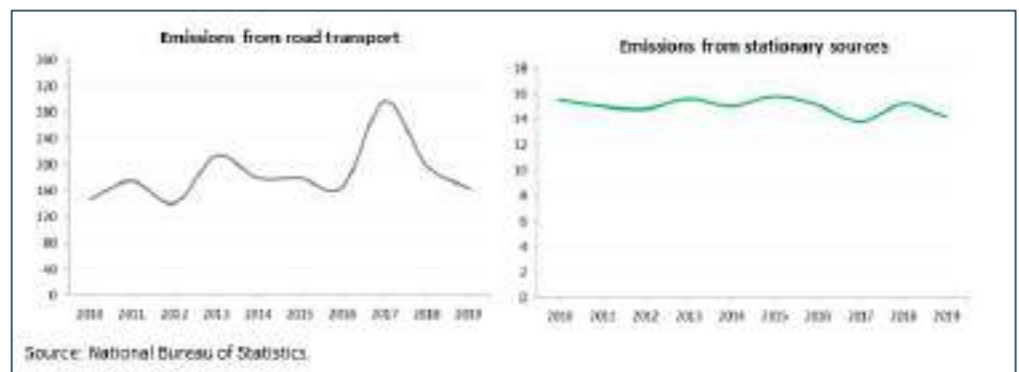


Figure 5.26 Pollutant emissions into the atmosphere (thousand tonnes)

Emissions of pollutants (nitrogen oxides and sulphur oxides) in terms of the population rate show a worrying trend. Although Moldova ranks near the bottom among European states in terms of emissions of pollutants per capita, its emissions are rising rapidly. Compared with 2014, emissions per capita grew by almost 83% in Moldova in 2019, while dropping in almost all other European countries. Only Lithuania experienced a slight increase of 3.2% (Figure 5.27). Comparing these trends to a similar EU indicator, emissions per capita in Moldova more than doubled, increasing from 32.2% to 74.6%.

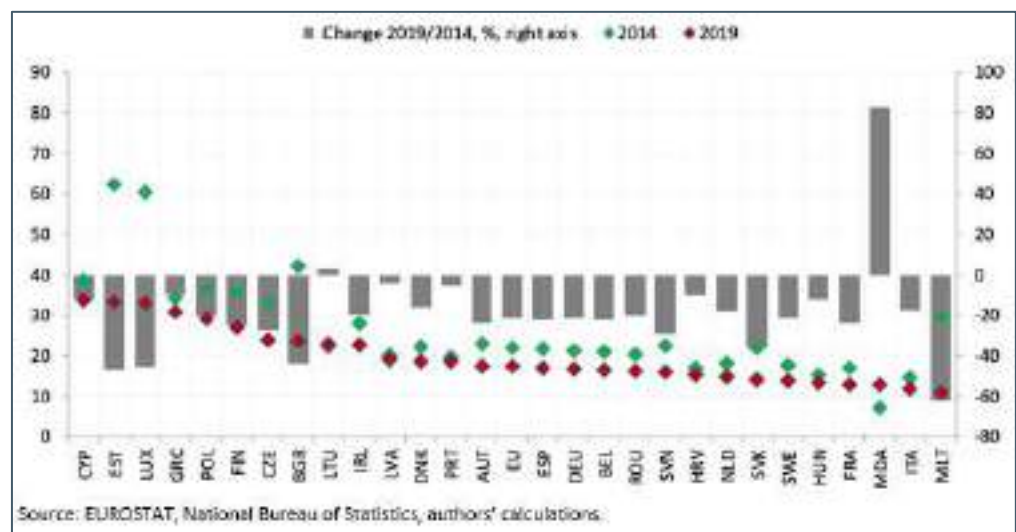


Figure 5.27 Atmospheric emissions of pollutants (nitrogen oxides and sulphur oxides) reported per capita

An overview of data on average pollution levels collected during the Word from Space study is presented in Table 5.9.

Table 5.9 Average air pollution levels in the largest towns of WMZ-1 in 2018-2020

Average air pollution levels during July 2018- July 2020			
	NO ₂ , 10-4 mol/m ²	SO ₂ , 10-3 mol/m ²	CO, 10-1mol/m ²
Cantemir	0.225	0.810	0.328
Taraclia	0.231	0.763	0.327
Cahul	0.242	0.775	0.330
ATUG	0.235	0.782	0.328

Source: The Consultant's compilation of data from World from Space³⁵

In comparison to most European countries, air pollution is generally low in Moldova. However, low average regional values do not mean there might be local hotspots, where pollution levels are significantly higher. Moreover, other pollutants not observed by the Sentinel 5p satellite can severely affect human health. Only in-situ ground measurements (with sensor networks) are able to unveil such pollution.

The statistical data for 2016-2020 on emissions of air pollutants in Moldova, in SDR and ATUG are included in the following table:

Table 5.10 Emissions of air pollutants from stationary sources of economic entities, tons

Administrative unit	2016	2017	2018	2019	2020	2016 to 2020, % of 2016
SDR, including the Rayons:	1,880.5	2,039.1	1,992.0	2,024.2	1,840.6	-15
Basarabasca	179.5	313.2	239.6	264.7	235.7	-70
Cahul	315.5	310.1	355.9	365.5	333.6	13
Cantemir	134.8	102.9	114.6	145.8	83.5	-44
Căușeni	293.7	285.4	369.4	407.9	457.4	50
Cimișlia	251.3	236.6	292.4	276.1	256.7	-12
Leova	267.7	361.7	314.2	216.2	215.9	-20
Ștefan Vodă	241.6	187.2	178.1	180.6	158.0	-48
Taraclia	196.4	242.0	127.8	167.4	99.8	-39
ATUG	594.6	571.7	380.2	339.3	442.2	-16
Moldova, Total	15,761.8	15,109.4	13,802.1	15,167.6	14,159.2	-5

Source: Statistical DataBank of Moldova

³⁵ worldfrom.space/air_pollution_md/ (accessed 15.02.2023)

5.5 Hydrology

5.5.1 Surface water bodies

In Moldova there are few large rivers having a high flow, while there are many medium and small rivers. The river network includes 3,085 rivers that flow permanently and temporarily; of them only 240 have a length exceeding 10 km and only eight rivers— Nistru, Prut, Raut, Ichel, Bîc, Botna, Iaplug and Cogîlnic have the lengths of more than 100 km. Geological and climatic conditions have favoured the development of a fairly dense hydrographic network in the region, consisting of rivers and rivers with rather low flow rates showing considerable fluctuations within a year.

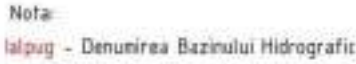
Areas of the SDR and ATUG included in WMZ-1 mainly belong to the Prut River hydrographic basin. The length of the Prut River (tributary of the Danube) is over 980 km (with 695 km located within Moldova). The area of the Prut river basin is 27,540 km² (8.2 thousand km² within Moldova), the average width is 51 km, in the lower course of the river basin narrows to 2 km at the Prut's confluence with the Danube. The medium and lower sectors of the Prut valley are located on the territory of Moldova, and the upper sector is located within the Ukrainian Carpathian Mountains. The monthly average flow within a year is 50.9 m³/s (monthly average values range from 17.6 m³/s up to 96.8 m³/s), the absolute maximum is 468 m³/s (19.11.1995), the absolute minimum is 11.2 m³/s (30.11.1992) The Prut River's bed is clean (it is not covered by aquatic plants), the bottom is irregular, covered with sand and pebbles, includes numerous islands and sand banks. The depth is about 1-2 m, in the deepest parts of the bed the river depth is 4 to 6 m. The typical water velocity is 0.4 to 2 m/s. The Lower Prut Natural Park associated with the river is located in the southern part of Moldova.

Besides the Prut, rivers draining the territories included in WMZ-1 include the left tributaries of the Prut: Cahul (length 39 km), Salcia Mică (37 km), Ialpușel (45 km), Lunguța (12 km), Sărata (59 km) and Tigheci (43 km). Water from the Prut and other rivers is used for irrigation of agricultural lands.

The Cahul Rayon is mostly belonging to the Put and Cahul River basins but is also partially located within the hydrographic basin of Frumoasa Crihana and Larga Rivers. The Cantemir area is located within the hydro-graphic basins Tigheci and Larga. The largest basin that is located mostly in the Taraclia and ATUG area is that of the Ialpușel River basin (see Figure 5.28).

Natural lakes in the WMZ-1 area include Belevu, Dracele, Manta, Rotunda. Other surface bodies include ponds and other artificial water reservoirs.

Lake Belevu – a relic from other times long passed with a length of 5 km, width of 2 km and a depth of 0.5 – 2 meters is one of Moldova's biggest natural lakes. The lake dates back almost 6,000 years, when much of the Danube Delta was still under the waters of the Black Sea. The lake is annually hosting the flocks of migrating pelicans in their journey to the Danube's delta.



Source: EIA, 2015

Figure 5.28 Map of river basins on the territory including WMZ-1

5.5.2 Quality of surface water

Systematic monitoring on the chemical and ecological quality of surface waters in the Republic of Moldova was during many decades carried out by the State Hydrometeorological Service (SHS) operating a network of 49 control stations on 16 rivers, 5 water reservoirs, 3 natural lakes and one estuary. Water samples were collected on monthly bases for analyses per 7 groups of quality indicators including, inter alia, the content of *dissolved oxygen (O_2)*, *BOD₅*, *organic substances*, *petroleum products*, *detergents*, *phenols*, *orthophosphates*, *phosphorus*, *ammonium ions*, *nitrites*, *nitrites and nitrates*. The data of analyses were compared with the established maximum allowable concentrations. The statistics of actual concentrations exceeding the established thresholds is not available. Due to reorganisation of the governmental agencies, no information is available on the ongoing water quality monitoring programmes.

5.5.3 Surface water protection zones

According to Law No. 440 of 27.04.1995 on areas and strips for the protection of water from rivers and other water bodies, the following *protection zones and strips of water* protection shall be established in accordance with Article 440:

- Along the banks of rivers and water bodies, water protection zones shall be established at least 500 metres wide from the edge of the riverbank on the banks, but not further from the water;
- For meadows (with permanent or temporary water current) along the banks, the water protection zone with a width of at least 15 metres on both banks shall be established.
- The width of the water protection zones of the Dniester, Prut and Danube rivers is at least 1,000 metres.

The water protection zone of rivers and other water bodies includes the river meadow, the first over-the-mountain terraces, the steep edges and peaks of the main banks, rivers and valleys that enter directly into the river valley. A special regime of economic activity shall be established in the water protection zone of rivers and other water bodies. In the case of the use of surface water sources for centralised water supply in order to meet the needs of drinking water in water abstraction sites, sanitary protection zones shall be established, which shall provide for a special operating regime.

Estimated distances from the sites selected for the establishing the key infrastructure facilities in WMZ-1 within the Project are indicated in the maps included in the following figures prepared during the EIA in 2015. As could be concluded basing on the estimated distances per Figure 5.29 and Figure 5.31 the Cahul site (currently proposed for the regional landfill, sorting station and composting station), the Cania site (currently proposed for TS in Cantemir Rayon) and the Taraclia site (currently proposed for TS in Taraclia Rayon) are located at distances of a few kilometres from the nearest permanent water bodies, i.e. outside protective zones of any water bodies.

As for it is located between two rivers within a distance of less than 700 m from the nearest river (see Figure 5.30). This location should be taken into consideration during establishment and operation of the Nisporeni TS, as well as during the closure and remediation of the existing Nisporeni waste disposal site.

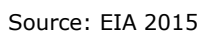
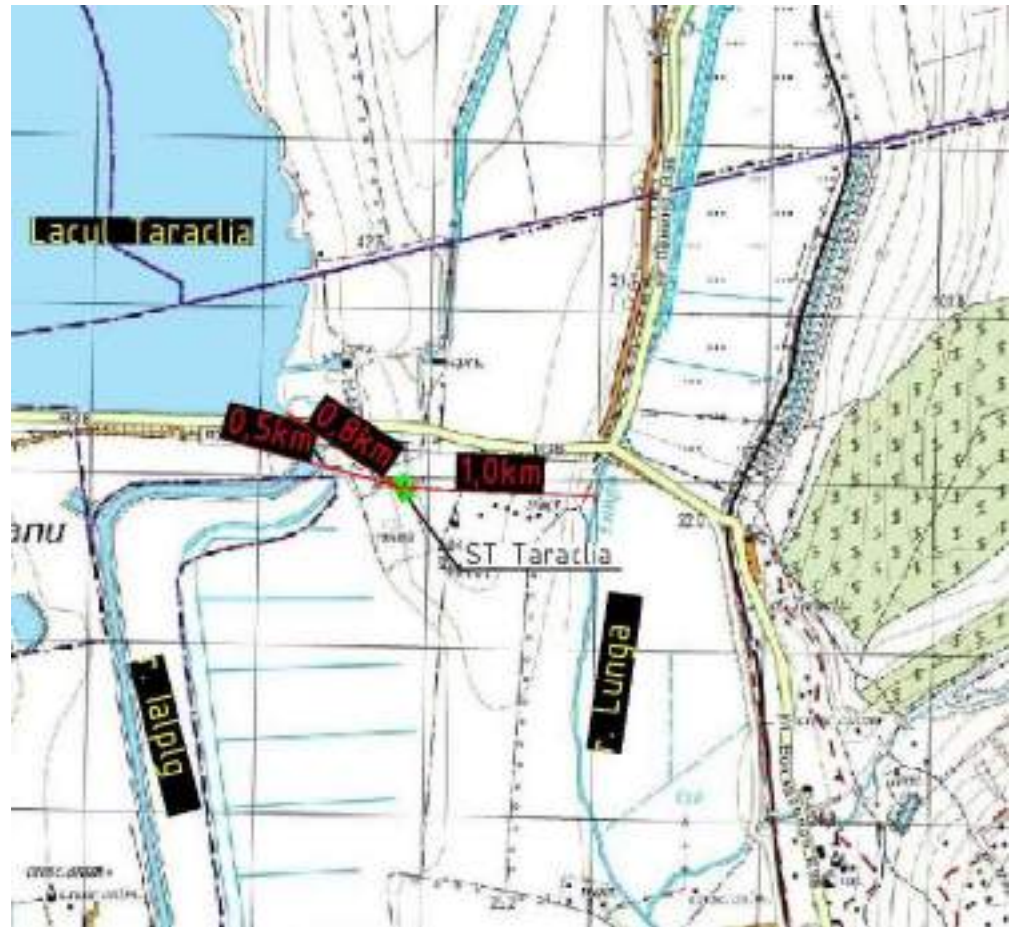


Figure 5.30 Distances from Cania TS site to the nearest permanent surface water bodies



Source: EIA 2015

Figure 5.31 Distances from Taraclia TS site to permanent surface water bodies

5.6 Geology and geomorphology

5.6.1 Geological conditions in WMZ-1

The geological structure of the area includes continental and marine formations of different ages. The uppermost geological structures and the basic current geomorphological features were formed in the Neogene and the Quaternary time. The Neogene deposits spread throughout the territory of SDR and ATUG and cover the older formations.

The Miocene (lower Neogene, N_1) deposits are subdivided into the Meotian series, the Sarmatian- Meotian series, and the Sarmatian series. As represented in the geological map of the Republic of Moldova (see Figure 5.32), the Meotian series (N_{1m}) is represented by delta deposits: clays and fine sands, with some very rare traces of iron. The Sarmatian-Meotian series (N_{1s-m}) is represented by layers of grey, greenish and mottled clay, sands, sandstones, conglomerates. The Sarmatian series (N_{1s}) are the poly-facial layers of clays, sands, marls, reef deposits with some traces of iron.

The Pliocene deposits (upper Neogene, N_2) are represented by the alluvial sediments of the terraces of the Prut river.

Quaternary deposits (Q_{I-III}) are present on the slopes of river valleys including the first six terraces above the floodplain. The deposits include loam, sandy loam, sand with layers of gravel and pebbles. The deposits have a thickness of up to 20 m. Contemporary deposits (Q_{IV}) include alluvial deposits in the floodplains of rivers (sandy soils, mud with inclusions of gravel and pebbles) and alluvial-deluvial formations of the bottoms of ravines (loam, sand, gravel). The thickness is of 10-14 m.

The key geomorphological features include interfluvial systems of river terraces and a network of ravines and valleys cutting the plateau-like areas, where the slopes are affected by landslides.



Source: Atlas Physical and Human Geography of the Republic of Moldova. Chisinau, 2015

Figure 5.32 Geological map of Moldova

5.6.2 Seismicity

According to the seismic map of the Republic of Moldova (Figure 5.33) the proposed landfill site is located in an area (marked as ZMD3) characterised by level 8 out of 9 levels (level 1 in the zoning means low seismic activities, level 9 means high seismic activities). Furthermore, the map shows that the whole Project area is located within the zone of level 8. However, a better location from the seismic point of view cannot be found in the WMZ-1. Thus, there is a risk of earthquakes in the area. International geotechnical regulations do not require particular improving measures for landfills in zones with an increased risk of earthquake.

However, the seismic risk needs to be considered in the landfill design (stability analysis) and the required quality of construction works, landfill operation and monitoring of the landfill settlements.



Source: EIA, 2015

Figure 5.33 Seismic map of Moldova

5.6.3 Mineral resources in WMZ-1 area

The mineral deposits in the area are mainly represented by sedimentary formations suitable for the production of building materials – limestone, marl, clay (including bentonite), sand and gravel. Some of the materials could be used for the construction of regional sanitary landfill and other infrastructure included in the proposed project. Information about some of the deposits is presented in

Table 5.11 Deposits of mineral construction materials within WMZ-1 area

Rayon	Location	Mineral material
Cahul	Cahul, 3 km to the South-East of the city	Sand
	Frumusica, 2.2 km South-East of the village	Sand
	Tatarca Mare Valley	Sand
	Manta, 1.5 km to the South-East	Sand
	Taraclia de Salcie, northern border	Loam
	Colibaş, 2 km to the South-East	Loam
	Rosu, northern border	Clay
Cantemir	Tartaul, the eastern border of the village	Loam
	Capaclia - 1 km to the North-East of the village	Gravel
	Cociulia, the north-eastern border of the village	Clay, sand, keramzit clay
	Thesmall, 0.1 km North-East of the village	Clay, including bentonite clay
Taraclia	Tvardiţa, 1 km North-East of the village	Clay
	Albota de Sus, 1 km North-East of the village	Loam
	Taraclia, 1,6 km East from the railway station	Loam, argillite

Source: COWI on the basis of EIA, 2015

5.7 Groundwater

According to the information presented in the EIA prepared in 2015, the shallow groundwater aquifers in the southern part of Moldova are encountered in alluvial deposits within the valley of the Prut and smaller rivers.

The deeper aquifers include the Pontian (N_{2p}) aquifer present within the area south of Cahul. The aquifer comprises two layers of fine sand separated by a clay layer having a thickness of 1 to 20 m. The water quality meets the drinking water quality requirements, by cases of contamination by ammonia (up to 6 mg/l) and nitrates (over 50 mg/l) have been reported. The groundwater of the aquifer flow direction coincides with the immersion of the Pontian deposits towards South-West with discharge within the Prut River valley. The aquifer's recharge by precipitation is supplemented by leakage from the underlying Sarmatian-Meotian (N_{1s3-m}) aquifer associated with the lenses of sand having a thickness of 1 to 15 m embedded in the clay series. The aquifer immersion towards South-West leads to increase of artesian pressure. The water quality is characterized by total dissolved solids values of 1 to 3 g/l. A number of deeper aquifers are characterized by total dissolved solids values up to 70 g/l, and in some locations (e.g. in Gotesti) are considered as low-thermal with the water temperature of up to 42°C.

Groundwater is used for water supply (mainly from the upper aquifers) and for balneological purposes. The groundwater intakes have sanitary protective zones establishing the regulatory restrictions for economic activities that could potentially affect the intakes.

5.7.1 Hydrogeological description of sites proposed for SWM infrastructure in WMZ-1

The selected sites are located outside sanitary protective zones of any groundwater intakes.

Cahul site

The site is located next to the existing dumpsite, borrow pits remaining after excavations of sand and clay, as well as a ravine formed within a high terrace of the Prut river. The ravine allows to get an overview of deposits (loam, sand, clay of Sarmatian-Meotian age) present within the site. There is a need for a more detailed hydrogeological study for the landfill site to verify availability of natural layer with low permeability (e.g. clay) within the site. According to Annex 11 to the FS of 2015, the four boreholes (see Figure 5.34) drilled in 2014 to the depths of 8m (borehole 1) and 7m (boreholes 2, 3 and 4) within the site selected for landfill near Cahul have encountered layers of loam deposits of various thickness in all boreholes. However, clay deposits were encountered only in one of the four drilled boreholes – in borehole 1 (at drilling depth interval 5.5m – 8.0m). No loam or clay, but only sand deposits were encountered in borehole 3 (drilling depth – 7.0m) located within the area preliminary planned for Cell 2 of the landfill.



Source: GIZ, FS 2015

Figure 5.34 Location of boreholes drilled during investigations at Cahul site in 2014

The boreholes were located along a stretch of about 400m, no geological profile was presented in the available documents, but the variety of drilling results indicates the risks of major variety of the soil conditions within the site and absence of low permeability deposits (clay) required as a natural base layer for construction of regional sanitary landfill in compliance with the EU landfill directive.

The EIA of 2015 states that a thick layer of clay present within the site ensures protection of the deeper regional aquifers used for water supply.

Cania and Comrat sites

Soil conditions are assessed as suitable for establishment of the TS facilities. No information is available on hydrogeological investigations performed on these two site sites proposed for transfer stations.

Taraclia site

The site is located on the left side of the Ialpugul Mare river valley, within the second and third terraces above the floodplain. It was earlier used as part of an animal husbandry facility. Remains of concrete structures and sewage pipes at depth 1.5-2 m have been observed within the site territory. Groundwater has been encountered at the depths of more than 5 m.

The proposed infrastructure for WMZ-1 shall be designed, constructed and operated observing the protection zones of surface water bodies and intakes of surface water and groundwater in adjacent areas. The protection zones will be clarified at the design stage.

5.8 Biodiversity

The southern part of the country is characterized by a high degree of disturbance to the natural ecosystems (about 2/3 of the land is used for agricultural needs and could be seen as agriculture ecosystems). The areas of natural steppe and meadow ecosystems are smaller and heavily damaged. Forest ecosystems cover about 365,000 ha (11%) of Moldova's territory. Out of them about 10% are located in the SDR Rayons included in the WMZ-1 (18,313 ha in Cahul Rayon, 13,127 ha in Cantemir Rayon and 5,467 ha in Cahul Rayon).

5.8.1 Flora

Moldova's flora includes 5,568 species of plants. More than 30 species of woody plants are an important source of livelihood for the rural population, approx. 200 species are medical plants and approx. 700 species of wild plants serve as food for wild and domestic animals.

About 320 species of higher plants are encountered on the territories of SDR and ATUG. Places of high concentration of aquatic and marsh plant species are the scientific reserve "Lower Prut", lakes Manta and Branza. About 170 species (main families Poaceae - 20, Cyperaceae and Lamiaceae) were identified in the scientific reserve "Lower Prut".

Bush plants (xerophytes semi-shrub) predominate in the steppes of the area. On sandy-loam soil slopes the widely represented species include "barboasa" (*Bothriochloa ischaemum*) involving semi-shrub "jugarel" (*Teucrium polium*, *T. chamaedrys*), Austrian wormwood (*Artemisia austriaca*), grooved milk (*Euphorbia seguieriana*) and others.

Some of the plant species (e.g. ambrosia) pose risks for the human health in Moldova. A leaflet published in 2019 via the website of MARDE including, inter alia, the photos presented in provides information about the risks and nuisance associated with this plant and contains recommendations for actively combatting ambrosia, e.g. by mechanical cutting and chemical methods.



Source: MARDE, 2019

Figure 5.35 A set of photos from information published by MARDE about ambrosia impacts and combat programme

5.8.2 Fauna

Fauna species in WMZ-1 are typical for the disturbed habitats in agricultural and built-up areas of Moldova. Diversity of natural fauna species is protected within designated areas of various types as described in Section 5.9.

5.8.3 Natural ecosystems and vegetation types in WMZ-1

Within the sites proposed for SWM infrastructure facilities in WMZ-1 no flora and fauna species have been found that are rare, vulnerable and endangered species included in the Red List of the Republic of Moldova and covered by the international treaties on biodiversity to which the Republic of Moldova is a party.

As the Project activities are expected to be carried out during daytime, no information has been collected about presence of bats, which are mostly active during nights. Additional information could be collected regarding the populations of crow family birds (e.g. jackdaw *corvus monedula*) and birds of prey, as these could be potentially affected by the landfill operations.

5.9 Protected nature areas

The flora of Moldova includes about 5 500 species of plants, 208 of which are included in the most recent edition of the Red Book³⁶. With respect to fauna, the country has approximately 17,000 species of animals, 219 of which are under threat of extinction and included in the Red Book.

The Red Book of Moldova is normally updated every ten years following reassessment of the conservation status and geographical distribution of wild flora and fauna species. The latest edition dates from 2015 and practically doubles the number of protected species (Figure 5.36). The status of amphibians and reptiles is especially alarming. Of the total number of species, 64% of amphibians and reptiles are threatened with extinction, followed by 40% of mammals and 22% of birds. More species in these categories risk extinction without urgent and effective measures.

The status of fish resources is similar with 27% listed as endangered species. From an aquatic biodiversity point of view, the Nistru and Prut rivers are undoubtedly the richest in fish resources. While industrial fishing has been banned for many years, poaching and uncontrolled fishing are depleting these resources. In practice, state institutions and control mechanisms lack capacity to monitor activity, whether it is sport fishing, recreational fishing or commercial fishing.

³⁶ <https://mediu.gov.md/indicatori/capitol3en.html> (accessed 17.02.2023)

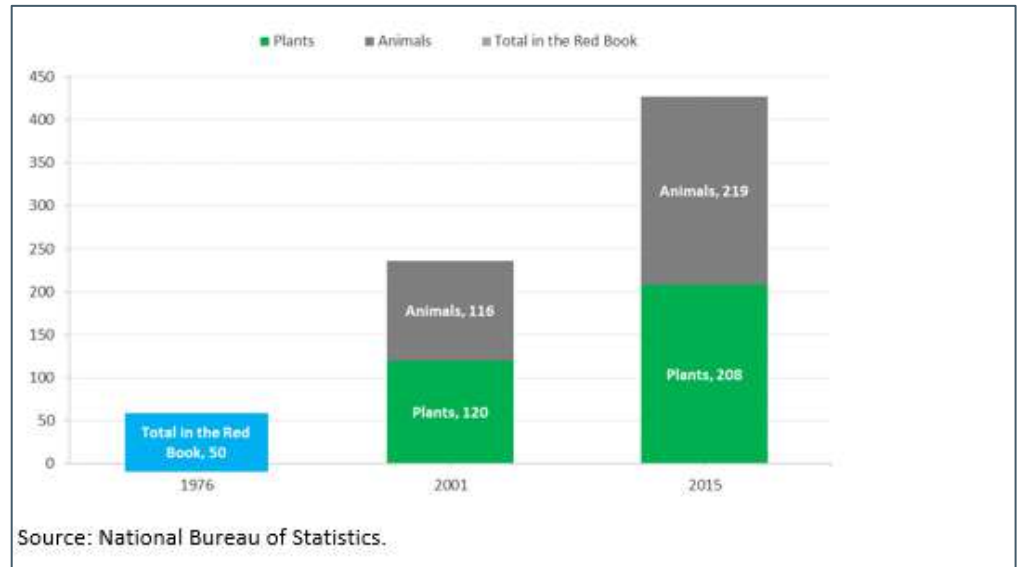


Figure 5.36 Protected plant and animal species (included in the Red Book)

Protection of nature areas valuable for biodiversity conservation in Moldova is regulated by the following key legal acts:

- > Forestry code;
- > Law No. 1538-XIII of 25 February 1998 on the Fund of State Protected Nature Areas;
- > Law on environmental protection;
- > The law of the animal kingdom;
- > The Law of the Vegetal Kingdom;
- > Law on the Red Book of the Republic of Moldova;
- > National Strategy and Action Plan on Conservation of Biological Diversity;
- > Decision No. 211 of 13.03.2009 on the approval of the Regulation for the Cadastre of objects of the vegetal kingdom.

The most valuable protected nature area in the southern part of Moldova is the Lower Prut ("Prutul de Jos") state-owned nature reserve located in the Cahul Rayon near Slobozia Mare village. According to BirdLife International, the Lower Prut nature reserve is the most important wetland area from Republic of Moldova, especially for breeding and migration³⁷. The water body of Beleu Lake comprises two thirds of the reserve. The remaining part is covered by the meadow and floodplain flora including 270 species of vascular plants. The fauna is specific to aquatic ecosystem that serve as a nestling place for birds, and during the seasonal migration period this water ecosystem serves as a place of resting and food for migratory birds. Some bird species, such as swan, red breasted goose, pelican, great white egret and others are under state protection. The aquatic ecosystem of the reserve is appreciated unanimously as one of the most important wetlands of the Republic of Moldova, which besides the status of scientific reserve also has the

³⁷ datazone.birdlife.org/site/factsheet/lower-prut-river-and-manta-beleu-lake-iba-moldova (accessed 17.02.2023)

status of wetland of international importance (the Ramsar site with registration number 1029).



Source: BirdLife International, 2023

Figure 5.37 Borders of Lower Prut protected nature area in southern Moldova

The site selected near Cahul for regional sanitary landfill of WMZ-1 is located at a distance of 40 km from the Lower Prut reserve, which is the nearest protected nature area to the site.

The site for Cania TS in Cantemir Rayon is about 25 km far from the nearest protected nature area represented by the forest massif management by Moldsilva Agency close to the landscape reserve Cordi Tigheciului (continuation of Codrii Moldovei Centrale) including 9 species of rare plants included in the Red List of Moldova. The TS sites in Taracia and Comrat are proposed within sites not affecting the forest areas and protective strips, while no protected nature areas are located within 10 km distance from the sites.

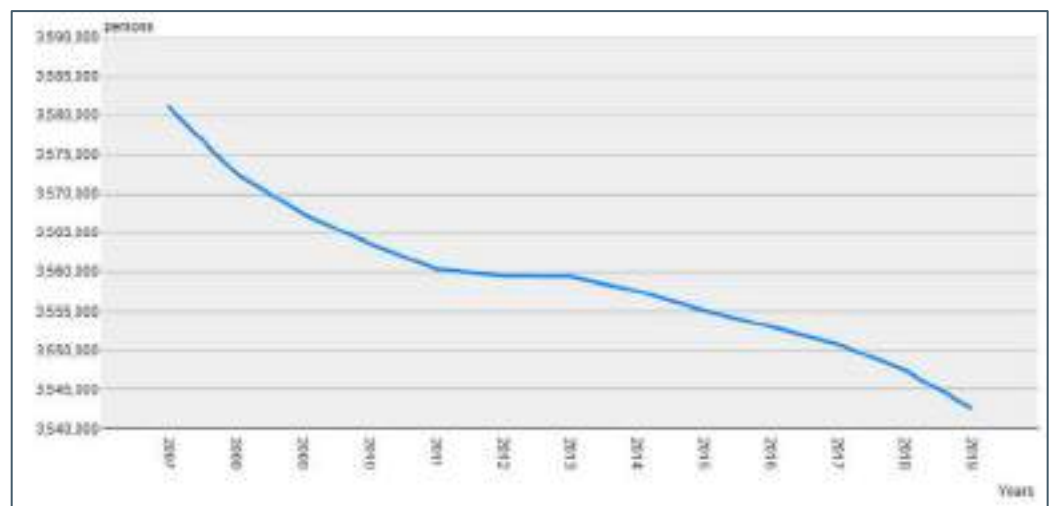
SWM facilities planned for WMZ-1 shall be established and managed taking into consideration the nature protection requirements of national and international regulatory documents.

6 Socio-economic conditions and infrastructure in WMZ-1

6.1 Population

In general, there is no reliable information on the number of people permanently resident in Moldova and the number of people having the Moldovan citizenship, but mostly resident/working abroad. In the data available from the National Bureau of Statistics (NBS) the population number and relative indicators are estimated using the number of the population with habitual residence. The usual residence is defined as the place where the person has lived predominantly in the last 12 months regardless of temporary absences (for the purpose of recreation, vacation, visits to relatives and friends, business, medical treatment, religious pilgrimages, etc.).

The graph in Figure 6.1 shows the population decline trend in Moldova from 2007 to 2019.



Source: NBS

Figure 6.1 Resident population of Moldova, as of January 1 in 2007-2019

In 2019, the depopulation process of the Republic of Moldova continued. Thus, the net migration of the population with habitual residence in 2019 had a negative value (- 38.2 thousand persons), as in previous years, being at the same time decreasing compared to 2018 (- 41.8 thousand people). Information on population development in 2019-2022 is presented in Table 6.1

Out of the total emigrants, about 43% were own young people in the age groups 20-29 years and 30-39 years, 21% and 22% respectively. A similar situation is specific in the case of immigrants, the same age groups hold a share of about 42% of the total, (19% for the age group 20-29 years and 23% for the age group of 30-39 years).

Table 6.1 Usual resident population³⁸ of Moldova, as of January 1

	2019	2020	2021	2022
Total population, persons, thousand	2 684,8	2 643,7	2 626,6	2 603,8
by age group, in %:				
0-14	18,7	18,5	18,3	18,2
15-59	60,5	59,8	59,3	59,1
60-79	18,5	19,3	20,0	20,4
80+	2,3	2,4	2,4	2,3

Source: Moldova in figures, 2022

Urbanization in Moldova is a continuous phenomenon that is characterized by a growth in the urban population in the context of an overall reduction in the country's total population. Even though the country's stable population as per 1 January 2019 was 38,400 persons less than per 1 January 2007, the population of Chisinau municipality in the same period increased 52,600 persons including (37,000 persons in the city itself (increase of 5.6%) and 15,500 in the suburbs (increase of 12.8%). This clearly indicates a trend towards concentration of Moldova's population in the capital city. It is also estimated that the municipality population also hosts at least additional population of 4.5-5 per cent due to people commuting to the city on a daily basis³⁹.

As stated in National Report of the Republic of Moldova for United Nations Conference on Housing and Sustainable Urban Development HABITAT III (2016)⁴⁰ the average density of population in cities is 2.600 inhabitants / km². In Chisinau this indicator is 5500 inhabitants / km², in Balti - 3500 inhabitants / km². In urban residential areas the density of population varies depending on the type of constructions. It may be 20-60 people / ha in individual homes neighbourhoods and 200-450 people / ha in apartment blocks areas. Overall, the urban density of Moldovan towns is quite high compared to other Eastern European countries. An overview map of urban centres in Moldova is presented in Figure 6.2.

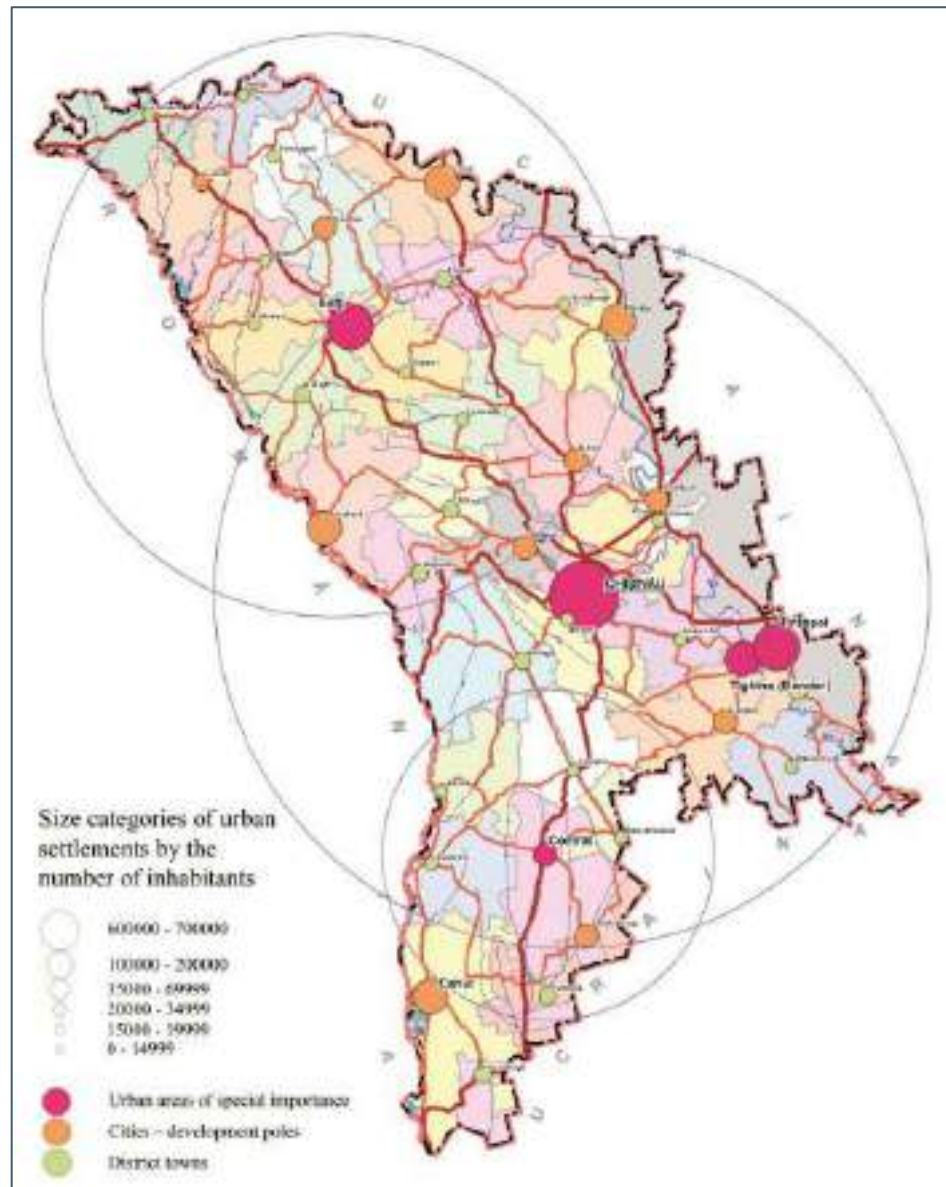
Currently the towns of Moldova, and especially the capital city, have depleted the reserves of land for the expansion of built space. This causes social tensions. The development along the capital - regions and urban - rural axes is disproportionate. To make the most of the economic potential of small towns and to mitigate the effects of misbalanced development of settlements is a big challenge for Moldova.

³⁸ Usual resident population – the number of people who have lived mainly on the territory of the Republic of Moldova for the last 12 months, regardless of temporary absences (with the purpose of recreation, holiday, visits to relatives and friends, business, medical treatment, religious pilgrimages, etc.).

³⁹ UNDP

⁴⁰ https://habitat3.org/wp-content/uploads/Raport-Habitat-III_-eng.pdf

Regional development is an important part of the Association Agreement between Moldova and the EU. The Government has committed to distribute chances for sustainable development throughout the country fairly, as small towns are extremely important elements in promoting economic and social territorially balanced development, particularly due to their role of a link between urban and rural areas.

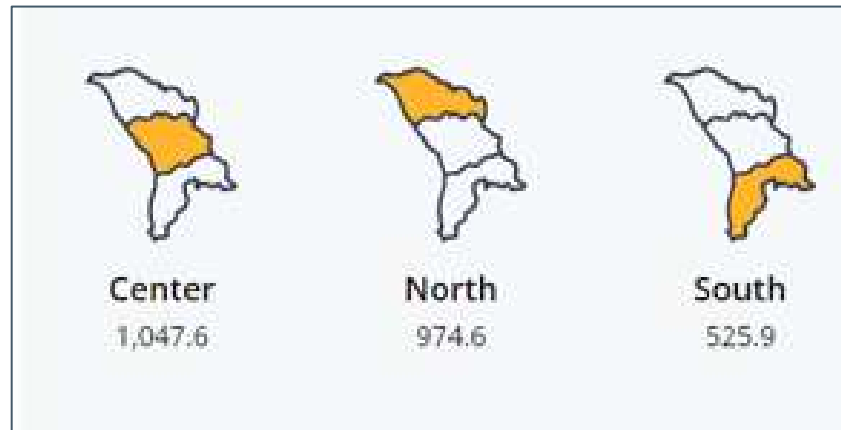


Source: https://habitat3.org/wp-content/uploads/Raport-Habitat-III_-eng.pdf

Figure 6.2 Categories of urban settlements in Moldova by number of inhabitants

Some small towns used to be villages in recent history and acquired the status of towns while developing their functions as centres of agricultural production processing. The village - town linkages remain very tight both at macroeconomic level and at the level of human relationships within families. Due to these connections, density of the settlements network and small size of the territory of Moldova, the limits of peri-urban agricultural areas are rather vague.

Population distribution between the three statistical regions in Moldova in 2019 is indicated in Figure 6.3. The statistical region South (including the Rayons of Leova, Cimislia, Basarabeasca, Causeni, Stefan Voda, Cantemir, Taraclia, Cahul and ATU Gagauzia) has lowest population among the three regions.



Source: GenderPulse⁴¹

Figure 6.3 Population in the three Statistical Regions of Moldova in 2019

Information on population of the areas (out of the statistical region South) included in WMZ-1 is presented in Table 6.2. About 34% of population in WMZ-1 (and 34% in Moldova) live in urban areas while 66% of population in WMZ-1 (and 66% in Moldova) live in rural areas. The share of urban population in ATUG is 41%, while in SDR it is 27%.

Table 6.2 Resident population in WMZ-1, as of 1 January 2019, persons

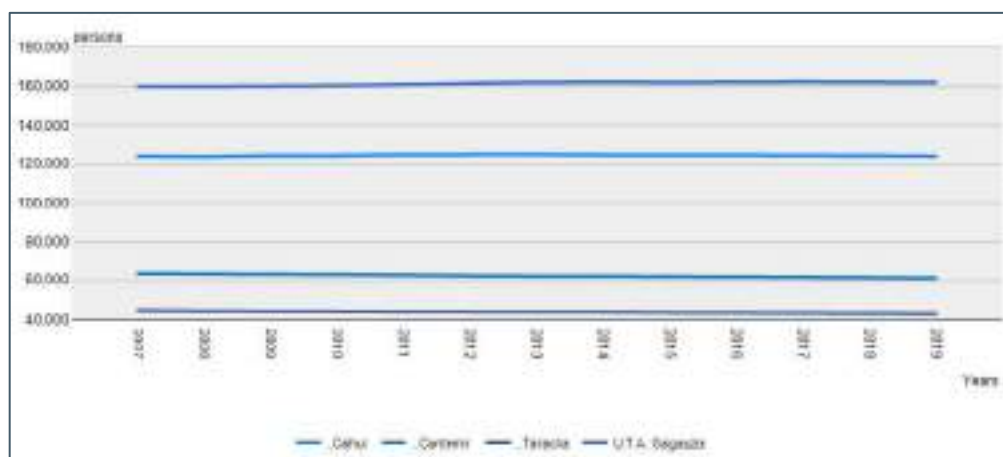
	Total	Urban	Urban, % of total	Rural
SDR	525,928	140,842	27	385,086
...Cahul Rayon	124,091	39,431	32	84,660
...Cantemir Rayon	61,317	5,746	9	55,571
...Taraclia Rayon	43,179	20,726	48	22,453
SDR Rayons in WMZ-1	228,587	65,903	41	162,684
ATUG	161,676	65,942	41	95,734
Total in WMZ-1	390,263	131,845	34	258,418

Source: COWI basing on the data from NBS

Cahul city is the largest urban settlement in the three Rayons of SDR included in WMZ-1, and Cahul Rayon has the highest population number. The highest percentage of the urban population in these Rayons is in Taraclia Rayon (about 48%), and the lowest is in Cantemir Rayon (about 9%).

Graphs included in Figure 6.4 show an overview of the population size and development in 2007-2019 in the areas included in WMZ-1.

⁴¹ <https://genderpulse.md/en/demography/population-structure/number-of-resident-population-in-territorial-profile>



Source: NBS

Figure 6.4 Population of areas included in WMZ-1 (as per 1 January 2007-2019)

As could be seen in Table 6.3, one-person households dominate in Moldova in general, as well as in the statistical region South. And the share of one-person households shows a clear trend to increase in 2014-2019 both in Moldova and in the statistical region South.

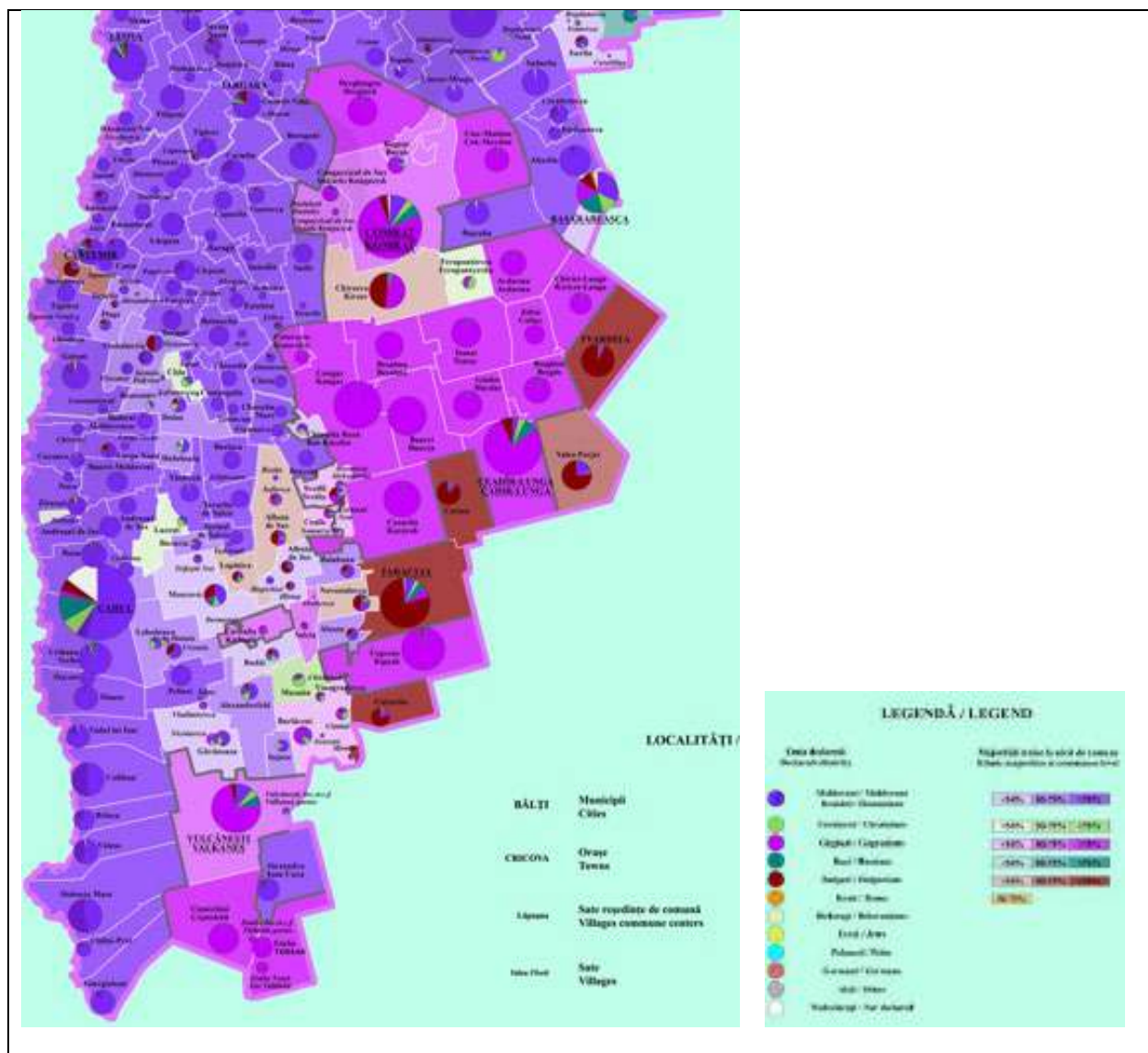
Table 6.3 Household structure in Moldova and in statistical region South by household type, percent

	2014	2015	2016	2017	2018	2019 (i)
Moldova						
One person	25.5	27.4	28.3	28.9	33.6	30.9
Family couple without children	22.1	21.7	21.8	24.1	21.8	22.3
Other households without children	17.2	17.0	16.7	14.6	12.8	15.3
Family couple with children	17.4	18.9	18.2	18.0	18.1	17.8
Single parent with children	2.3	1.9	2.5	2.1	2.3	2.4
Other households with children	15.5	13.0	12.5	12.4	11.5	11.3
Statistical Region South						
One person	25.7	26.8	29.9	26.3	33.2	31.3
Family couple without children	19.9	19.6	19.8	26.0	22.2	25.8
Other households without children	17.9	19.2	15.8	16.5	13.2	13.9
Family couple with children	15.9	15.4	17.1	15.6	16.3	14.6
Single parent with children	1.2	0.9	1.4	2.0	1.0	1.6
Other households with children	19.4	18.1	15.9	13.5	14.1	12.7

Source: statistica teritoriala 2020

Ethnic structure of population in the Rayons included in WMZ is presented in Source: NBS, population and housing census, 2014

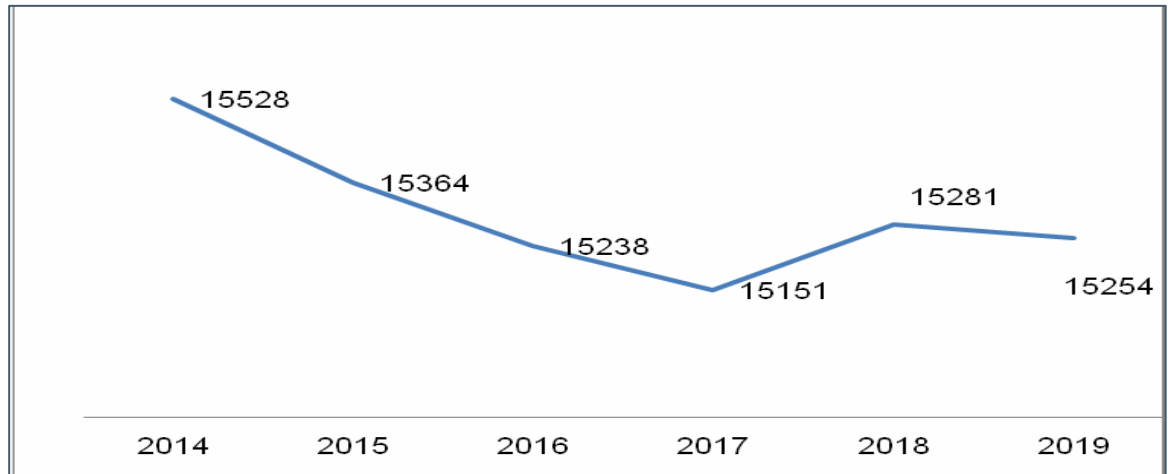
Figure 6.5. The structure ATUG is remarkable as indicating high percentage of Gagauzians and Bulgarians, which differs this part of Moldova from its other parts.



Source: NBS, population and housing census, 2014

Figure 6.5 Ethnic structure by settlements and Rayons in WMZ-1

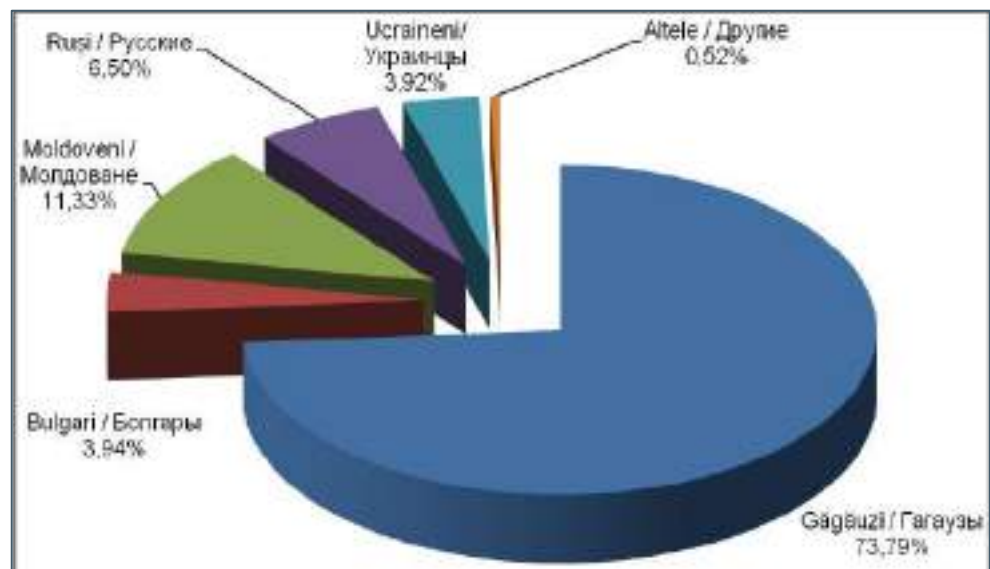
Data available at the locality/Rayon level in WMZ-1 also show a decrease of population. For example, in 2014-2019, population of Vulcanesti town in ATUG decreased from 15,528 to 15,254 people, which is the reduction of 1.7% of the total population (see Figure 6.6).



Source: Strategy of Socio-Economic Development of the City of Vulcanesti for the period 2020-2025

Figure 6.6 Population dynamics in the City of Vulcanesti in 2014-2019

The ethnic composition of population in Vulcanesti (see Figure 6.7) is as follows: 73.79% are Gagauz (11,256 persons), 11.33% are Moldovans (1,728 persons), 6.5% are Russians (991 persons), 3.92% are Ukrainians (598 persons), 3.94% Bulgarians (601 persons).



Source: Strategy of Socio-Economic Development of the City of Vulcanesti for the period 2020-2025

Figure 6.7 Population structure by ethnic group in the City of Vulcanesti

In terms of the durable goods owned by households, the data for Statistical Region South are rather similar to average data for Moldova, as could be seen in Table 6.4.

Table 6.4 Endowment of households in Moldova and in statistical region South with durable goods (pieces per 100 households)

Item	2015	2016	2017	2018	2019 (i)
Moldova					
Mobile phone	151	152	156	154	167
Television	107	107	108	109	112
Computer	54	57	60	60	66
Refrigerator, freezer	95	96	97	98	101
Microwave oven	29	28	30	39	46
Mechanical washing machine	29	28	26	25	28
Automatic washing machine	51	52	57	58	65
Vacuum cleaner	59	57	58	58	74
Bicycle (for adults)	13	11	11	10	23
Car	24	23	22	22	27
Statistical Region South					
Mobile phone	149	147	158	151	155
Television	107	108	109	109	112
Computer	51	56	56	56	60
Refrigerator, freezer	96	96	99	103	104
Microwave oven	33	34	31	41	45
Mechanical washing machine	36	34	33	30	35
Automatic washing machine	50	50	56	60	58
Vacuum cleaner	59	56	59	58	68
Bicycle (for adults)	18	17	17	14	29
Car	25	24	22	24	22

Source: statistica teritoriala 2020

Information about the monthly earnings and the gender pay gap in Moldova and in areas included in WMZ-1 in g are included in Table 6.5. The rows related to WMZ-1 are marked in grey.

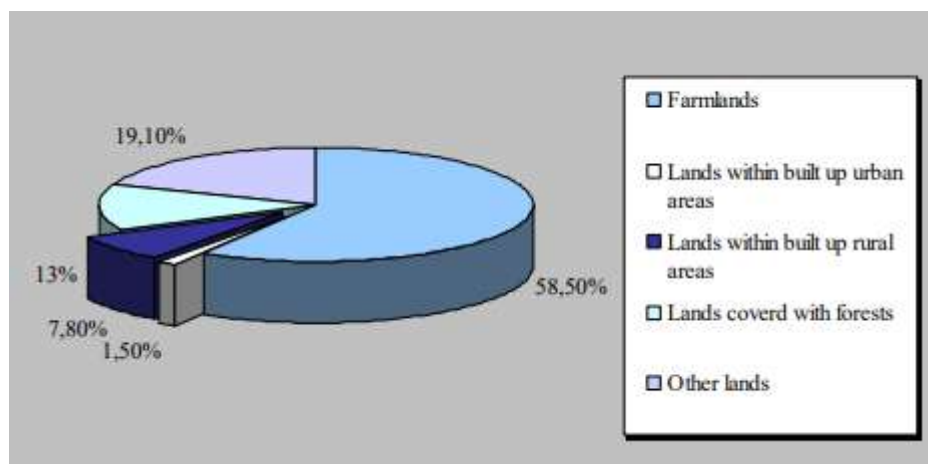
Table 6.5 Average gross monthly earnings of men and women in Moldova and WMZ-1, MDL

Territorial unit	2018				2019			
	Total	Including:		The gender pay gap, %	Total	Including:		The gender pay gap, %
		Women	Men			Women	Men	
Moldova total	6 268,0	5 800,7	6 779,4	14,4	7233,7	6709,8	7808,0	14,1
South Statistical Region	4 814,7	4 645,5	5 012,2	7,3	5572,2	5443,0	5725,1	4,9
Basarabeasca	4 343,0	4 524,4	4 209,6	-7,5	4986,7	5023,4	4954,4	-1,4
Cahul	5 310,0	4 990,4	5 678,6	12,1	6075,5	5845,2	6338,7	7,8
Cantemir	4 712,1	4 678,2	4 755,5	1,6	5384,9	5460,0	5285,0	-3,3
Causeni	4 602,5	4 398,4	4 870,4	9,7	5459,4	5340,8	5607,3	4,8
Cimislia	4 658,3	4 616,3	4 699,2	1,8	5552,2	5467,5	5636,7	3,0
Leova	4 362,0	4 109,2	4 700,4	12,6	5354,1	5280,4	5450,3	3,1
Ștefan Voda	4 708,7	4 546,7	4 928,2	7,7	5434,6	5313,1	5598,2	5,1
Taraclia	4 791,6	4 733,5	4 858,5	2,6	5208,9	4988,7	5482,2	9,0
ATUG	4 799,5	4 682,9	4 941,5	5,2	5554,9	5548,9	5561,9	0,2

Source: COWI on the basis of data from statistica teritoriala 2020

6.2 Land use pattern in WMZ-1

A general structure of land use in Moldova is presented in Figure 6.8



Source: NBS

Figure 6.8 An overview of land use structure in Moldova

The private sector accounts for the largest share of agricultural land and also accounts for most of the agricultural production. According to 2019 data, the share of agricultural land in private property in Moldova is 65%. The following table presents the detailed information on agricultural areas sown in the areas included in WMZ-1.

Table 6.6 Sown area in agricultural enterprises by crops in 2020, ha⁴²

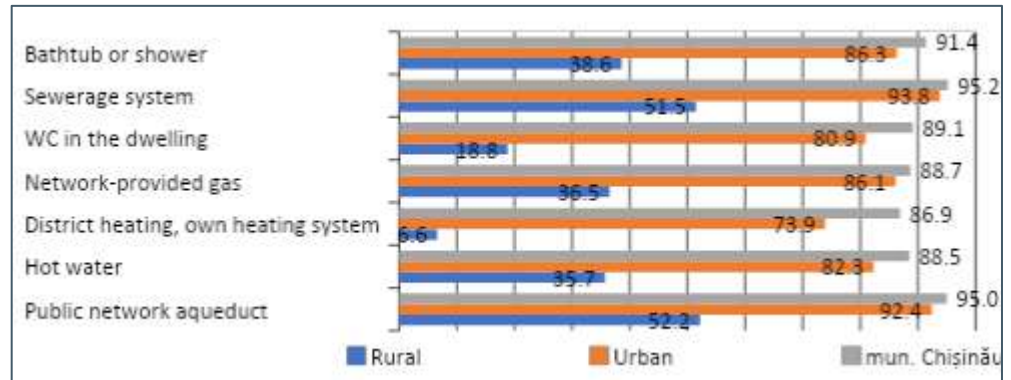
	Total	Industrial crops	Potatoes, vegetables and food melons and gourds	Forage crops	Annual grasses	Perennial grasses
SDR	247,912	96,414	741	2,456	170	695
..Cahul Rayon	48,416	19,210	2	861	70	377
..Cantemir Rayon	22,369	7,664	27	249	5	139
..Taraclia Rayon	32,872	12,350	5	90	0	90
ATUG	79,174	31,078	91	2,051	201	575

Source: NBS

6.3 Utility services

Access to utility services considerably different in rural areas, in urban areas and in Chisinau. An overview of available statistical data is presented in Figure 6.9.

⁴² Information is presented without the data on districts from the left side of the river Nistru and municipality Bender



Source: <http://statbank.statistica.md>

Figure 6.9 Access to utilities in different areas of residents in Moldova in 2018

The share of rural households with connection to public networks in Moldova accounted in 2019 for only 37% compared to 90% in urban areas.

Moldova is rapidly expanding its public water supply network, which has increased access of people to safely managed drinking water services. However, Moldova still ranks near the bottom in relation to other European countries with respect to this indicator. Between 2010 and 2020, the public water supply system expanded quickly, and the length of sewerage networks increased by 81.4% – from just under 8,510 km to about 15,436 km. This increase was largely due to expansion of public water supply systems in rural areas. Between 2010 and 2020, the length of public water supply networks in rural communities increased 2.6 times, from about 4 046 km to nearly 10 614 km. In urban areas, expansion of public water supply networks has been much slower, increasing by only 8% – from about 4 463 km to 4 822 km (Figure 6.10)⁴³.

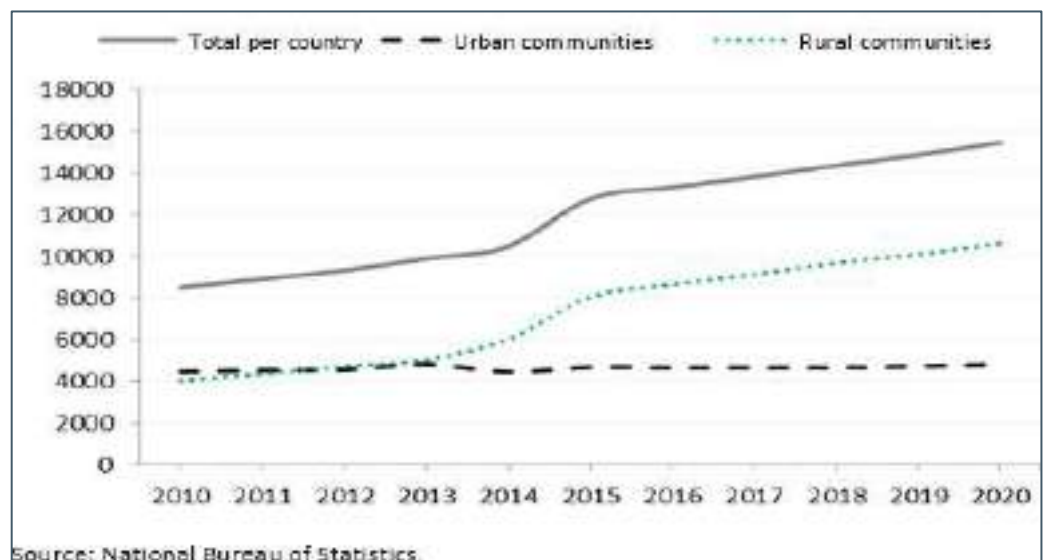


Figure 6.10 Length of public water supply networks in Moldova, km

⁴³ <https://mediu.gov.md/indicatori/capitol4en.html> (accessed 17.02.2023)

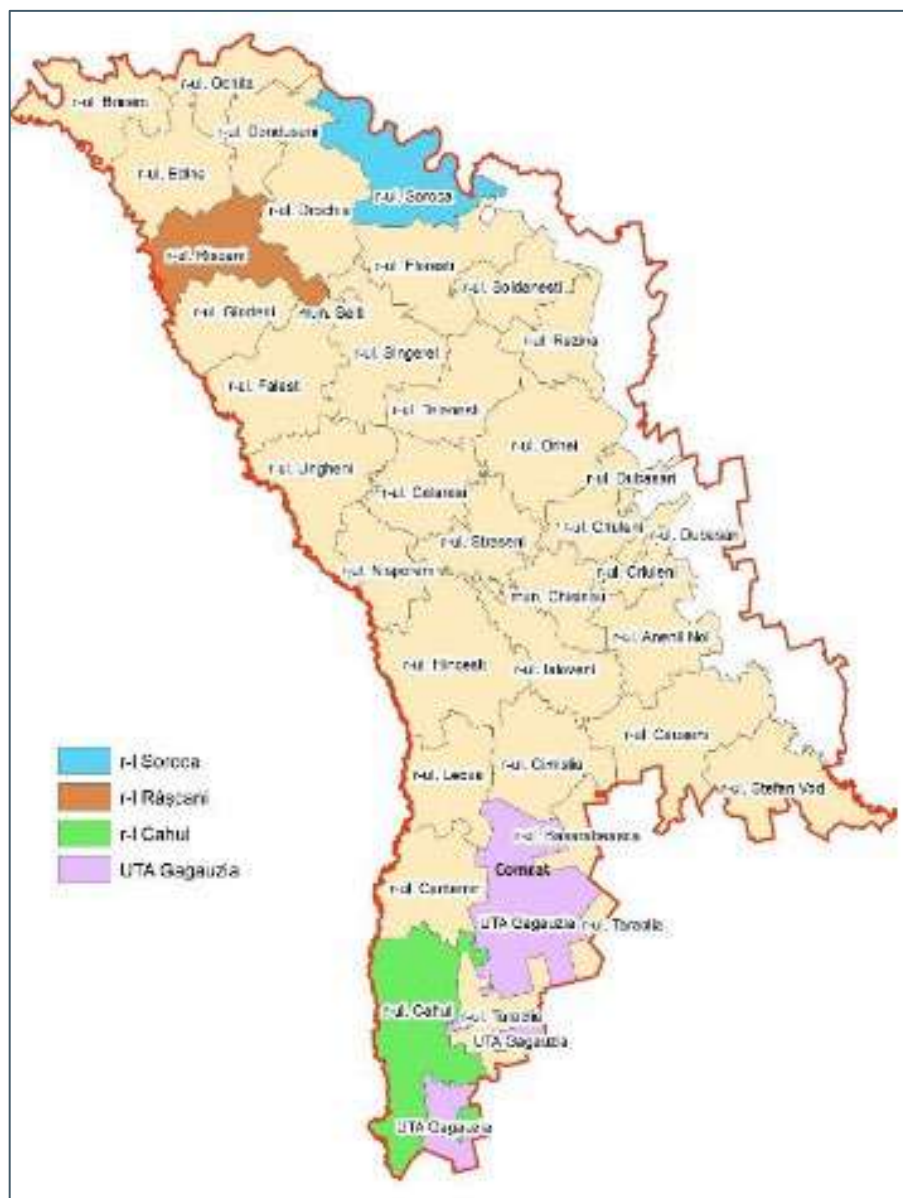
Between 2014 and 2020, the share of the population using safely managed water services increased from 72.2% to 74.1%. However, despite this progress, Moldova remains well behind other European countries in ensuring the population access to safe water sources (Figure 6.11). In 2020, for example, the share of the population in the European Union using safely managed water services accounted for 97.8%, which is 23.7% more than the share identified by the similar indicator in Moldova.



Figure 6.11 Share of population having access to safely managed drinking water services (percentage)

Improvements of water supply and sanitation services in many residential areas in Moldova have been achieved over the years due to many national and international cooperation projects. Further improvements are envisaged in Cahul Rayon and in ATUG, as these areas, among others (see Figure 6.12, have been included in the Moldova Water Security and Sanitation Project with the budget of EUR 44.1 million, which will support the Government of Moldova in implementing a comprehensive, long-term approach to addressing persisting challenges in the country's water sector.

Moldova has been grappling with challenges in the water sector, and the drought in 2020, coupled with the COVID-19 pandemic-induced crisis, emphasized the need to invest in a more inclusive and resilient water sector. The Moldova Water Security and Sanitation Project, which is co-financed by the Austrian Development Agency, includes critical investments in water and sanitation in towns and rural areas with the objective to increase access to safely managed services.



Source: Moldova Water Security and Sanitation Project. Chisinau, 2021

Figure 6.12 Rayons included in the Moldova Water Security and Sanitation Project

As of 1 January 2020, the city of Vulcanesti has reported the following indicators:

Table 6.7 Indicators of access to utility services in Vulcanesti

Indicator	Value
Total resident population	12,294
Total number of households (in flats, houses)	5,656
- households connected to water supply	61%
- households connected to sewerage	24%
- households covered by SWM collection	100%
- households connected to gas network	99%
% of local paved roads	74%
% of streets with night lighting	31%
Length of local roads, km	65

Source: Strategy of Socio-Economic Development of the City of Vulcanesti for the period 2020-2025

Out the 5,656 houses/apartments in Vulcanesti, 3,444 are connected to the water supply networks, and only 1,374 are connected to the sewerage network, while 100% of the households are connected to the power supply networks and 3,636 are connected to internet.

As mentioned in the Strategy of Socio-Economic Development of the City of Vulcanesti for 2020-2025, the maintenance of artesian wells providing water to the city of Vulcanesti is not carried out properly. One of the problems with their operation is that their sanitary protection zones are not maintained – they are not fenced and could be accessed by unauthorized persons, as well as by grazing sheep, cows, etc. Another problem associated with the operation of artesian water intake wells is the lack of timely cleaning and disinfection, as well as timely inspection of their condition.

In the city of Vulcanesti as of 31.12.2019, the total housing stock of 5,656 apartments/houses had an area of 473 thousand square meters. Most of the apartments/houses are privately owned. Only 25 apartments with an area of 1,012 square meters have not been privatized. With 15,254 inhabitants in the city, the average housing area in Vulcanesti is 31 square meters per person.

Information on dwelling stock and utility connections in selected parts of WMZ-1 is presented in Table 6.8. The share of households connected to gas is very high.

Table 6.8 Dwelling stock with utility connections in 2021, units

	Total	Water pipe	Sewerage system	Central heating	Bathroom (shower)	Gas
	2021	2021	2021	2021	2021	2021
Raionul CAHUL	38,973	25,728	25,181	14,913	16,954	38,550
Raionul CANTEMIR	19,430	10,154	10,143	2,476	8,396	18,666
Raionul TARACLIA	14,242	9,759	9,446	8,757	8,122	12,739
U.T.A. GAGAUZIA	51,091	40,419	40,419	36,889	21,569	50,531
Municipiul Comrat	9,581	8,172	8,172	7,845	3,662	9,381

Source: Statistical Databank⁴⁴

6.4 Energy infrastructure and energy efficiency management

The rural localities in the Rayons included in WMZ-1, like elsewhere in Moldova, are not provided with centralized heating systems but operate with autonomous local private systems using gas or stove heating.

44

https://statbank.statistica.md/PxWeb/pxweb/en/30%20Statistica%20sociala/30%20Statistica%20sociala_06%20LOC_LOC010/LOC010320reg.px/table/tableViewLayout1/?rxid=2345d98a-890b-4459-bb1f-9b565f99b3b9

Moldova depends to a very large extent on imported energy sources. Over 95% of the total energy consumed is imported. Over the last five years, the structure of imports of energy sources has been more or less constant.

In December 2021, the Cabinet of Ministers of Moldova approved a draft decision on the starting of negotiations and approval of the signing of an agreement on financing between the Moldovan government and the European Commission on the Contract on strengthening the state and resilience for Moldova. The budgetary support will be provided as non-refundable assistance.

The agreement assumes a grant of 60 million euros in a single instalment for the management of the crisis in the energy system. The main goal of the concerned support is to attenuate the social and economic impact, following the increase in the prices for natural gas, enhance the government's capacity to provide personalized services to vulnerable groups, as well as for the long-term social and economic recovery, energy security and energy transition in Moldova.

The European Commission adopted the decision on financing related to the budgetary support, Contract on strengthening the state and resilience for Moldova, on 10 December 2021. The agreement was signed on 15 December at the Eastern Partnership Summit in Brussels.

The potential for energy efficiency in Moldova is very high. At national level, this potential relates mainly to the heating of buildings that are not insulated, domestic water heating, lighting and ventilation systems. Most of these systems are old, inefficient, and are designed, operated and maintained at a low level. Therefore, following the implementation of energy efficiency measures, significant reductions in energy expenditure are usually achieved.

To promote energy production from renewable sources, on 15 December 2021, the Cabinet of Ministers of Moldova approved a resolution on the draft law for amendment of the Land Code allowing the rural communities, agricultural producers and animal breeders will be able to diminish the expenses for production and maintenance by the use of photovoltaic installations. In this respect, the Cabinet of Ministers approved the government's notification on the draft law for the amendment of the Land Code.

The document outlines amendments, which will allow placing solar photovoltaic systems on farmlands, without being necessary the change of the purpose. According to the same amendments, decision-makers allow changing the high-quality farmlands for the construction of wind energy devices. The photovoltaic installations should be fixed at the soil by metal structure and not through the use of reinforced concrete or other type of construction materials, which would have negative impact on the soil's fertility. The photovoltaic panels should be placed on lands with degraded soils with a reliability of less than 40 points. The changes are necessary for protecting the high-quality farmlands and at the same time, for enhancing the energy security, reducing the import of energy. The document envisages measures to preserve and enhance the soil's fertility and outlines the conditions for designing, setting, assembling of solar photovoltaic systems and wind power plants.

6.5 Sources of income

According to the results of the annual research "Earnings and labour costs in 2019"⁴⁵, the average number of employees was 625.2 thousand people, and this is 2% (or 12.2 thousand people) more than in 2018.

The distribution of employees by economic activities reveals that most employees were engaged in the following sectors:

- > industry - 17.8% of the average total number of employees
- > wholesale and retail trade; maintenance and repair of motor vehicles and motorcycles - 16.7%
- > education - 15.3%
- > health and social assistance - 9.7%.

Women predominate among employees (326.9 thousand, or 52.3% of the average number of employees). The share of women and men differs significantly by economic activities and is largely influenced by the profile of economic activities.

Female employees predominated in the following spheres of activities:

- > health and social assistance - 81% of the average total number of employees in this activity
- > education - 76.7%
- > financial and insurance activities - 70.1%
- > accommodation and catering activities - 65%.

Men predominate in the following spheres:

- > constructions - 86.8% of the total employees in this activity
- > agriculture, forestry and fishing - 73%
- > transport and storage - 71.8%
- > administrative service activities and support service activities - 64.9%.

In 2019, there were 46,900 unemployed persons. In terms of gender, more men (27,600) were unemployed than women (19,300) in 2019. Unemployed for less than six month (32,000 persons) make the highest share of undeployed persons. People from rural area accounts for the highest share of unemployed persons, 26,000 unemployed persons from rural area compared with to 20,000 from urban. The South Region has the higher unemployment rate compared with the total population rate and the North region has the lowest unemployment rate.

Although the Republic of Moldova has made progresses in income increase, the income of the population remains the smallest in the region, ranking the Republic of Moldova as the poorest country in Europe. From 2010 to 2019 the average disposable income of the population grew by 53.5% from MDL 1,273.7 to MDL 1,956.6. At the same time, the discrepancy between the income of urban and rural population has

⁴⁵ <https://statistica.gov.md/print.php?l=en&idc=168&id=6742>

increased – from 23.6% in 2010 up to 41.8% in 2015, which proves that social inequalities between the urban and rural population have deepened⁴⁶.

According to the WB overview for Moldova (October 13, 2021)⁴⁷, despite a solid economic performance over the past two decades, Moldova still remains among the poorest countries in Europe. Although a growth model reliant on remittance-induced consumption has generated high growth and reduced poverty, it had become less sustainable well before the COVID-19 pandemic. The decline in remittances, combined with a shrinking and aging population, has resulted in low productivity growth, and a significant number of the lower-income population has become dependent on pensions and social assistance.

The pandemic and a severe drought in 2020 more starkly exposed the vulnerabilities of this growth model to shocks. With a subsequent decline in GDP of 7 percent in 2020, Moldova was among the countries in Europe most affected by COVID, which significantly impacted households and businesses across the country.

Against this backdrop, the Government has laid the foundations for a more inclusive and resilient growth model. The economic recovery from the pandemic not only hinges on containment of the crisis and a more favourable external environment, but also on complementary measures aimed at mitigating its impact and supporting a private sector and household recovery with structural reforms that would help steer the economy away from the current economic model.

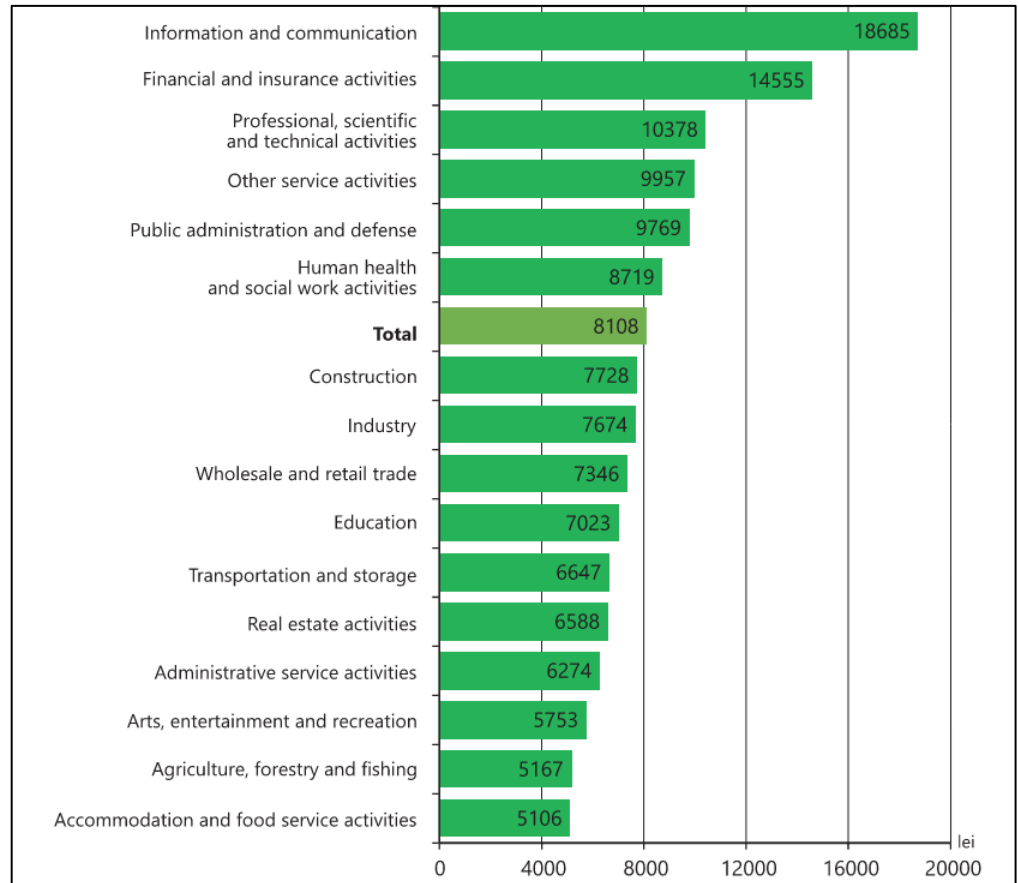
The new Government has a strong mandate and parliamentary support and is regaining trust among citizens and international partners. Nevertheless, the economic and social recovery will have to be complemented by improved governance and strengthened capacity to implement reforms.

In 2020, the average gross monthly nominal earnings in the national economy constituted 8,107.5 lei and increased compared to 2019 in nominal value by 10,2%, and in real terms (adjusted to the consumer price index) - by 6, 2%⁴⁸

⁴⁶ Inequalities in urban and rural Moldova: Beyond incomes and averages, looking into the future of inequalities, UNDP, Moldova 2020

⁴⁷ <https://www.worldbank.org/en/country/moldova/overview#1>

⁴⁸ Moldova in Figures. Statistical pocket-book, NBS, 2021



Source: Moldova in Figures. Statistical pocketbook, 2021

Figure 6.13 Average monthly earnings per employee, by economic activities, in 2020

The data on average earning per employee and well as the data on the gender pay gap are presented in Figure 6.14.



Source: Statistical Yearbook of the Republic of Moldova, 2020

Figure 6.14 Average monthly gross earning per employee, by sex, and gender pay gap

In 2021, the monthly disposable income of the population was, on average, 3510,1 lei per person, increasing by 13,4% compared to previous year. Incomes of the population from the urban area registered a higher value, on average with 1324,0

lei or 1,4 times compared to those from the rural area. The main sources of income were remunerated activity (50,8%), social payments (18,5%) and remittances (12,5%). By areas of residence, there are significant differences in the main source of household's income. Revenues from remunerated activity contributed to the formation of disposable income in proportion of 62,1% in the case of households from urban areas, and in rural areas – by 40,0%. At the same time, income from the self-employment in agriculture is an important source of income for the rural households (15,3% of the total disposable incomes).

Disposable incomes of the population in proportion of 93,8% consists of monetary sources, and 6,2% represent in-kind incomes. In absolute values, the average monthly per capita cash income amounted to 3291,2 lei, and those in kind – 218,9 lei. The share of cash incomes is more significant for the urban area (97,3%), and in the case of the rural population their contribution is 90,4%.

Remittances remain a significant source for household budgets and represent 12,5%.

Further details related to disposal income in urban and rural areas of Moldova are presented in Table 6.9.

Table 6.9 Disposable incomes of population in Moldova in 2021

	Total	Urban	Rural
Total disposable incomes			
(average monthly per capita), lei	3 510,1	4 309,0	2 985,0
of which in % by sources:			
Remunerated activity	50,8	62,1	40,0
Self-employment in agriculture	8,1	0,5	15,3
Self-employment in non-agricultural sector	7,4	8,1	6,7
Social payments	18,5	16,0	20,9
Other incomes	15,2	13,2	17,0
of which remittances	12,5	9,5	15,4

Source: Moldova in Figures. Statistical pocketbook, 2022

The remunerated activity represents the most important source of income with a share of 50.8% in total disposable incomes, this contribution was maintained at the level of 2019-2020. Social payments are the second most important source of income. Money remittances from outside the country remain a significant source for the household budget. In 2021, on average, it represented 12.5% of total incomes or 0.4 percentage points less than in 2020, but practically the same as in 2019.

Over the years, low salaries have resulted in international labour migration causing a growth of money remittances from abroad, which currently are a significant source in the households' budget. On average, remittances represent 12.5% of total households' income (see Table 6.9). According to

the Public Opinion Barometer⁴⁹ (June 2021), the response to the question about household members working abroad was as presented in the following table:

Table 6.10 Data from respondents in Moldova about household members working abroad (June 2021)

Question	Number of respondents	Response share, %			
		Yes	No	I do not know	No answer
Are there people in your household who are currently working in another country (for more than 2 weeks)?	1,161	52.5	46.6	0.3	0.6

Source: COWI on the basis of data from Public Opinion Barometer

According to the WB overview for Moldova (October 13, 2021)⁵⁰, despite a solid economic performance over the past two decades, Moldova still remains among the poorest countries in Europe. Although a growth model reliant on remittance-induced consumption has generated high growth and reduced poverty, it had become less sustainable well before the COVID-19 pandemic. The decline in remittances, combined with a shrinking and aging population, has resulted in low productivity growth, and a significant number of the lower-income population has become dependent on pensions and social assistance.

The pandemic and a severe drought in 2020 more starkly exposed the vulnerabilities of this growth model to shocks. With a subsequent decline in GDP of 7 percent in 2020, Moldova was among the countries in Europe most affected by COVID, which significantly impacted households and businesses across the country.

Against this backdrop, the Government has laid the foundations for a more inclusive and resilient growth model. The economic recovery from the pandemic not only hinges on containment of the crisis and a more favourable external environment, but also on complementary measures aimed at mitigating its impact and supporting a private sector and household recovery with structural reforms that would help steer the economy away from the current economic model.

The new Government has a strong mandate and parliamentary support and is regaining trust among citizens and international partners. Nevertheless, the economic and social recovery will have to be complemented by improved governance and strengthened capacity to implement reforms.

⁴⁹ bop.ipp.md

⁵⁰ <https://www.worldbank.org/en/country/moldova/overview#1>

Selected latest available data for Moldova from the Public Opinion Barometer⁵¹ (June 2021) are presented in the following diagrams:

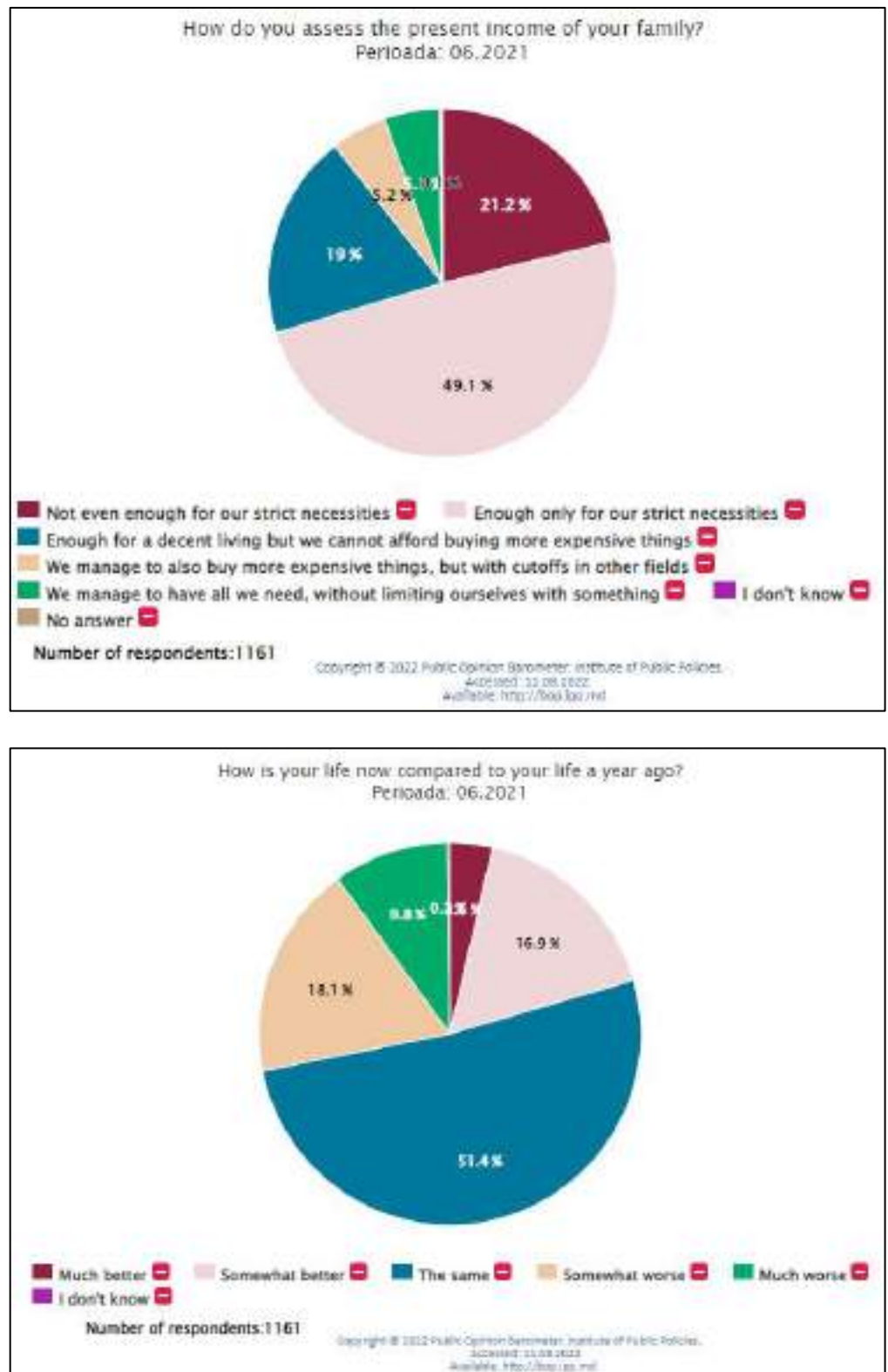


Figure 6.15 Diagrams of survey response regarding income and perception of life

⁵¹ bop.ipp.md

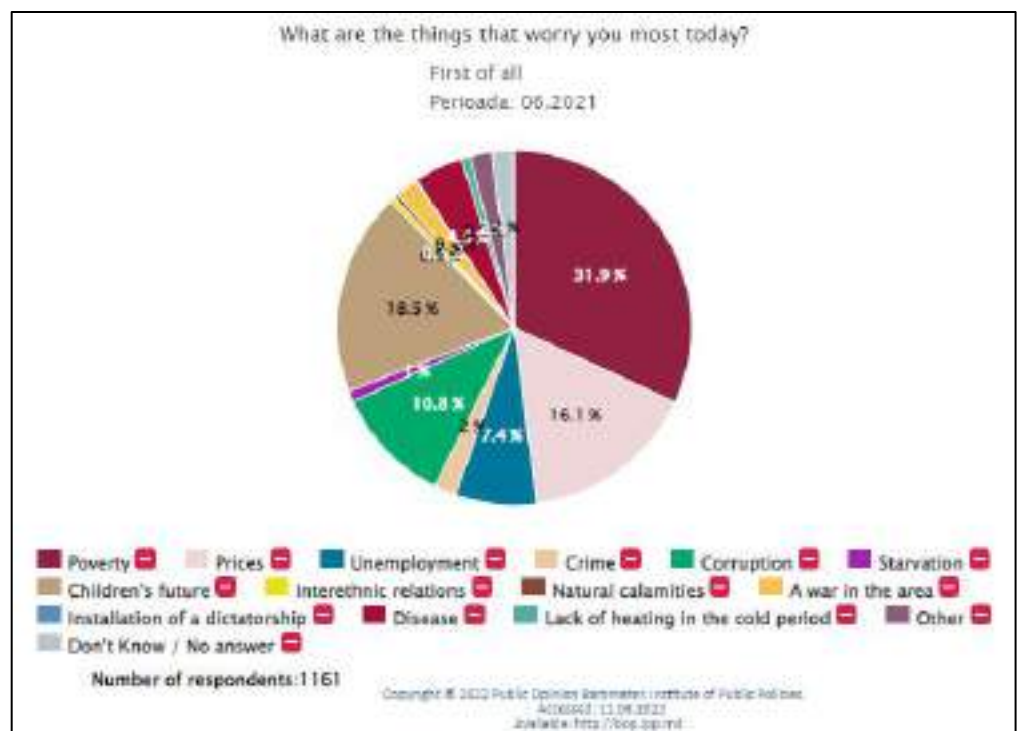
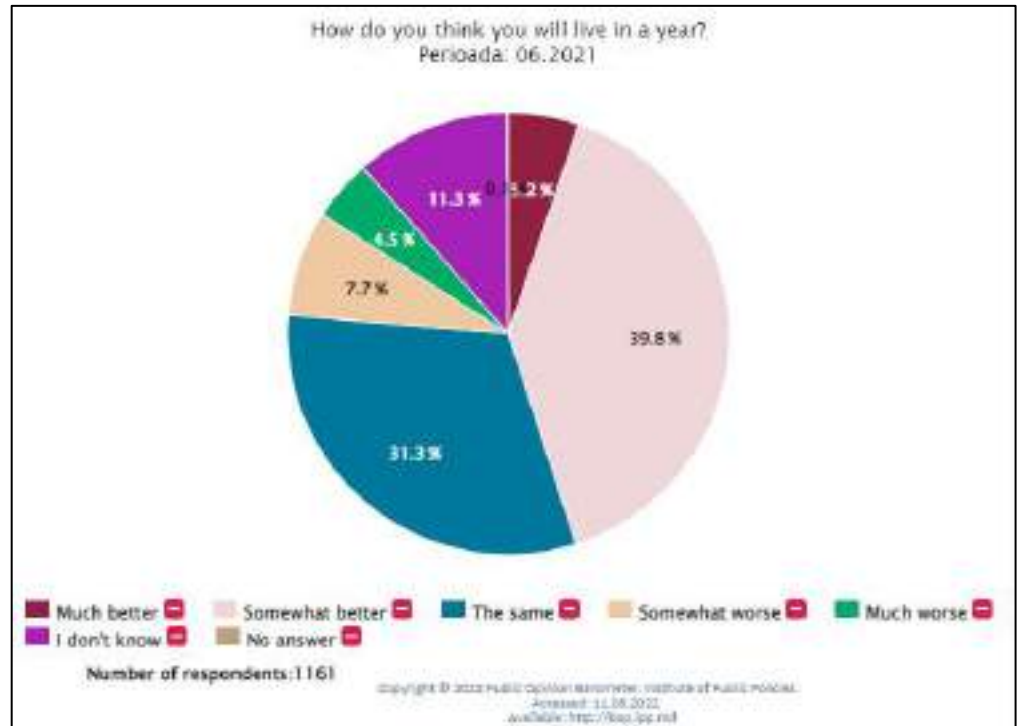


Figure 6.16 Diagrams of survey response regarding life prospects and current worries

In 2021, the average monthly consumption expenditures of the population amounted to an average 3039,5 MDL per capita, or 8.9% more compared to the previous year. Consumption expenditures are strongly influenced by household size. Thus, in single-person households, the average monthly expenditure per capita is 1.9 times higher than in those with 5 or more people. At the same time,

large households allocate the greatest proportion for food consumption (48.1% of total consumption expenditures).

The average monthly expenditures in total for the country were exceeded only by the households consisting of maximum 3 people, the others registering lower levels. In 2021, the value of the subsistence level constituted in average 2,154,0 MDL per capita per month. Depending on the area of residence, the subsistence level reveals significant differences, the highest value being recorded for the population from cities (Chişinău and Bălţi) – 2,373.7 MDL or 9.9% more compared to the subsistence level for towns and 14.6% more compared to the rural area⁵².

Due to lack of revenue data at the Rayon level, the overview of disposable income data in the following table is provided for the whole statistical region South (Table 6.11).

Table 6.11 Disposable income per capita in statistical region South in 2021

	Average monthly disposal income per capita	
	Average monthly per capita. MDL	Percent of total
Disposable income - total	2,985.5	100.0
Employment	1,217.0	40.8
Self-employment in agriculture	286.8	9.6
Self-employment in non-agricultural sector	212.5	7.1
Property income	-	-
Social protection payments	662.4	22.2
..pensions	512.9	17.2
..child allowances	31.9	1.1
..social support	14.3	0.5
Other incomes	606.8	20.3
..remittances	559.9	18.8

Source: <http://statbank.statistica.md> (accessed 15.08.2022)

The poverty rate in the South region is rather high (40.4% in 2019). Households with single elderly people and those with more than 3 children are most at risk of living in poverty. Poverty also varies depending on the level of education of the head of the household. Each additional level of education of the head of the household means a decrease in the poverty rate, from 78.3% for households where the head of the household has primary education or no education, to 4.6% for households where the head of the household has higher education⁵³.

⁵² Moldova in figures, 2022

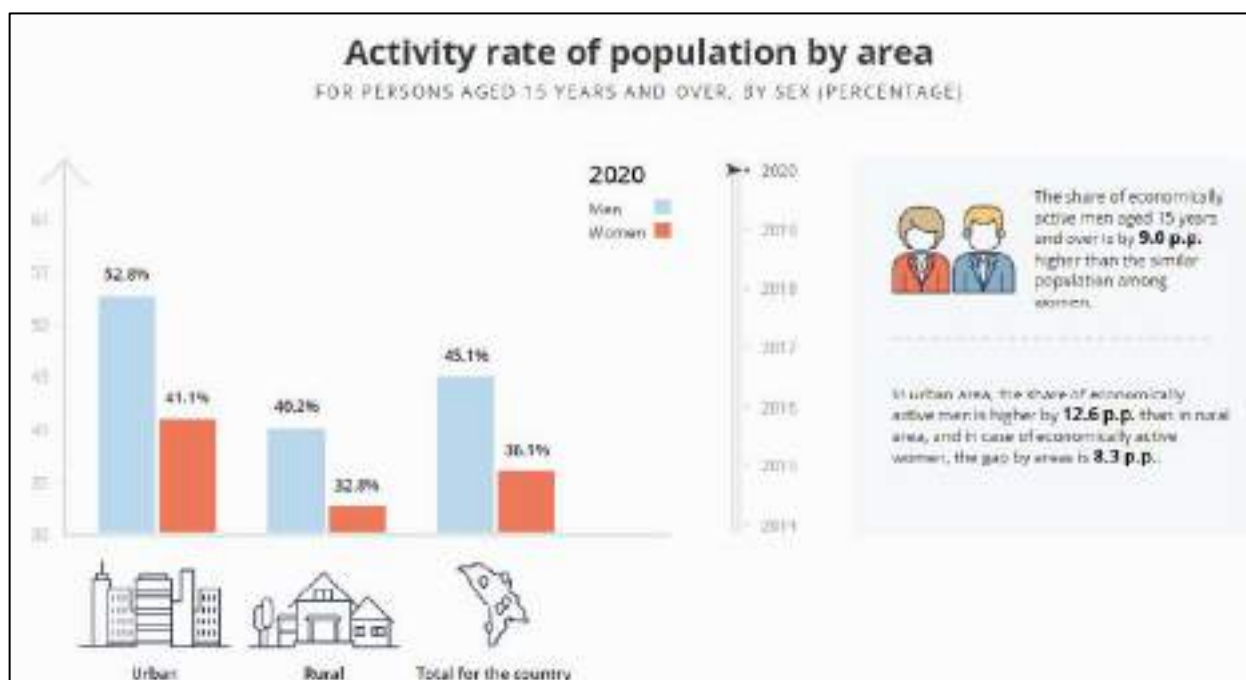
⁵³ NBS, <https://statistica.gov.md/newsview.php?l=ro&idc=168&id=6865#idc=429&>

Table 6.12 Structure of consumption expenditures in the statistical region South

	2014	2015	2016	2017	2018	2019
Total consumption expenditures (monthly averages per person), lei	1,564.0	1,756.9	1,833.1	1,960.0	1,998.5	2,163.6
including in %, for:						
Food	47,6	46,3	47,1	46,4	48,4	45,6
Alcoholic beverages, tobacco	1,2	1,4	1,3	1,3	1,4	1,6
Clothing, footwear	9,2	10,7	10,3	11,2	11,2	8,9
Home maintenance	19,3	17,4	18,1	17,8	17,9	18,1
Home equipment	3,8	4,1	4,4	3,7	3,5	5,3
Medical care and health	5,3	5,5	4,8	5,9	4,2	5,0
Transportation	3,2	3,8	3,2	2,8	2,9	3,9
Communications	4,6	4,4	4,7	4,6	4,9	4,9
Leisure	0,7	1,0	0,7	0,8	0,7	1,3
Educational	0,6	0,4	0,6	0,4	0,3	0,7
Hotels, restaurants, cafes, etc.	0,8	0,9	0,6	0,9	0,6	0,8
Various	3,7	4,1	4,2	4,3	4,1	3,9

Source: Statistica teritoriala 2020, NBS of Moldova. Chisinau, 2020

Proportion of economically active population in urban and rural areas differs. As indicated in Figure 6.17 for 2020, it also differs for men and women living in urban and rural areas.



Source: GenderPulse

Figure 6.17 Activity rate of men and women living in urban and rural areas of Moldova in 2020

In urban areas the percentage of economically active men (52.8%) and women (41.1%) is higher than in rural areas. In general, the percentage of economically active men is about 10% higher than percentage of economically active women.

6.6 Gender equality issues

In March 2021, the National Bureau of Statistics presented information on the statistical portrait of women and men in the Republic of Moldova based on the available data⁵⁴ for women and men including the following:

- > Demographic characteristics
- > Level of education
- > Women and men in the labour market
- > Women and men infected with COVID-19
- > Victims of domestic violence
- > Women and men in decision-making and entrepreneurship positions
- > The household standard of living from a gender perspective
- > Social protection of women and men

The key features of the statistical portrait of women and men in Moldova are described below.

Women predominate in the population

The female population predominates among the population with habitual residence. At the beginning of 2020, 93 men were male. The ratio varies significantly depending on specific age groups. The male population predominates in the 0-14 age group, with 112 men in 100 women. In the age group 15-34 years the number of men and women is almost identical. The differences are more pronounced for the population aged 35-64 and 65 years and over, with 92 men and 61 men respectively returning to 100 women.

Life expectancy in women is higher than in men

Women live, on average, 8.3 years longer than men. Life expectancy at birth in 2019 was 75.1 years for women and 66.8 years for men. This gap is caused by the higher level of premature mortality of men, especially those of the working-age elderly (16-62 years).

Women marry earlier than men

The average age of the woman at the first marriage in 2019 was 26.0 years, and in men - 28.9 years. By age group, most men who married in 2019 belong to the 25-29 age group (36.5%), and marriages at the age of 20-24 (35.5%) predominate for women. Marriages up to the age of 20 are more common in rural areas: 10.1% of rural marriages were concluded by women under the age of 20, compared to 4.2% of marriages in women of the same age in urban areas. Of the total marriages recorded in 2019, those entered by single persons accounted for 80% for both men and women.

⁵⁴ <https://statistica.gov.md/newsview.php?l=ro&idc=168&id=6934>

Girls predominate in post-secondary technical vocational education, and boys in secondary technical vocational education

In the 2020/21 academic year in the vocational training programmes for skilled workers in secondary technical vocational education, boys made up about three quarters of the total (73%), while in the vocational training programmes of masters, technicians and other specialists in postsecondary technical vocational education there were girls (54%).

The distribution of pupils enrolled in technical vocational education by vocational training fields shows a certain polarisation, by gender, of the corresponding professions/professions/specialities. In secondary technical vocational education some professions related to machinery and equipment are dominated by boys. At the same time, the professions of equally high market demand (tailor clothing manufacturer, seamstress, confectioner, baker) are chosen mainly by girls.

In postsecondary technical vocational education, boys' options were mainly directed towards the fields of engineering, information and communication technology, dentistry. Girls show preferences for such areas as: health care and obstetrics, social assistance and counselling, pedagogy, hairdressing and beauty services, secretarial and office work, medicine, textile manufacturing and processing.

Women opt more for higher education

Higher education compared to post-secondary technical vocational education has an even higher level of participation of the female population (58% of all students in the 2020/21 academic year). Women are also better represented in master's degree studies (including integrated studies), where the share of female students is 64% of all students enrolled at this level, as well as in higher education – 56%.

At the level of higher education, the female population is mainly oriented towards the following general fields of study: education sciences, social and behavioural sciences, philology, public services. On the other hand, men mainly opt for engineering and information and communication technologies. In addition, in the most in-demand areas, such as economics and law, one can see: a majority of women in economics (two thirds of total students) and almost equal weights of women and men in law.

The distribution of students by general fields of master's studies is relatively similar to that of the bachelor's degree: an important part of them is represented by students in the field of law where the proportion of women and men is equal, education sciences in which women dominate, health and economic sciences in which women represent more than 70%.

In the labour market women have a higher level of education than men

According to Labour Survey data, women aged 25-64 years have a higher level of education than men of the same age. The largest gap is recorded for the upper level²: in 2019, 24.9% of women of this age reached this level compared to 17.8% of men of the same age. In the employed population, women have a higher level of education than men. In 2019, 32.4% of employed women had *higher education* and 17.3% of *average specialized* studies, while among employed men

these indicators constituted 23.5% and 12.1% respectively. The share of women in the number of people employed with *higher education* is much higher than that of men (56.7% compared to 43.3% in 2019). The same difference is registered for people with *average specialist education* (57.6% women and 42.4% men in 2019).

The employment rate among women is lower than that of men

The share of women in the employed population is lower than that of men (48.7% women and 51.3% men in 2019). The gender employment gap was 7.7 p.p. in 2019: women had a rate of 36.5% compared to 44.2% for men. The employment rate of women depends on several factors, including the presence of children under the age of 16. Thus, for women aged 25-49 years with at least 1 child (16 years and less) the employment rate in 2019 was 49.7%, while for women without children the employment rate reached 59.6%.

Women work predominantly in the service sector

Distribution by economic sectors shows a higher share of employed women in the service sector (58.0% women and 42.0% men respectively in 2019). Less women are found in the agricultural sector (39.0%), industry (46.5%), construction (6.4%), transport and storage (27.3%), information and communications (35.9%), but predominate in such economic activities as hotels and restaurants (71.8%), financial intermediation and insurance (72.1%), education (82.2%), health and social assistance (80.2%), cultural and leisure activities (59.9%).

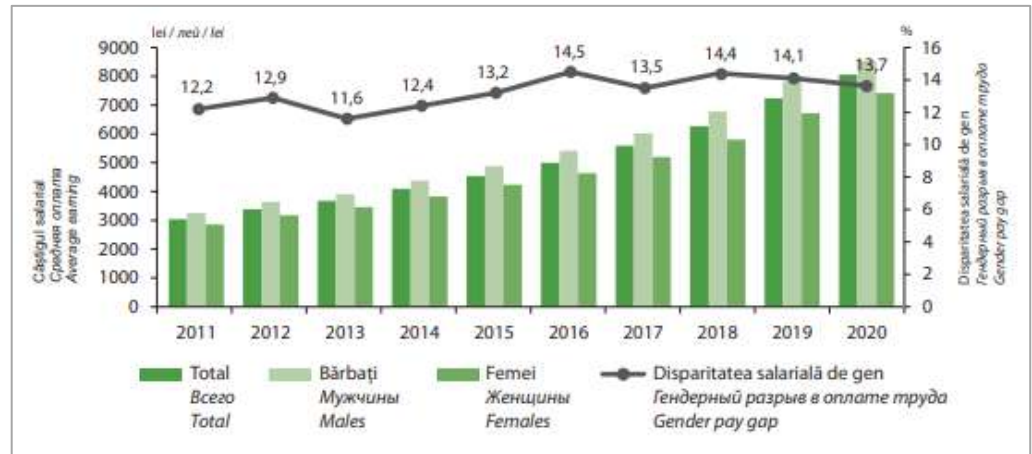
Women to a greater extent prefer employment and formal employment

In 2019 more than 83.2% of all employed women were employed as *employees*, i.e. on the basis of individual employment contracts. For men this indicator was 72.6%. Among non-employees, men were predominant in the category of *self-employed workers* (71.9%), and women among *unpaid family workers* (74.2%). The share of informal employment in 2019 among women was 18.1%, and among men 27.9%.

Women earn on average 14% less than men

Women earned 14.1% less than men (85.9% of men's average earnings) in 2019. Expressed in numerical value, the discrepancy amounted, on average, to about 1,098 lei. Thus, the average gross monthly earnings of women in 2019 amounted to 6,709.8 lei and for men 7,808.0 lei.

An overview of statistical data on gender pay gap for 2011-2020 is presented in Figure 6.18.



Source: Anuarul statistic al Republicii Molodova, 2021

Figure 6.18 Average monthly gross earning per employee, by sex and gender pay gap

The largest gaps in women's and men's earnings are in financial sector, information and communications, industry

Women get lower earnings than men in most economic activities, in 2019, the biggest differences were recorded in the following activities:

- > financial and insurance companies – by 42.9% (by 8105.0 lei) less;
- > information and communications – 35.7% (6704.5 lei) less;
- > industry – by 20.9% (by 1660.7 lei) less;
- > health and social care – 19.6% (1634.4 lei) less;
- > accommodation and food activities – 15.9% (with 880.3 lei) less.

At the same time, women earn higher earnings than men in the following activities:

- > administrative services and support services – 10.7% (with 585.1 lei) more;
- > education – by 1.1% (by 67.5 lei) more;
- > other service activities – by 6.5% (with 499.2 lei) more.

Women are less exposed to accidents at work

Of the 457 employees who suffered accidents at work (excluding the fatal ones) in 2019 women accounted for 31%. The rate of non-fatal work accidents among women is 2.4 times lower than that of men (43.4 women for 100 thousand females employed, 105.6 men for 100 thousand male employees). Out of the 36 employees who suffered fatal work accidents registered in 2019, two were women. The fatal work accident rate among women was 0.6 per 100 thousand females employed, while among men the rate was 11.4.

Unemployment affects men to a greater extent than women

The unemployment rate (the share of unemployed BIM in the labour force) in 2019 at country level registered the value of 5.8% among men and 4.4% among women. By age, the highest rate for both men (11.1%) and women (9.4%) was registered in 15-24-year-olds persons.

Women have higher values among NEET youth compared to men

In 2019, the share of NEET youth⁵⁵ in total 15-24-yearold persons was 22.8% in women and 16.5% in men. Among 15-29-year-old persons, respectively 35.5% for women and 19.4% for men, and among 15-34-yearolds, respectively 40.3% for women and 21.2% for men.

COVID-19 affected the female population in the labour market more

The impact of the COVID-19 pandemic on the labour market from the end of the first quarter of 2020 affected 30.9% of the total employed women, compared to 18.5% of all employed men. About 60.5% of the total people affected at workplaces were women and 39.5% were men (while in total employment in the second quarter of 2020 women made up 47.8% and men 52.2%).

The impact of the pandemic on the situation at work has the following effects: interruption/cessation of activity, decrease in hours of work actually worked, provision of work at home, transition to part-time work, etc.

Among employed persons affected by the pandemic in the second quarter of 2020, the majority as represented by people who did not work at all/were absent from work (55.0% among women and 69.2% among men), followed by people who had to work fewer hours per week (36.7% among women and 20.7% among men) and people who worked at home/worked remotely (33.0% among women and 14.2% among men).

Women exceed the number of men infected with COVID-19, while mortality among men is higher

According to data from the Ministry of Health, Labour and Social Protection⁶, from the beginning of the COVID-19 pandemic, from March 2020 to March 4, 2021, some 191.2 thousand cases of infection with the new type of coronavirus and 4.0 thousand cases of death have been confirmed. Of the total number of infected people, women account for about 58.6%, and of the total number of deaths – 49.0%. The number of pregnant women who became infected with the virus constituted 857 cases.

Most often were infected with the new type of coronavirus women aged 50-59 years - 21.5% of the total number of infected women and men aged 60-69 years (20.4%). At the same time, both women (37.4%) and men (37.1%) died more often aged 60-69 years.

Women and men victims of domestic violence

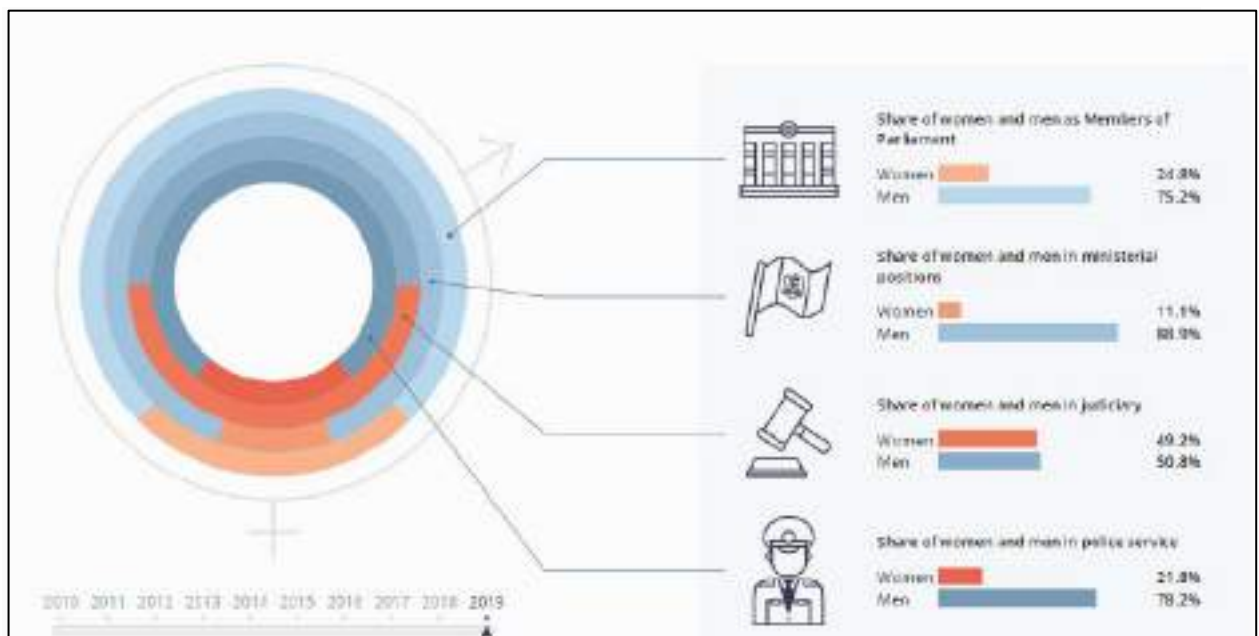
In 2020, 517 people suffered as a result of domestic violence, and about 64.4% of the victims were women. Both women and men, victims of violence, were mostly aged 35-64. At the same time, the share of boys aged 0-17 who suffered as a result of domestic violence was almost triple that of girls, the same age - 11.4% compared

⁵⁵ NEET youth - young people who are not part of the employed population, do not study/learn within the formal education system and do not participate in any courses or other training outside the formal education system (from The English: "Persons Not in Employment, Education or Training")

to 4.2%. Counselling services (e.g., via 24/7 telephone hotlines) and support to victims of domestic and sexual violence, sexual exploitation of children, human trafficking, as well as activities for protection of rights of socially vulnerable people are provided by the International Center "La Strada"⁵⁶ and other organisations in Moldova.

Women continue to be under-represented in decision-making

Share of women and men in decision-making positions in Moldova in 2019 is presented in Figure 6.19. The proportion of male leaders of all levels is higher than that of women. Of all leaders of all levels (legislators, members of the executive bodies, other senior officials and leaders of the public administration, leaders and senior officials of the administrative units) in 2019, 54.3% were men and 45.7% - women.



Source: GenderPulse

Figure 6.19 Share of women and men in decision-making positions in Moldova in 2019

Women's participation in decision-making is reflected as the proportion of seats in the Parliament of Moldova. The proportion increased from 4.81% in 1997 to 24.75% in 2020. The proportion data for Moldova, other countries and the EU in general are presented in Table 6.13.

Table 6.13 Proportion of seats held by women in national parliaments, %

Country	1997	2020
Bulgaria	10.83	26.67
Hungary	11.40	12.06
Lithuania	17.52	26.95
Moldova	4.81	24.75

⁵⁶ <http://lastrada.md>

Country	1997	2020
North Macedonia	3.33	39.17
Poland	13.04	28.70
Romania	7.21	21.88
Ukraine	3.78	20.80
EU	17.01	32.41

Source: <https://sdg-tracker.org/gender-equality>

During the local general elections in 2019, the share of women elected to level 1 and 2 local councils was 35.6%. The share of women elected in level 1 local councils was 36.5%, and those elected to local councils of level 2 - 27.1%.

The share of women in the total number of employees of police bodies, including civil protection and border guards, at the beginning of 2020 was 21.8%. At the same time, the share of women in the total number of judges at the beginning of 2020 was 49.2%.

Women own or manage businesses in a smaller proportion than men

According to business environment development research (2018)⁹, the share of women who own or manage businesses amounted to 33.9%, so women are twice as young among entrepreneurs compared to men. At the same time, although women predominate in the population (52.2%), the share of women engaged in entrepreneurship is lower than the share of women in the number of economically active population (49.4%).

Young men aged 15-34 opt for an information and communications business to a greater extent than women of the same age (24.4% compared to 20.0%). In contrast, women aged 15-34 years are involved in the other services sector to a greater extent than men (20.5% compared to 17.3%). Most often, women involved in business aged 35-44 years manage enterprises with the main type of activity wholesale trade - 38.9%, while men of this age mainly manage enterprises in the field of information and communications - 40.1%. Both women and men aged 45-54 years, most often manage enterprises with the main type of industry activity - 31.3% and 29.9% respectively. With age, agriculture is characteristic, men and women aged 55-64 years manage enterprises with this main type of activity at 31.3% and 31.1% respectively. For entrepreneurs aged 65 and over, agriculture predominates for men (12.1%) industry for women (7.7%).

Women are engaged in income-generating activities to a lesser extent than men

According to Household Budget Research data, women aged 18 and over are more dependent on social payments compared to men. In 2019 virtually every third woman (32.2%) had as its main source of income the pension compared to almost every fourth man (22.3%). At the same time, for about 62% of men in this age group, the main source of income was individual and wage work compared to about 48% for women.

Men are more optimistic in assessing the standard of living of the household in which they live compared to women

Men-run households are more optimistic about household living standards. Thus, among male-led households, 21.5% rated living standards as very good or good, and for women-driven households this share is only 15.8%. At the same time, male-led households can afford unexpected expenses in the amount of 5000 lei, in a higher proportion than those run by women (24.1% compared to 15.2% in 2019).

The poverty level of women and men does not differ significantly

In 2019 the level of poverty among women was 25.6%, and among men – 24.8%. At the same time, the poverty rate among women-led households is higher than in male-led households. Thus, the level of poverty in women-led households was 26.6%, or 2.0 p.p. more than in male-led households.

Social protection of women and men

According to data of the National Social Insurance House, on 1 January 2021 of the total number of pensioners (686.3 thousand), 64.5% were women. Depending on the category of pensioners, the share of women ranged from 78.1% for survivor's pensioners, 69.8% for beneficiaries of old-age pensions, up to 50.9% for disability pension beneficiaries and 11.3% for employed pensioners of law enforcement. The share of persons receiving old-age social security pension in total population of this age was 93.6%, women (94.8%) 4.9 p.p. compared to men (89.9%).

In terms of disability pensions, every second pensioner of disability was a woman (50.5%). Men predominantly received severe disability pensions (57.8%) (52.2%), and women's pensions for severe disability (52.9%). A man receiving a severe disability pension, most often aged 55-64 years (63.6%), and a woman - age 65 and over (47.6%).

Additionally, 36.0 thousand men (52.3%) and 32.9 thousand women (47.7%) have received the state social allowances from social security bodies since they have not met the conditions for obtaining the right to a pension.

Women receive lower old-age pensions than men. On 1 January 2021, the average size of the old-age pension for men in the non-agricultural sector was 2,901.7 lei, compared to 2,105.2 lei for women. At the same time, the average size of the old-age pension for employees of the agricultural sector was 1,561.9 lei for men compared to 1,501.6 lei for women. The average size of the old-age pension for both men and women in the non-agricultural sector covered the minimum value of existence for pensioners, while in the agricultural sector, the average size of the old-age pension for men covered only 91.5% of the value of the minimum of existence, and for women - only 87.9%.

6.6.1 Representation of women in Rayon Councils in WMZ-1

As could be seen in the following table prepared basing on information available on websites of Rayon Councils in WMZ-1, about one third of members in these Rayon Councils are females, which correspond to the quota established by the national legislation.

Table 6.14 Percentage of female members of Rayon Councils in WMZ-1

Council location	Number of members	Female staff	% of female staff
Cahul Rayon	35	11	31
Cantemir Rayon	33	7	21
Ceadir-Lunga City	23	9	39
Comrat City	27	8	30
Taraclia			
Vulcanesti City			

Source: The Consultant's compilation of data from <http://www.cahul.md>, <http://cantemir.md>, <https://www.ceadir-lunga.md>, <http://comrat.md>, <https://www.taraclia.md>, <http://cantemir.md>

The Rayon Councils will be involved in decision-making related to changes in the SWM system within the Project. For the decisions could take into consideration the aspects of gender equality in access to employment and improved services the members of Rayon Councils would require a program of information and training during the Project preparation and implementation.

6.6.2 Gender issues in SWM service providers in WMZ-1

Sex- and age-disaggregated data collected from the three largest providers of SWM services in WMZ-1 as presented in Table 6.15, show that out of 145 staff currently employed with the six largest providers of SWM services only 22 (15%) are females. They are not employed as technical specialists but are practically dominating among the marketing and control staff, as well as among the administrative staff. No information on the wage gap between male and female staff was reviewed.

Table 6.15 Data on female staff and on staff age groups for the largest providers SWM services in WMZ-1 in 2022

Personnel type	Total staff	Female staff	% of female staff	WMS Staff age			
				20-35	36-45	46-60	60+
Municipal Enterprise Cahul (IM Gospodăria Comunal-Locativă Cahul), Cahul Town							
Administrative	3	2	67	0	1	2	0
Marketing and control	3	0	0	0	1	2	0
Technical	28	0	0	1	9	14	4
Auxiliary	6	0	0	0	0	3	3
Subtotal	40	2	5	1	11	21	7
Municipal Enterprise Cantemir (IM Apa-Canal Cantemir), Cantemir Town							
Administrative	2	1	50	1	1	0	0
Marketing and control	2	2	100	0	0	1	1
Technical	7	0	0	2	0	2	3
Auxiliary	2	2	100	0	2	0	0
Subtotal	13	5	38	3	3	3	4
Municipal Enterprise Vulcanesti (IM Gospodaria Locativ-Comunala Vulcanesti), Vulcanesti Town							
Administrative	5	4	80	0	1	0	4
Marketing and control	2	2	100	1	0	0	1
Technical	8	0	0	2	2	4	0
Auxiliary	9	0	0	0	0	5	4
Subtotal	24	6	25	3	3	9	9
Municipal Enterprise Taraclia (IM Apa-Canal Taraclia), Taraclia Town							
Administrative	3	2	67	0	0	2	1
Marketing and control	2	2	100	0	1	1	0
Technical	14	0	0	2	4	6	2
Auxiliary	3	0	0	0	0	2	1
Subtotal	22	4	18	2	5	11	4
Public works and sanitation department within mayoralty, Ceadir-Lunga Town							
Administrative	1	0	0	1	0	0	0
Marketing and control	2	2	100	1	0	0	1
Technical	16	0	0	0	8	4	4
Auxiliary	2	0	0	0	0	2	0
Subtotal	21	2	10	2	8	6	5
Municipal Enterprise Comrat (IM Gospodaria Locativ-Comunala Comrat), Comrat Town							
Administrative	2	1	50	1	0	1	0
Marketing and control	2	2	100	1	1	0	0
Technical	17	0	0	0	4	10	3
Auxiliary	4	0	0	0	1	2	1
Subtotal	25	3	12	2	6	13	4
Total	145	22	15	13	36	63	33

Source: The Consultant's compilation of information collected from the SWM service providers in 2022

It is worth noting that, as indicated in the table above, about half of employees in the presented largest SWM service providers are of the age 46-60, while less than 10% are of age 20-35 and the total number of staff in age groups 20-35 and 36-

45 with each service provider is less than in age groups 46-60 and 60+. It could be expected that introduction of new equipment and modern systems for control of waste collection operations as well as for data management would result in making the work in SWM service providers more attractive for women and for younger staff.

Certain changes in the organisational setup and staff responsibilities for implementation of the Project. Development and implementation of HR management policy throughout the Project will be required for PIU and SWM service providers. This would be part of the ESAP.

The organisational setup for the Project and operation of the proposed facilities could allow for opportunities for employing men and women. Sex-disaggregated data regarding the current operations could hardly be relevant for assessment of the future employment opportunities taking into consideration possible improvement of working conditions for the staff. At the same time the Project should be prepared and implemented to ensure that men and women equally benefit from the improved SWM services and sustainability of the new system. Collection and review of sex-disaggregated data could confirm a need and provide a basis for development and implementation of a Gender Equality Plan as part of the Project. This set of activities could be included in the ESAP.

6.7 Stakeholder engagement practices

In general, the stakeholder engagement practices during preparation of various infrastructure development projects in Moldova follow the principles of the Aarhus Convention and the best practices of the EU countries. As determined by the national legislation, the public consultation is an integral part of EIA procedure. The public authorities are responsible for and have gained valuable experience in arranging the stakeholder consultation activities in various forms, e.g., publications in the media, feedback forms on websites, public meetings, meetings of working groups, workshops of stakeholders representing the Rayon level authorities and other organisations).

Keeping in mind that video info is of major interest (see the diagram below), may of authorities place on their websites the videos of their sessions and other local events.

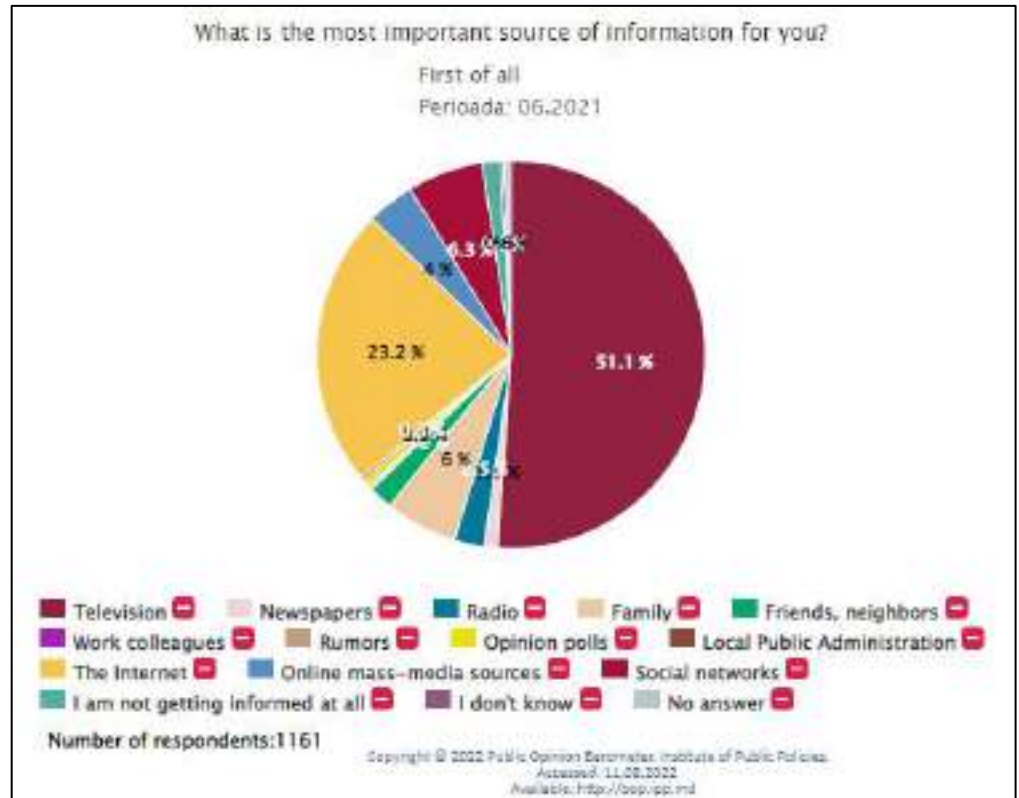
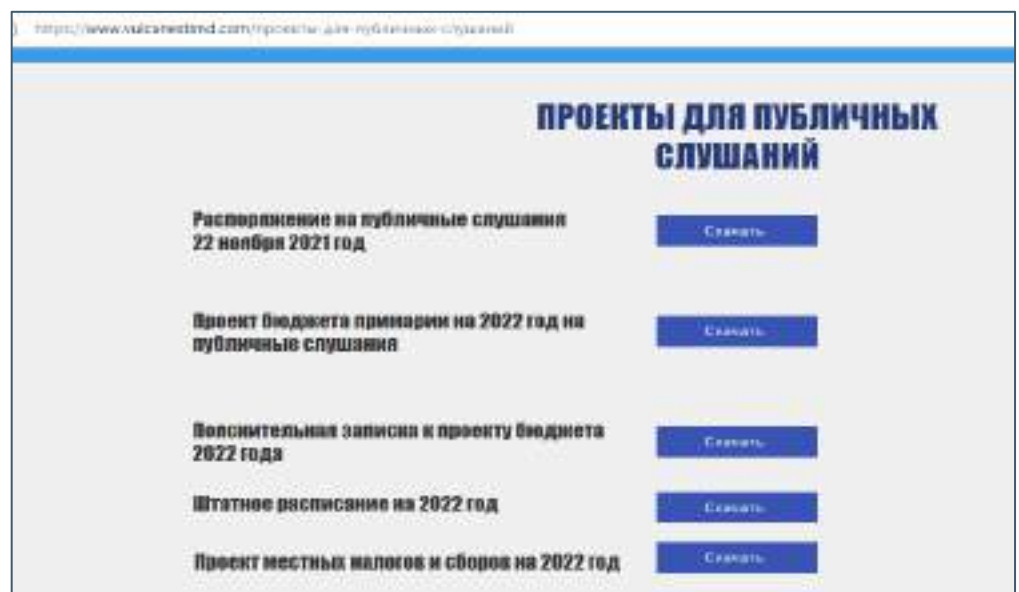


Figure 6.20 Diagram of survey response regarding important information sources

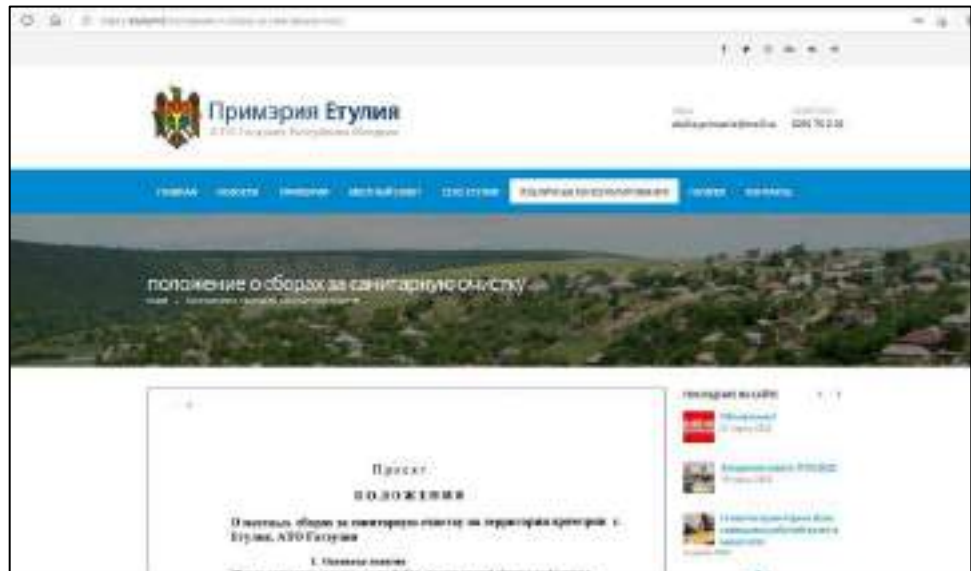
Ministries, Agencies of Regional Development and many LPAs in Moldova via their websites actively communicate with the public. For example, drafts of various decisions prepared by the city council of Vulcanesti are disclosed via a designated webpage for public consultations on draft documents (see Figure 6.21).



Source: vulcaneshtimd.com (accessed 23.03.2022)

Figure 6.21 Example of the City of Vulcanesti webpage for disclosure of drafts documents for public consultations

Even rather small settlements in Moldova actively disclose draft of regulatory documents for public comments. For example, in ATUG the Mayor office of Eutulia (a settlement with about 800 residents) has placed a draft regulation on payments for SWM collection services (see Figure 6.22).



Source: eutulia.md (accessed 23.03.2022)

Figure 6.22 Example of regulation of charges for SWM services disclosed on website of Eutulia in ATUG

Modern technologies are actively used by the local authorities to allow all residents of Eutulia to see videos records of the local council (see Figure 6.23).



Source: eutulia.md (accessed 23.03.2022)

Figure 6.23 Example of video record of local council session of 17.03.2022 disclosed on website of Eutulia in ATUG

6.7.1 Public information and consultation during EIA

The public is typically informed about each stage of the EIA procedure by announcements:

- > in the mass media;
- > on the websites of the MoEnv, rayon councils, local public administrations, and the consultants;
- > in the offices of local public administrations.

The EIA process during the preparation of the SWM project for area currently included in WMZ-1 (but not including Comrat Rayon), included a series of activities carried out by the MSPL/GIZ team in July-August 2016 for informing the public about the project and for consultation with the public regarding the EIA findings and recommendations. These activities were led by the Ministry of Regional Development and Construction (MRDC) as the project initiator/promoter. Information about the activities was presented in the report issued by the MSPL/GIZ team in 2016. The Environmental Decision based on the EIA was issued by the Ministry of Environment on 15 June 2017.

The following activities were carried out to ensure the transparency principle and environmental information accessibility in the decision process at the stage of the project planning:

- > Placing on the websites of MDRC (mdrc.gov.md), SDR (adrsud.md) and MSPL project (serviliilocale.md) of the following links to public information and consultation activities according to the planned environmental impact assessment process with the Environmental Impact Assessment Program for the planned activity:

<http://www.mdrc.gov.md/libview.php?l=ro&idc=25&id=3076&t=/Dezvoltare-regional/Reports-and-studies/System-of-Management-Integrated-of-Waste-in-The-Area-of-Management-a-Waste-no-3-from-region-of-Development-South;>

[http://www.adrsud.md/public/files/II_Evaluarea_impactului_asupra_mediului_in_Zona_3_de_Management_al_Deurilor_din_Regiunea_de_Developare_Sud.pdf;](http://www.adrsud.md/public/files/II_Evaluarea_impactului_asupra_mediului_in_Zona_3_de_Management_al_Deurilor_din_Regiunea_de_Developare_Sud.pdf)

- > <http://www.serviciilocale.md/pageview.php?l=ro&idc=35&id=1131&t=/Planificare-si-programare-regional/assessment-impact-on-the-environment/>

- > Publication of the public notice in the newspapers on consultation and draft program for carrying out the environmental impact assessment of the planned activity, including the deadlines for submitting comments:

Name of the newspaper	Locality	Newspaper No.	Date of issue
Cahul Expres	Cahul	39	08.10.2015
Time	Kishinev	38	02.10.2015

Name of the newspaper	Locality	Newspaper No.	Date of issue
Свет	Taraclia	38-39	08.10.2015
South Express	Cantemir	no.20 (90)	09.10.2015
Знамя	Ceadîr-Lunga	No. 80-81 (8258-8259)	09.10.2015

The following stakeholder engagement activities were performed as the public consultation process regarding the EIA report:

- > Disclosure of EIA report on websites of MDRC (mdrc.gov.md), SDR (adrsud.md) and MSPL project (serviliocale.md) with the following links:

<http://www.mdrc.gov.md/libview.php?l=ro&idc=25&id=3076&t=/Dezvoltare-regionala/Rapoarte-si-studii/System-de-Management-Integrat-al-Waste-in-Zona-de-Management-a-Waste-nr-3- din-Region-de-Development-South>,

http://www.adrsud.md/public/files/II_Evaluarea_impactului_asupra_mediului_in_Zona_3_de_Management_al_Deeurilor_din_Regiunea_de_Devoltare_Sud.pdf

<http://www.serviciilocale.md/pageview.php?l=ro&idc=35&id=1131&t=/Planificare-si-programare-regionala/Assessment-impact-on-the-environment/>

- > Providing by e-mail and in paper copies the non-technical summary of EIA report to LPAs of Cahul, Cania, Cantemir and Taraclia with an abstract translated in Russian for LPAs in Taraclia, Ceadir-Lunga and Vulcanesti.
- > Publications in the newspapers⁵⁷:

Name of the newspaper	Locality	Newspaper No.	Date of issue
Cahul Express	Cahul	28	21.07.2016
Time	Kishinev	23 (2162)	22.07.2016
Свет	Taraclia	41	21.07.2016
South Express	Cantemir	no.14 (108)	22.07.2016
Знамя	Ceadîr-Lunga	29 (7796)	22.07.2016

- > Public meetings were held in Cahul (03.08.2016, with 37 attendees including 21 women and 16 men), in Cania (28.07.2016, with 67 attendees including 28 women and 38 men), in Taraclia (04.08.2016, with 33 attendees including 12 women and 21 men)

⁵⁷ Copies of the publications are available following the link:
<https://cloud.mail.ru/public/JsqE/AuxwN3oHf>

As stated in the public consultation report 2016, no suggestions/objections from concerned public which could be considered relevant for making changes in the proposed project were received during the public consultation procedure on the EIA. The participants expressed their support to the proposed improvements in SWM system within the proposed project. The Minutes of Meetings and lists of questions and answers are available.

6.7.2 Stakeholder workshops

Stakeholder workshops and teleconferences were held in September 2022 with participation of representatives of MoEnv, EPIU, EBRD and the mayors or deputy mayors of the largest towns of WMZ-1 (Cahul, Cantemir, Ceadir-Lunga Comrat, Taraclia on 09.09.2022 and on 16.09.2022). Discussions during the workshops facilitated by the Consultant were focused on selecting the best organisational setup for intermunicipal cooperation essential for successful establishment and operation of the future waste management system in WMZ-1. A teleconference was also held (on 16.09.2022) with the mayor of Cania. Even though Cania is not a large LPA and not a residence municipality for the Rayon administration, consultation with the LPA is important, as it is proposed to establish a TS on the territory of Cania municipality. The municipality's agreement is required for the transfer to the state of the ownership of the land plot selected for the TS in Cania.

7 Assessment of Project impacts

The following Chapters include a preliminary assessment of potential impacts caused by the Project and the recommended mitigation measures.

The following phases of the proposed Project are considered in this preliminary assessment:

- > Pre-construction phase;
- > Construction and supply of equipment;
- > Operation and maintenance;
- > Closure and decommissioning.

7.1 Types of impacts

The assessment is related to environmental and social impacts of the proposed Project activities during the construction, operation, closure and aftercare phases for the proposed regional sanitary landfill, as well as for the construction and operation phases of waste sorting station and of composting station (both proposed to be located close to the regional sanitary landfill) and the proposed waste collection and transfer system, as well as for closure and remediation (capping) of the existing dumpsites.

Most of impacts associated with construction and operation of landfill and other SWM infrastructure facilities, as well as for capping of existing dumpsites would be similar and thus would require similar mitigation measures. Due to the difference in scale of facilities and respective construction sites, major attention during the assessment of impacts is focused on the regional landfill (LF), sorting station (SS) and composting station (CS), while the collection points and transfer stations are not subject to detailed assessment.

Description of specific impacts in each chapter is followed by description of proposed mitigation measures.

The proposed Project is aimed to improve waste collection, transportation, treatment and disposal operations based on the establishment/construction of the sanitary landfill, sorting station and composting station (in Cahul), as well as construction of waste transfer stations (in Cania, in Comrat and in Taraclia). Impacts related to this phase of the Project scheduled for about 2 years will mostly have a relatively short duration.

Due to the nature and scale of the Project activities mainly envisaged with residential areas and existing dumpsites the following impacts will not likely be significant:

- > Loss of natural habitats, native species, introduction of alien species;
- > Impact on forest, fishery and mineral resources, handling of surplus soil;
- > Changes in surface run-off and coastal structures;
- > Impact on cultural heritage sites;

- > Impacts on indigenous peoples (there are no indigenous peoples in the country);
- > Thermal pollution and electromagnetic radiation;
- > Transboundary impacts (even though WMZ-1 is located close to the border with Romania and border with Ukraine, the improvement of waste management services in WMZ-1 will have local significance and will not cause negative impact on the territory of the neighbouring countries).

7.2 Uncertainties

The key uncertainties and data gaps for the assessment of impacts at the present stage of the Project preparation are related to the following:

- > Envisaged changes in capacity and layout of proposed infrastructure (regional landfill, sorting station and composting station in WMC near Cahul, as well as TS in Cania, TS in Taraclia and TS in Comrat), access roads, connections to water supply, power supply, telecommunication system, etc. – this is due to the changes in the Project concept in 2022;
- > Need for verification of information on land ownership conditions for the proposed sites, activities of any waste pickers, informal recyclers, informal land users, etc. that could be potentially affected by the Project;
- > Need for detailed topographical surveys and studies of geotechnical and hydrogeological conditions of the sites selected for SWM infrastructure facilities in WMZ-1 including, inter alia, the assessment of potential risks related to soil and groundwater conditions at Cahul site;
- > Need for updated information regarding the protection zones of water intakes and surface water bodies, status of biodiversity, protected nature areas and historical/cultural heritage sites – the information will provide a baseline for the monitoring programme;
- > Schedule for the Regional Operator establishment, for operations/integration of smaller providers of SWM services;
- > Quality of SWM services and performance of service providers within the future IWMS in WMZ-1;
- > Schedule for closure and remediation of all dumpsites in WMZ-1
- > Potential for landfill gas generation at the regional landfill and at the remediated (capped) dumpsites;
- > Feasibility assessment for production of RDF (in one or more WMZs) and using it as an alternative fuel for cement industries and/or other clients.

It is expected that a more detailed assessment of impacts will be made, and the mitigation measures will be elaborated during the EIA performed according to the national procedure at the later stage of the Project preparation, when many of the current uncertainties and data gaps get resolved.

8 Impacts and Mitigation Measures during Pre-construction Activities

In general pre-construction activities are those that are necessary for fixing locations of project components, completing engineering documents and collecting environmental data. They provide essential information for determining project feasibility and developing project description used during environmental studies.

Pre-construction activities for the proposed Project include:

- > Feasibility Study and its updates
- > Signing of loan agreement
- > Mobilisation of SWM group in NOIEP of MoEnv (it is expected that PIU at RO will be established when the new infrastructure facilities and equipment are operational)
- > Completion of EIA with public consultations according to the national procedure;
- > Procurement planning, tendering, contracting, engineering design, obtaining of approvals and permits for construction and supply of equipment, etc. with mitigation measures taking into consideration the EIA recommendations.

The impacts which may appear during construction and operation stages of the proposed Project (e.g. traffic safety, soil erosion, air and water pollution, impacts on habitats, nuisance for communities, work with hazardous substances, identification of borrow sites for mineral construction material required for landfill development, etc.) shall be taken into consideration during the design stage to ensure adequate mitigation of environmental and social adverse impacts.

It is expected that the proposed Project will not require any physical displacement. However, the EIA during the pre-construction activities should identify any existing issues related to possible economic displacement that can be full, partial, permanent, or temporary and be caused by restrictions imposed during the Project activities (e.g. construction of access road, the landfill construction and operation, the dumpsite closure and remediation) and resulting in loss of access to physical assets or natural resources irrespective of mechanism used for introduction of such restrictions. If relevant, a Compensation and Livelihood Restoration Framework could be prepared for the Project and expanded to Compensation and Livelihood Restoration Plans for implementation of site-specific components of the Project.

The measures for mitigation of the impacts identified at this stage shall be integrated into the design documentation and contractual clauses for contractor(s) to ensure their proper implementation.

The main issues to be considered at the design stage of the Project include the following:

- Optimal waste collection and disposal scheme, adequate capacity of landfill and other SWM facilities for the planned period within the suitable site and access to the facilities;
- Identify existing borrow sites (quarries) that could be used for the landfill development, to the extent possible, eliminate the need for opening the new borrow sites;
- On steep slopes and along riverbanks erosion protection with gabions, gravel or vegetation shall be included in design, if relevant;
- Storm-water facilities shall be included in the design taking into account the risk for pollution of surface and groundwater resources;
- Best management practices applied for similar projects shall be studied to ensure that the most relevant and adequate mitigation measures and practices are considered;
- All relevant permits shall be obtained prior to commencement of construction activities, including positive resolution issued by the Environmental Expertise Authority;
- During preparation of the bidding documents for procurement of contractor for construction works careful consideration should be given to reflecting the EBRD Performance Requirements;
- Procurement of consultancy services should be arranged for adequate supervision of construction works (by the Project Implementation Support Consultant) and capacity building of the operator (by the Corporate Development Consultant);
- Project monitoring program should be agreed with the EBRD, the local authorities and possibly other parties (e.g. NGOs).

The main issues to be considered at the pre-construction stage would include the following:

- stakeholder engagement program focused on involvement of all urban and rural municipalities in implementation of the new municipal solid waste management system in WMZ-1;
- consultations for step-by-step increase of user charges for households and other clients if the waste management system, establishment of waste registration system and waste tipping fee (gate fee) by the time, when all elements of the new waste management system are operational;
- planning for smooth introduction of the new system elements with regard to technical and social aspects;
- preparations for coordination of activities planned in WMZ-1, exchange of experience (lessons learned);

- > planning and allocation of funds for closure and remediation of existing dumpsites;
- > elaboration of enforcement measures for prevention of waste dumping;
- > planning of public awareness-raising campaign for prevention of further dumping of waste;
- > training of the staff;
- > establishing a procedure for regular reporting to the EBRD and the local stakeholders.

Many of the above listed activities will be continued during later phases of the Project.

9 Environmental Impacts and Mitigation Measures during Construction

Environmental impacts and mitigation measures related to the construction phase of the Project are in detail discussed in the following sections of this chapter. Their summary is provided after the description.

9.1 Emissions of pollutants to air during construction

Air pollution occurs during construction works and includes release of dust from digging-loading works, earthworks, establishment of earth access roads, operation of heavy machinery and construction equipment, emission of harmful substances from combustion of diesel used by transportation means and machinery during the construction works, emissions from welding, concrete-mixing, asphalt-placing activities, as well as dust caused by improper storage of friable construction materials and non-timely disposal of friable construction waste. Dust and (in case of asphalt works) the bitumen smoke arising from construction activities may have negative impact on the ambient air quality. However, there are no off-site receptors within 500 m of the main construction sites for the proposed SWM infrastructure facilities, and hence the potential for nuisance impacts is limited. The contractor employees involved in construction works will be the on-site receptors. It should be noted that these impacts will occur during the construction works but will only be short-term and affect different people at different times. No major air pollution is expected as long as proper work methods and equipment operation practices are applied.

To prevent or minimize the potential emissions to air during construction works the following mitigation measures are recommended:

- > Sprinkling of water on unpaved, non-vegetated surfaces to minimize airborne fugitive dust and during earthmoving activities, prior to clearing, and before excavating, backfilling, compacting, or grading;
- > Post and enforce speed limits for vehicles to reduce airborne fugitive dust from vehicular traffic;
- > Allow site access only to authorized vehicles;
- > Keep soil moist while loading into dump trucks;
- > Keep soil loads below the freeboard of the truck;
- > Tighten gate seals on dump trucks;
- > Trucks loaded with loose construction materials (such as gravel, sand, soil, etc.) shall be covered to minimize dust emissions during transportation;
- > When feasible, shut down idling vehicles and equipment;

- > Train workers to handle construction materials and debris during construction to reduce fugitive emissions;
- > Where possible stockpiling of friable material should be avoided, and in-time delivery should be practiced;
- > Conduct dust-depressing measures aimed at prevention of air pollution through watering of access roads, construction site, construction camps;
- > Develop a traffic management plan to ensure smooth traffic flow and safety both for workers and the passing traffic;
- > All vehicles must be regularly checked and equipped with effective exhaust mufflers according to the requirements of relevant national legislation.

9.1 Change in drainage pattern

No major changes in drainage pattern will be caused during procurement of new waste collection containers and waste collection vehicles during establishment of new waste management system in WMZ-1. Measures for management of surface runoff should be included into design for upgrading/establishment of the waste collection points, preparations for closure of dumpsites with clean-up of areas adjacent to the dumpsites.

Changes in the local drainage pattern during establishment of the landfill and other SWM infrastructure facilities will be related to construction of surface runoff management system and leachate management system. The runoff collection system for the landfill and other SWM infrastructure facilities are designed with the objective to keep clean surface runoff separate from the contaminated runoff and leachate.

During construction phase the water will be mostly used during soil moving works for dust control and for compacting a layer of clayey material an element of the landfill's bottom/base liner to achieve its lower permeability; when clearing vegetation and grading; for unpaved road traffic; for making concrete for foundations; and for consumptive use by the construction crew. Water will likely be trucked in from off-site by means of special vehicles. The quantity of water used for construction activities will be relatively small and will not cause any changes to existing drainage pattern.

Construction activities for the proposed development can have minor impact on hydrology and water quality of the area, as the construction waste will not be leached into groundwater or any surface water body.

Grading associated with earthworks during construction phase could cause runoff to be directed away from the construction sites. In addition, rain falling directly on the landfill area or other construction site will flow under gravity to site gullies and may discharge into depressions and potentially affect the soil quality in the downstream areas. Overall, the impacts on surface water resources are related to

the project footprint (e.g., land disturbance, erosion, changes in runoff patterns, and hydrological alterations, etc.).

Site-specific drainage control is required to ensure that surface water runoff is properly managed. In particular, the following mitigation measures are recommended:

- > Minimize the planned amount of land to be disturbed as much as possible. Use existing access roads and quarries, if possible;
- > Locate access roads to minimize stream crossings;
- > Construct drainage ditches where necessary, use appropriate structures at culvert outlets to prevent erosion;
- > Clean and maintain drainage ditches and culverts regularly;
- > Use special construction techniques in areas of steep slopes, erodible soils and stream crossings;
- > Do not alter or restrict existing drainage systems, especially in sensitive areas such as erodible soils or steep slopes;
- > Dispose of excess excavation materials in approved areas to control erosion and minimize runoff.

Considering the fact that the proposed landfill site is located in the area with identified layers of clayey deposits and depth to groundwater exceeding several meters, it is not likely that surface runoff can penetrate into groundwater within the site.

9.2 Flooding potential

The Prut River is the major river nearest to the site proposed for establishment of the regional landfill and other SWM facilities. The proposed site is located in a zone elevated about 100 m above the Prut River valley. The impact from flooding is likely to be negligible. Due to establishment of drainage ditches/culverts the snowmelt and rainfall water will be drained from the proposed landfill (WMC) area and discharged into the natural drainage flow (the brook directed south-west of the site and diverted by the irrigation system within the arable lands).

Flooding potential of waste collection points and TS sites will be assessed taking into consideration the historical information about local floods and climate change trends.

9.3 Landscape impacts of excavation and construction

The Project activities related to establishment of the sanitary landfill and other SMW infrastructure facilities will be carried out within the area affected by dumping of waste, by cattle grazing and traffic of vehicles along mud roads. The proposed Project activities will include upgrading of the access roads, which will assume a certain scope of landscape engineering including levelling of the area and establishment of side ditches, which will provide more regular landscape features. Construction of landfill and other SWM facilities will be carried out in phases allowing establishing facilities with the limited area of excavation and construction activities at a time. The design of landfill and other SMW infrastructure facilities will be prepared to ensure a minimum scope of soil works changing the existing landscape. The excavation and construction works will be related to establishment of landfill cell 1 as a large shallow basin with a flat bottom, construction of several low-level buildings, a fence, a weighbridge, a system of berms along the borders of waste disposal cell, temporary stored soil that will be later used for covering of waste.

9.4 Pollution of surface water and groundwater during construction

Pollution of water resources during construction phase usually happens as a result of improper storage of construction materials, construction waste and excavated materials, as well as spillage of fuel, oil and other substances during construction works.

To prevent pollution of surface water and groundwater resources the following mitigation measures shall be implemented during construction works:

- > To reduce the likelihood of contamination due to spillage of oil from construction equipment and wastewater from construction camps, the sites for these areas shall be carefully designated and proper technical condition of machinery and equipment shall be ensured. In addition, sand or fine gravel should be spread on the ground in the locations designated for parking and servicing of construction machinery. In case of spillage the polluted layer should be removed and replaced with new layer of sand or fine gravel;
- > Sections located very close to drainage ditches/culverts shall not be used for construction material storage and temporary accumulation of waste;
- > Provide for covered zones of preliminary accumulation of construction materials and wastes in order to minimize formation of leachate as a result of rainfall;
- > All vehicles must be regularly checked, and their normal operational technical conditions shall be ensured. In case any leakage of oil or other liquid is observed, the vehicle must be moved to a paved impermeable area and be immediately fixed.

The proper supervision should ensure that the risk of soil and groundwater contamination during the construction works is very limited.

9.5 Wastewater generation and disposal during construction

During construction stage the water will be used at construction camp for drinking, cooking, washing and bathing purposes, as well as at construction sites for construction activities (i.e., watering of the construction sites, washing the wheels, etc.). The facilities for daily accommodation of the workers shall be equipped with systems for water supply and sewerage collection. The wastewater from construction camp will be collected in a septic tank made of impermeable material (the minimum volume of septic tank is specified in the locally applicable regulations). The tank will be regularly emptied by a special vehicle, which will transport wastewater to a centralized wastewater collector in accordance with prior agreement with the local authorities.

Improper operation of the sewerage system and wastewater collection tank may have minor negative impact on the site as a result of pollution of surface runoff accumulated in seasonal pools. At the construction site, in order to minimize negative impacts from wastewater generation and discharge, the following measures are recommended for application:

- > Avoid potential spills; washing of vehicles and equipment on the site to shall be restricted;
- > Chemicals and other liquid and solid dangerous materials must be managed properly;
- > Wastewater from the accommodation facilities shall be collected and adequately removed from the site.

9.6 Hazard vulnerability during construction

Overall, the term "natural hazard" refers to all atmospheric, hydrological, geological (including seismic), and wildfire phenomena that, because of their location, severity, and frequency, have the potential to affect humans, their structures, or their activities adversely. The natural hazards relevant for the landfill site and other SWM infrastructure include drought, earthquake, flood and wildfire. The site is located in Moldova, where the risk of earthquakes is rather high, so all the landfill and other SWM facilities should be designed, constructed and operated with respect to this fact. Drought and extreme precipitation (rain, snow) might affect the waste and soil humidity and runoff conditions during soil works.

Mitigation of disasters usually entails reducing the vulnerability of the elements at risk, modifying the hazard-proneness of the site. Mitigation measures to address such impacts usually include specific safety or vulnerability reduction measures incorporated in the design documents developed for construction of landfill and

other SWM infrastructure or building of protective devices (if relevant). To properly deal with hazards and ensure timely implementation of mitigation measures it is recommended that a Disaster Management Plan be developed for the landfill and other SWM facilities jointly with relevant authorities. The Disaster Management Plan should include measures addressing the following issues:

- > Natural hazard prediction;
- > Emergency preparedness;
- > Disaster rescue and relief;
- > Post-disaster rehabilitation and reconstruction;
- > Educational and training activities.

To reduce hazard vulnerability at the sites of landfill and other SWM facilities the following measures are recommended:

- > Construction of cut-off drains;
- > Establishment of buffer zone around landfill and other SWM facilities;
- > Ensure preservation of safety rules by workers, while dealing with hazardous and toxic materials;
- > Compliance with rules on storage and handling of construction materials, fuel, oil products, chemical substances, etc.;
- > Regular inspection of landfill and other SWM facilities to ensure their proper operation;
- > Train workers on how to act in emergency situations;
- > Establish reliable communication between the operators of landfill and other SWM facilities and the respective local authorities, first-aid service, rescue service, police office, fire office, operators of electricity, gas and water supply utilities to ensure adequate response in case of emergency.

The landfill is located in a seismic activity region (7 points according to the international scale). However, sufficient engineering measures for soil collapsing elimination and watering of subsoils are implemented by a geological barrier and impermeable liners as well as surface water and melt water derivation around the landfill. Since the bottom liner is composed of natural and synthetic materials having certain strain and elasticity. The flexible drainage layer and elastic synthetic materials will be used for leachate collection system. It is assumed that there is only a minor risk for failure in the integrity of the liner in case of earthquake.

9.7 Noise during construction

The primary source of noise during construction will be heavy equipment (e.g., bulldozers, graders, backhoes, excavators, dump trucks, etc.) and vehicular traffic. The magnitude of construction noise impacts depends upon the construction activity. Noise levels generated by construction equipment, duration of the activity is considered to be limited due to significant distance (more than 1 km) from noise-sensitive receptors (residential areas), and location of the landfill site in a depression on a slope with soft soil and vegetation. Construction sites for TS are also located far enough from residential areas.

Elevated noise levels at the construction site are inevitable, but they are temporary and might generate short-time impact. Use of machinery and equipment during construction and operation of landfill will be planned to ensure that the estimated noise levels will not exceed the levels acceptable for the key receptors (residents). The allowable noise levels are regulated by the Sanitary Norms applicable locally. Due to complicated landscape conditions the estimates cannot be based on calculations or modelling but should be verified by instrumental measurements of noise levels at the receptors.

The following mitigation measures are recommended to reduce noise impacts:

- > Limit noisy activities to the least noise-sensitive times of day (weekdays only between 7 a.m. and 10 p.m.);
- > All machinery and equipment should have sound-control devices no less effective than those provided on the original machinery/equipment. Motorized equipment should be adequately muffled and maintained;
- > Whenever feasible, schedule different noisy activities (e.g., earthmoving, truck unloading, etc.) to occur at the same time, since additional sources of noise generally do not add a significant amount of noise. That is, less-frequent noisy activities would be less annoying than frequent less-noisy activities;
- > To the extent feasible, route heavy-truck traffic away from residences and other sensitive receptors;
- > Workers in the vicinity of sources of high noise shall wear necessary protection gear;
- > Barriers (e.g. fences) or purpose-built acoustic screens should be used to reduce the noise reaching worker's camp, where practicable;
- > Avoid use of percussive and impact tools wherever possible;
- > Machinery in intermittent use should be shut down or throttled down to a minimum when not in use.

9.8 Odour nuisance during construction

Earthworks and civil works are not among the activities considered likely to produce odour emissions. It is considered unlikely that activities associated with the construction phase would result in the generation of odours other than odours from vehicles and construction machinery. It is therefore considered that the odour impact during the construction phase would be minor.

9.9 Spillage of hazardous waste during construction

During construction of the landfill and other SWM facilities no spillage of hazardous or medical waste is expected. Relevant measures will be implemented during operation and maintenance of construction machinery and vehicles for preventing spills of fuel, waste oil and chemicals. These measures will include:

- > Keeping vehicles and equipment in good working order to prevent oil and fuel leaks;
- > Training of workers to promptly clean up any fuel or oil spill;
- > Availability of portable spill containment and clean-up equipment in all vehicles.

9.10 Impact on biodiversity

The construction impacts on biodiversity would be proportional to the amount of disturbance and habitat fragmentation. It should be noted that the sites proposed for landfill and other SWM facilities do not include a critical habitat of any plant or animal species, and there are no protected natural resources nearby the sites. The likelihood and significance of impacts on biodiversity are low.

Site fencing will be developed during the landfill construction to prevent site access by cattle and wildlife species.

9.11 Sustainable natural resources management

Taking into account absence of natural water bodies immediately nearby the Project sites, the impact on biota and water resources should be considered negligible. The construction activities for remediation of existing dumpsites will prevent pollution of soil and water bodies with waste. The locally available construction materials will be used wherever applicable. Requirements for sustainability of supply chain for the materials (e.g. delivery of sand and gravel from authorised borrow sites, origin of materials not from areas of high ecological value, monitoring of origin) will be included in the contracts and checked during the construction supervision.

9.12 Greenhouse gas emissions

During construction phase, no landfill gas will be generated, and hence no significant emissions of greenhouse gases are expected. However, there could be limited emissions of greenhouse gases by construction machinery and equipment, transportation vehicles, welding works, etc.

The following measures will ensure minimization of contribution of construction activities in generation of greenhouse gases:

- > Develop a traffic management plan to ensure smooth traffic flow;
- > Regularly check technical condition of vehicles and machinery, and ensure that all the vehicles are equipped with effective exhaust mufflers;
- > Turn off the construction machinery and equipment that is not in use.

9.13 Climate change and adaptation

The construction works will be mainly carried out during summer months. Probability of heavy rains (cloudbursts) and extremely hot temperatures should be considered during planning of the works. On the other hand, probability of severe winter frosts and heavy snow should be addressed during planning of equipment and construction site maintenance.

9.14 Summary of assessment

Environmental impacts during the construction works are expected to be irreversible, short-term and site-specific. They could be mitigated basing on the known good practices. Summary of identified environmental impacts related to the proposed construction activities and measures recommended for mitigating the potential negative impacts is presented in Table 9.1.

Table 9.1 Assessment of environmental impacts during construction of landfill and other SWM facilities

Impact	Assessment	Mitigation measures required
Change in drainage pattern	Negligible	-
Flooding potential	Negligible	-
Landscape impact of excavation and construction (landfill and access road)	Minor positive	-
Contamination of soil, surface water and groundwater	Minor negative	Installation of bottom liner in landfill cells and leachate pond, surface runoff management, at construction sites, spill control, at construction sites

Impact	Assessment	Mitigation measures required
Air pollution (dust and emissions from machinery, dust during soil works)	Moderate negative	Maintenance of equipment, sprinkling of soil, covers during soil transportation, low on-site vehicle speed
Noise from construction machinery and vehicles	Moderate negative	Construction during day hours, use of silencers, low on-site vehicle speed, PPE for workers
Odour nuisance	Minor negative	Maintenance of vehicles and machinery
Biodiversity	Negligible	-
Management of natural resources (land, water)	Negligible	Use local materials where applicable
Greenhouse gas emissions	Minor negative	Use efficient machinery and work schedule
Climate change and adaptation	Negligible	-

10 Social Impacts and Mitigation Measures during Construction

Construction of the landfill and other SWM facilities with upgrading of respective access roads is planned on a public land and is not expected to require any permanent or temporary acquisition of land. The construction works can be carried out with no disruptions in any public services.

Key adverse social impacts of construction activities for establishment of landfill and other SWM facilities usually include the increased traffic, noise, aesthetic degradation, and property devaluation nearby the sites. Impacts of these types will not be critical for the proposed Project, because the sites selected for landfill and other SWM facilities are located far from residential areas, mostly next to the existing dumpsites.

Soil works for closure and remediation of existing dumpsites, even of these located close to residential areas, will be short-term activities resulting in improvement of living conditions in nearby residential areas.

It is expected that contractors of the infrastructure of sanitary landfill and other SWM facilities will bring their qualified staff but will also recruit local daily labourers for construction activities. Therefore, the assessment is that construction of the sanitary landfill and other SWM facilities will have a positive impact on local employment.

Social impacts and mitigation measures related to the construction phase of the Project are in detail discussed in the following sections of this chapter.

10.1 Socio-economic and cultural impacts

Increase of user charges for waste collection services in WMZ-1 required for proposed improvement of the services and establishment of the sanitary landfill and other SWM facilities will be the key socio-economic economic impact of the proposed Project. All households in the project region will be affected by increase of user charges. The charges will be also increased for other users of the waste management system (institutions, shops, hotels, restaurants, etc.). To mitigate the major negative impact of the user charge change it is proposed to increase the charges already during the construction and establishment of the new waste collection system. Increase of user charges can bring essential improvements of waste management services only if collection rate of the user charges is high. Otherwise, the households will not be encouraged to pay more for the services. Thus, the waste system user charge increase will have a direct socio-economic and an indirect cultural impact.

Socio-economic impact of the Project activities for closure and remediation of dumpsites and establishment of integrated SWM system in WMZ-1 will also be associated with potential loss of access to waste and means of livelihood for informal waste pickers (if any identified prior to the construction works). Measures to be considered for livelihood restoration of the informal waste pickers within the Project

could include training of waste pickers and providing them job opportunities within the solid waste management system. A framework document including the livelihood restoration measures could be prepared during the EIA. It could be further developed and implemented as a specific plan tailored for restoration and improvement of livelihood for waste pickers.

Direct socio-economic impacts will include creation of new jobs for construction workers and the associated income generated during the construction works. It is expected that the contractor will hire local drivers for transportation of construction materials. This employment opportunity will be available for about 2 years. Indirect impacts will occur as a result of the new economic development and will include new jobs at businesses that support the expanded workforce or provide project materials. Meantime, as the landfill is constructed for the whole WMZ-1, the employment impacts on the local economy are likely to be negligible. The majority of the new employment associated with the construction works will be of a limited scope and temporary nature.

Land use impacts are also considered to be negligible as the landfill, other SWM facilities and access roads are located on the publicly owned land and no acquisition of privately owned land is expected to happen to ensure availability of the sites. However, transfer (transformation) of land from pasture category for other land use category will be required in accordance with the national procedure. No impact is foreseen on the residential areas of nearby communities, as those are located at a sufficient distance from the landfill site. However, the short-term impacts will be related to restricted access for residents of adjacent areas to the Project sites. The restrictions will need to be established, the local residents consulted and informed prior to the construction works.

Direct impacts to cultural resources (e.g. tourist destinations, decorated springs, areas of traditional markets, festivals, etc.) or historical heritage could occur during soil excavation, but the impacts to cultural resources are very unlikely. However, the following mitigation measures are proposed to prevent cultural resource impacts if any occur:

- > Use existing roads to the maximum extent feasible to avoid additional disturbance to land surface and structures;
- > Periodically monitor cultural resources (if any) in the vicinity of the construction site;
- > An unexpected discovery of cultural resources during construction phase shall result in an immediate stoppage of civil works in the landfill site. The relevant information should be provided to the archaeological agency of Ministry of Culture, which after due consideration of the findings will recommend whether the works can be continued, or the design must be revised;
- > Educate workers and the public on the consequences of chance finds and unauthorized collection of cultural findings.

10.2 Labour and Working Conditions

According to the national Labour Code, employers - as part of construction process management - need to assess potential risks to ensure the safety and health of workers (depending on the size of the construction company, such assessment can either be performed by company's specialists or hired experts), as well as inform workers on safety practices and develop action plans to be followed in case of emergency. The construction company can establish a special committee dealing with worker's health and safety issues. The construction company shall ensure appropriate working conditions, so as the workers can implement their working duties. In particular, the construction company shall ensure:

- > Proper working condition of vehicles, machinery, mechanisms, equipment and other devices;
- > Timely provision of appropriate technical documentation;
- > High quality and timely provision of materials and tools to be used by workers;
- > Reliable and uninterrupted supply of electricity, gas and other sources of energy;
- > Safe working conditions for employee's health (preservation of safety norms and rules, proper lighting, heating, ventilation, level of noise lower than the minimum norms accepted, dust, vibration, and other factors that may negatively impact the health of employee);
- > Presence of emergency exits that are permanently accessible, free of physical obstacles. All workers should be made well aware of location of emergency exits;
- > Availability of fire extinguishers in all the vehicles and construction sites;
- > Availability of first-aid kit in all the vehicles and construction sites. All the workers shall be trained in delivering first aid and should be informed about the location of first-aid kit;
- > Close monitoring of workers' physical condition; strictly prohibit the use of alcohol, psychotropic drugs and narcotics during the works.

Employers are responsible for comprehensive promoting healthy work environment, for encouraging the workers encourage workers to take responsibility for their own health, safety and wellness, for creating environments that make the healthy choice the easy choice, for providing information and resources to assist the workers to make health choices and to maintain good health, to make work a healthy life experience.

In case the waste pickers get involved in arrangements for collection and sales of recyclables, their working conditions will be improved.

10.3 Occupational health and safety issues

Potential impacts to workers and public health and safety from construction works within the proposed Project would be similar to those expected for any construction project associated with earthmoving, use of heavy machinery and equipment, transportation of construction materials, and installation of industrial facilities. Most accidents at excavation and construction sites result from overexertion, falls, or being struck by equipment. Construction-related illnesses could also result from exposure to chemical substances from spills. In addition, health and safety issues include working in potential weather extremes and possible contact with natural hazards, such as uneven terrain and dangerous plants, animals, or insects. All personnel involved in excavation and construction would utilize appropriate safety equipment and would be properly trained in required occupational health and safety practices.

Measures to be carried out in order to mitigate occupational health and safety impacts include:

- > Conduct a safety assessment to describe potential safety issues (site access, construction, work practices, security, transportation of heavy equipment, traffic management, emergency procedures, and fire control and management) and measures to mitigate them;
- > Develop and implement a health and safety program for workers and the public, addressing all of the safety issues identified in the assessment and all applicable safety standards;
- > Identify all applicable occupational safety standards and establish safe work practices;
- > Ensure adequate provision of PPE, training on its use, timely cleaning and replacement of PPE;
- > Closely monitor application of appropriate occupational health and safety practices at the construction sites, in particular while working with electrical equipment, welding equipment, heavy and lifting mechanisms, etc.;
- > Consult with local planning authorities regarding traffic and traffic hazards. Address specific issues in a traffic management plan;
- > Develop a fire management strategy to minimize the potential for a human-caused fire and establish fire safety evacuation procedures;
- > Train workers in the early detection of fires;
- > Fence and closely monitor the construction sites to prevent public access;
- > Use appropriate procedures for storage and transportation of explosive materials, including appropriate signage indicating their location;

- Institute proper training protocols for employees working with dangerous materials.

10.4 Visual impacts, including view from the main road

Assessment of visual impacts, including view from the main road is largely based on professional judgment. During the construction phase, works will be confined to the proposed Project sites. The Project infrastructure construction works will include installation of fence, establishment of paved access roads and internal roads, arrangement of offices and auxiliary facilities, and preparation of the areas for waste reception and storage. Information signs will be installed at construction sites and during remediation of existing dumpsites.

Visual impact during the construction period will result from the traffic and on-site operation of machinery. Due to landscape features and long distances from residential areas and main roads the visual impact of the Project construction sites will be negligible. The fence will not be visible from any substantial distance. Visual impacts of the landfill facilities can be reduced by painting the buildings in a colour that merges with the surrounding natural background and planting a belt of trees/bushes around the site, so that the belt could be well developed by the time of the facility operation start.

Soil excavated during construction of landfill cells will usually form 2-3 m high temporary earth bunds along the perimeter of the cell. The surrounding landscape for the most part of the year is of yellow-brown colour, the mounds will have only a marginal impact on the general view in terms of shape and colour.

Soil works for remediation of existing dumpsites will result in covering of waste with soil (with fertile layer for future vegetation development) and thus in improving the visual impression of the areas.

The degree of change to the existing landscape during the construction stage will be low. Impact on visual receptors, as well as the duration and extent of the change in the landscape quality and value, taking into account that the landscape is currently of low sensitivity and can tolerate the change, will also be low.

The following mitigation measures are recommended for during construction phase:

- Design, construct, and paint conspicuous structures to blend with the character of the surrounding environment;
- Minimize the number of structures and co-locate facility components to the extent possible;
- Bury any power cables or lines on the site in a manner that minimizes additional surface disturbance, such as within areas that are already disturbed (e.g., access road shoulders);

- > Use non-reflective paints and coatings to reduce reflection and glare. Avoid uncoated galvanized metallic surfaces;
- > Use existing roads and disturbed areas to the maximum extent feasible to avoid additional surface disturbance;
- > Lighting for facilities should not exceed the minimum required for safety and security.

10.5 Population movements

No resettlement, temporary or permanent acquisition of land, property and other assets is required for construction of the proposed landfill and other SWM facilities.

The likelihood of population growth following the in-migration of the construction workers associated with development of landfill and other SWM facilities in WMZ-1 is very limited, considering the scale of the employment opportunities offered as a part of the Project. As a minor natural decline of population is observed during the recent years in WMZ-1, it is unlikely that the trends will be impacted as a result of the Project construction works. In addition, there is general labour migration trend with some seasonal movements from rural to urban areas of Moldova and to other countries.

10.6 Economic impacts

The major economic impact during construction phase will be creation of employment opportunities for local population, as well as increase in production of materials to be used during construction process. Though these opportunities (including 10-15 drivers and 10-15 unskilled workers) will be of temporary nature, they may still provide some possibilities for the local population to find work in the region, thus indirectly leading to reduction in seasonal workforce migration. Meantime, it should be also adopted that due to the scale and nature of the construction works, overall economic impact on the regional economy will be negligible, even in the communities located nearby the construction sites. The positive effect on employment, however slight, can be increased through procurement of local goods and services.

Traffic volumes on the roadways used to access the landfill and other SWM facilities will increase during the construction periods, in order to transport construction materials and workers. Increased traffic volume may cause air pollution (dust and emissions) and noise; however, these effects will be temporary and manageable with proper planning.

The impact on farming land during construction phase of the Project is likely to be minimal, with assumption that the construction works are implemented with all the precautions and rules duly kept, in particular those regarding control of noise, dust, soil and water resources. But if there are disruptions and income is lost, this needs to be compensated.

Construction of the landfill and other SWM facilities, remediation of existing dumpsites is not expected to generate any significant additional demands on utility services (water, electricity, telecommunication, etc.). These services are required for the on-site staff and works.

Overall, the adverse impacts mentioned in this section can be sufficiently mitigated though the measures described above in this report.

10.7 Community Health, Safety and Security

During construction process, the community health, safety and security may be impacted from dust and noise caused by vehicles and machinery movement to the construction site and transportation of construction materials. It could be envisaged that during the landfill construction the daily traffic on access road to the site will include 15-20 trucks, e.g. if the largest sole delivery will be about 15,000 m³ of drainage gravel transported by 1,500 trucks, which will stay for 50% of all incoming trucks to the site over 1 year (250 working days). Considering that landfill site is located in a sufficient distance from residential areas, no increase in incidence of communicable diseases, deterioration in health or access to healthcare facilities is expected to occur during construction activities. It is expected that the trucks will come via the existing access road. It is important to underline that due to the proposed application of soil excavated during landfill construction as the material for covering of the dumpsite a major scope of soil works will be carried without transportation of any soil materials to/from the landfill.

Some minor impacts on community health, safety and security could be caused during establishment of new waste collection points, particularly in rural areas not earlier covered by regular services.

To prevent any potential negative impact on community health, safety and security the following measures are proposed:

- > Provide information about landfill development project to the mayors of beneficiary communities;
- > Install appropriate warning signs at the entrance of construction site in a visible place;
- > Fence construction site to prevent unauthorized access;
- > Use covered/closed trucks for transportation of construction materials to avoid nuisance from dust;
- > Limit speed of trucks, construction machinery passing through residential areas to minimize nuisance from noise and vibration;
- > Terminate the works at the established time (e.g. work in daylight time) and avoid increase of noise and number of peak hours.

10.8 Education

During construction phase, it is not expected that access to educational facilities will be impacted. Considering that the Project sites are located at sufficient distances from residential areas, it is not likely that Project's construction phase would lead to severance from education facilities. Meantime, education programmes may support and benefit from the Project by sharing the information about future SWM system.

10.9 Social conflict

Commencement of the Project including the regional landfill and other SWM facilities in WMZ-1 may lead to creation of tensions within and between communities; particularly due to limited number of job opportunities available during construction phase of the project. Another issue that may cause some social tension among beneficiary communities is the mechanism to be employed after completion of construction works to ensure proper operation of the landfill site, such as waste collection mechanism (the route of movement of truck that collects waste, frequency of waste removal from communities, location of waste collection points, etc.) and user charge collection principles (who collects money, what is the charge used for, who will be involved in landfill operation, why there is a need to engage a private operator, etc.).

The management of the sanitary landfill and other SWM facilities could influence the socio-economic impacts on the neighbouring communities. If the management is attentive to the concerns of the community and develops timely solutions for the anticipated concerns, then the impact could be minor. The potential conflicts could be settled when the roles and responsibilities of the SWM service providers get clarified, hopefully during the construction phase, i.e. prior to the operation start of the new SWM system. Stakeholder consultations and grievance mechanism will be established during implementation of the proposed Project for identification and resolving the social conflict.

10.10 Gender aspects

Though construction of landfill in WMZ-1 would not have direct impact on men and women's social and economic roles, however, appropriate activities should be undertaken to ensure that both men and women are provided with equal opportunities to benefit from landfill development and to ensure they are not disproportionately adversely affected by any project activities and duly consulted before and during introduction of changes in the waste management system.

Measures to ensure that gender issues are properly addressed during the construction phase include:

- > Education and awareness campaigns organized and conducted at schools, municipal halls, libraries, and community gatherings to enhance men and women awareness about the Project construction activities and future SWM system;

- > Facilitate the participation of female to provide their opinion and input on organization of waste collection services, selecting the suitable locations and equipment for waste collection points convenient for all users and safe for children, planning collection schedule and payments for the services, etc.
- > Ensure that requirements of labour code and safety rules are duly applied during construction activities;
- > Ensure that landfill facilities include separate toilets and changing rooms for men and women;
- > Organize meetings on health hazards of solid waste and on occupational health risks with men and women in local communities.
- > Provide equal employment and remuneration opportunities in the workplaces for men and women.

10.11 Impacts on vulnerable groups

It is anticipated that the Project could benefit low-income and other vulnerable groups of population by creating job opportunities and stimulating local economic growth via better services, cleaner residential areas and increased tourism. An issue of potential concern relevant for construction of regional landfill and other SWM facilities with subsequent remediation of existing dumpsites, upgrading of waste collection points would be the loss of income for waste pickers and informal recyclers (if any identified in WMZ-1).

10.12 Summary of assessment

Identified social impacts of the Project and measures required for mitigating the potential negative impacts during the landfill construction are briefly summarised in Table 10.1 below.

Table 10.1 Summary of social impacts and mitigation measures during construction of landfill

Impacts	Assessment	Mitigation measures required
Increase of user charges	Major negative	Gradual increase of user charges, enhancement of public awareness and revenue collection rate
Labour and working conditions	Negligible positive	-
Occupational health and safety	Minor negative	OHS management plan
Visual impacts	Minor positive	-
Population movements	Negligible	-
Economic displacement (users of land allocated for and adjacent to landfill and other SWM infrastructure,	Minor negative	Information, avoidance, compensation

Impacts	Assessment	Mitigation measures required
waste pickers and informal recyclers, as appropriate)		
Community health, safety and security	Minor negative	Traffic safety measures, fencing during excavation and construction activities
Education	Negligible	-
Social conflict	Minor negative	Establishment of landfill management unit and transparent procedure for regulation of landfill gate fee
Gender	Minor positive	-

11 Environmental Impacts and Mitigation Measures during Operation and Maintenance

Environmental impacts and mitigation measures relevant for the operation phase of the Project are in detail discussed in the following sections of this chapter. Their summary is provided in Section 11.15.

11.1 Air pollution

Air pollution occurring during operation phase of the new waste collection system and the sanitary landfill includes release of dust during waste and soil transportation and loading, levelling, unloading works, emissions from engines of vehicles and machinery. Compaction trucks of high capacity will be used by the SWM service providers.

It could also be expected that certain amounts of waste could be delivered to the future landfill and other SWM facilities by private and corporate cars in addition to the trucks operated by RO and other providers of SWM services. Upgrading and maintenance of access road to the landfill and other SWM facilities is important for mitigating the impact from vehicles delivering the waste.

As there are no residential areas and no stand-alone residential buildings within 1 km from the boundaries of the landfill and other SWM sites, the potential for nuisance impacts from dust and subsequent air pollution is considered to be low. The landfill and other SWM facilities will be operated in line with the good international practice and measures for prevention of impacts on land and biota around the landfill and other SWM facilities will be implemented. A fence and a belt of trees/ bushes will be established around the site as a barrier on the way of waste spreading by wind. Waste accumulated in the green belt will be regularly collected and taken to the landfill. During the windy hours the landfill operations could be stopped. Waste tipping can be carried out in a mobile tent.

Waste from landfill and other SWM facilities can be also spread by birds and animals. Fencing should limit/prevent access to the sites for animals. Bird control measures should be implemented as required (e.g. by using bird scaring kites, sound signals, trained birds of prey).

Potential sources of air pollution that can occur during the operations within the landfill and other SWM facilities include impacts on air quality arising from dust, windblown litter, fuel and lubricants, landfill gas and the potential combustion of landfill gas. Air pollution can also occur in case of fires.

Coverage of the delivered waste at the landfill site will considerably reduce emission to air.

To prevent or minimize the potential impacts the following mitigation measures are recommended:

- > Post and enforce speed limits to reduce airborne fugitive dust from vehicles;
- > Allow site access only to authorized vehicles;
- > Keep soil moist while covering of waste;
- > Keep waste collection and transportation trucks closed/covered when travelling on public roads;
- > Maintain containers and trucks for preventing spills of leachate during waste collection and transportation
- > Water unpaved roads to prevent spreading of dust;
- > Regularly check technical conditions of all vehicles operated at the landfill site. These vehicles should be equipped with effective exhaust mufflers according to the requirements of relevant national and international legislation;
- > Arrange daily coverage to control spreading of waste by wind, birds, animals;
- > Restrict access to the landfill, train the staff to ensure prevention of waste fires;
- > Monitor landfill gas emissions and arrange for their collection and utilisation, when relevant.

11.2 Change in drainage pattern

During operation phase the water will be mostly used for washing the wheels of vehicles, sprinkling the earth access roads, as well as in the administration facilities. Operation of the landfill and other SWM facilities will have minor impact on hydrology and water quality of the area, as the wastewater will be discharged into natural environment only after appropriate treatment. In case the normal operational conditions of the landfill and other SWM facilities are kept, no impact on surface runoff of areas adjacent to the site is expected. Surface runoff within the site will be managed with installation of facilities for collection of clean runoff separated from collection system for contaminated runoff and leachate. Clean surface runoff and leachate will be collected in separate ponds established on the landfill site, within the lowermost part of the area.

The following mitigation measures are recommended to ensure adequate drainage control during landfill operation phase:

- > Clean and maintain drainage ditches and culverts regularly to ensure proper removal of runoff;
- > Do not alter or restrict existing drainage systems, especially in sensitive areas, such as erodible soils or steep slopes;

- > Regularly monitor groundwater table through monitoring wells established at the site.

11.3 Flooding potential

Taking into consideration the high elevations of the site above the level of the Prut River, as well as absence of other water bodies nearby the proposed site, it is assumed that there is likely to be a very low risk of flooding. Detailed assessment of flooding risks for other SWM sites will be carried out during the design stage.

To ensure that landfill area is properly drained even in case of heavy rainfall, the landfill operator will maintain the stormwater drainage system to ensure that runoff from landfill area would not be allowed to migrate away from the site or into surface water bodies.

11.4 Landscape impacts of soil works

Major soil works are envisaged during operation of landfill, but not during operation of other SWM facilities.

Operation of the landfill assumes tipping of waste and covering it with soil. It is recommended to use locally available soil for covering the waste and to carry out this activity without making any deep excavations on the landfill site and close to it. The landfill site is located on a slope of a natural depression, which will be gradually filled up due to the landfilling. Thus, the impact of excavation and construction works during landfill operation on the landscape will be minor positive.

11.5 Pollution of surface water and groundwater

During the operation phase pollution of water resources may be caused by uncontrolled discharge of runoff or leachate, leakage from the clogged drainage systems, runoff from the elevated landfill areas. It may also occur as a result of improper maintenance of machinery and equipment operated at the landfill site, due to spillage of fuel, oil and other substances. Meantime, proper operation of drainage system, leachate collection and treatment facilities, re-use of “clean” soils as capping soils to reduce surface water runoff from the waste, as well as stabilization of stockpiled soil by re-vegetation will minimize the potential adverse influences, and will allow to keep the physical, biological and chemical impacts to the water resources at a very low level.

Rain falling directly on active waste disposal areas within the landfill excavation may lead to an increase in leachate generation. This will be mitigated through leachate management and using temporary capping throughout operation. Areas of completed landfill will be progressively permanently capped.

Rain falling directly on non-active areas within the landfill excavation will not be considered as leachate. The rainwater will flow under gravity to site gullies and ditches before discharge to the environment. In case of potential flow of rainwater

over contaminated areas, the rainwater will be collected, stored and tested for surface water quality before discharge to the environment, via gullies or ditches.

Rain falling directly on non-excavated areas of the site will not be considered as leachate and will flow under gravity to site gullies and ditches before discharge to the environment.

Establishment of the proposed landfill far from natural water bodies will minimize the inflow of surface water that may be polluted by the leachate. The landfill design, construction and operation in accordance with the EU Directive 99/31/EC on the Landfill of Waste.

Careful operation of the landfill and maintenance of leachate collection system should ensure that risk of soil and groundwater contamination is limited. This is due to the following reasons:

- > Installations for diverting the surface runoff from contact with waste;
- > Proper slope of bottom liner system resulting in a limited area where a potential leak of leachate can occur, before the leachate enters the leachate collection pipeline;
- > Accumulation of leachate in evaporation pond having impermeable synthetic bottom liner, which can be inspected regularly;
- > Leachate will be treated in a treatment plant to the effluent quality acceptable for discharge into the natural recipient;
- > Wastewater generated in the staff premises will be treated at a designated wastewater treatment plant on the site or transported to the nearest municipal wastewater treatment plant.

Groundwater monitoring program will be carried out. The layers having low permeability will prevent infiltration of leachate and protect the soil and groundwater from contamination originating from sources located on the land surface.

To prevent pollution of surface water and groundwater resources the following mitigation measures are proposed for implementation during operation and decommission phases:

- > Regularly inspect and clean drainage ditches/ culverts;
- > Regularly inspect leachate collection and treatment facilities, wheel wash system, water supply and sewerage network at administrative building to ensure proper operational technical conditions;
- > To reduce the likelihood of oil spillage from machinery and equipment, and contamination with wastewater from administrative facilities, proper technical condition of machinery and equipment shall be ensured. In addition, sand or

fine gravel should be spread on the ground in the locations designated for parking, and servicing machinery. In case of spillage, the polluted layer must be removed and replaced with new layer of sand or fine gravel;

- > All vehicles must be regularly checked, and their normal operational technical conditions shall be ensured. In case any leakage of oil or other liquid is observed, the vehicle must be moved to a paved impermeable area and be immediately fixed;
- > Groundwater and surface water quality shall be monitored at regular intervals during operation and decommission phases.

11.6 Wastewater generation and disposal

During landfill operation the water will be used at the administrative facilities for drinking, cooking, washing and bathing purposes, as well as for washing the wheels of vehicles. The facilities for daily accommodation of landfill employees shall be equipped with systems for water supply and sewerage collection. The wastewater from administration, control and staff (including sanitary) facilities will be collected in the wastewater collection tank for further treatment. Wastewater originated from washing the wheels of vehicles and through drainage system will be discharged into the surface water collection and treatment system including sand trap and oil separator and will be treated prior to its discharge into natural environment. Another option would be to use the wastewater for watering the waste. The appropriate facilities (drainage layer, leachate collection pipelines, leachate accumulation and evaporation pond with impermeable synthetic bottom liner) will be used to ensure collection, storage, treatment and discharge of the leachate. Improper operation of the drainage system, leachate collection and treatment (evaporation) facilities as well as wastewater collection tank can have medium-scale negative impact and cause pollution of soil and seasonal water pools on the territory of the former clay quarry which is a closed drainage area.

At the landfill site, in order to minimize negative impacts from wastewater generation and discharge, the following measures are recommended for implementation:

- > Regularly inspect and ensure proper maintenance of wastewater collection tank, wheel washing system, leachate collection and treatment facilities;
- > Regularly inspect and maintain the surface water collection and treatment system that includes sand trap and oil separator. Ensure regular cleaning of drainage ditches/ culverts;
- > Avoid potential spills through application of appropriate occupational rules; washing of vehicles and equipment on the site to be restricted;
- > Chemicals as well as other liquid and solid dangerous materials must be stored and managed properly;

- > Wastewater from the accommodation facilities shall be collected and adequately removed from the site.

11.7 Hazard vulnerability

The natural hazards relevant for operations of the proposed landfill and other SWM facilities include extreme weather (heavy rainstorm, snowfall, many days with extreme air temperatures, winds, drought), earthquake and fire.

To reduce hazard vulnerability at the landfill site during operation the following measures are recommended:

- > Prepare Emergency Preparedness and Response Plan, inform the workers on its provisions;
- > Regularly inspect of cut-off drains and maintain the sanitary protective zone around the landfill;
- > Ensure compliance with rules on storage and handling of construction materials, fuel, oil products, chemical substances, etc.;
- > Regularly inspect landfill facilities and infrastructure to ensure their proper operation and updating of as-built documentation;
- > Provide periodic training to workers on how to act in emergency situations;
- > Maintain reliable communication between landfill site and respective local authorities, first-aid service, rescue service, police office, fire office, operators of electricity, gas and water supply utilities to ensure adequate response in case of emergency.

The landfill is located in a seismic activity zone (7 points). However, sufficient engineering measures for soil collapsing elimination and watering of subsoil are implemented by a geological barrier and impermeable liners as well as surface water and melt water derivation around the landfill. Since the bottom liner is composed of natural and synthetic materials having certain strain and elasticity. The flexible drainage layer and elastic synthetic materials will be used for leachate collection system. It is assumed that there is only a minor risk for failure in the integrity of the liner in case of earthquake.

11.8 Noise

The primary source of noise during operation would be machinery working at site (e.g., bulldozers, dump trucks, etc.) and vehicular traffic. The magnitude of noise impacts during operation is considered to be limited due to location of the site at a significant distance from residential areas and due to the landscape features with bars and depressions playing the role of noise barriers between the landfill site and the residential areas.

Noise impacts at the operation phase could be minimized through application of the following mitigation measures:

- > Limit noisy activities to the least noise-sensitive times of day (weekdays only between 7 a.m. and 10 p.m.);
- > All equipment should have sound-control devices no less effective than those provided on the original equipment. Motorized equipment should be adequately muffled and maintained;
- > Insulate the administrative buildings at the landfill site;
- > Install sound control devices (baffles, silencers) to limit noise levels of facility equipment;
- > Landfill employees in the vicinity of sources of high noise shall wear necessary protection gear;
- > Barriers (e.g. fences, etc.) or purpose-built acoustic screens should be used to reduce the noise reaching administrative building, where practicable;
- > Avoid use of percussive and impact tools wherever possible;
- > Machinery in intermittent use should be shut down or throttled down to a minimum when not in use;
- > Personal protective equipment should be provided to employees for hearing protection, the sign boards and training procedure should be in place.

11.9 Odour

Operation of the sanitary landfill and other SWM facilities will allow to close the existing dumpsites and thus to stop odour nuisance from them for residents and visitors of the adjacent areas.

There are two main sources of odour during operation of the landfill: odour from the degradation of the organic waste and odour from the leachate pond. The key mitigation of odour nuisance will be achieved due to location of the landfill site in a depression far from residential areas and taking into consideration the direction of prevailing winds.

The mitigation of odour can be achieved by the followings:

- > Minimize duration of waste exposure at the landfill without cover, particularly during days with high temperatures;
- > Unload, spread and compact the waste in the smallest area possible;
- > Avoid parking full waste vehicles on site overnight;

- > Directly recycle leachate from sumps and drains to leachate pond;
- > Closely monitor and maintain the gas collection systems and flares;
- > Regularly inspect and maintain top cover of landfill cells to ensure its integrity and development of vegetation cover;
- > Washout vehicles and their substructure to reduce on road vehicle odour;
- > Use waste collection vehicles with containers for leachate; regularly empty the containers at dedicated leachate collection points.
- > Plan waste collection services for shortest possible storage of waste at collection points.

11.10 Spillage of hazardous or medical waste

During operation the landfill special attention should be focused on management of hazardous waste collected as a fraction of municipal waste. Negative impacts may appear if this waste fraction were not properly handled and were released to the environment as a result of accidental spills.

A set of mitigation measures to be applied to prevent spillage of hazardous or medical waste and minimize negative impacts in case of accidental spill include the following:

- > Prepare and keep updated a comprehensive list of all hazardous materials that can be occasionally delivered to the landfill;
- > Develop a hazardous materials/medical waste management plan with specific details regarding emergency response;
- > Develop a waste management plan identifying anticipated solid and liquid waste streams, and addressing inspection and waste minimization procedures, storage locations, and waste-specific management and disposal requirements;
- > Implement spill prevention and response plan with training requirements, waste-specific spill response actions, spill response kits, and notifications to authorities;
- > Train employees to promptly contain, report, and/or clean up any oil, hazardous material and/or medical waste spill;
- > Provide portable spill containment and clean-up equipment in all vehicles;
- > Develop a storm water management plan to ensure compliance with regulations and to prevent off-site migration of contaminated storm water or increased soil erosion;

- > Document accidental releases of hazardous/medical waste, corrective actions taken, and resulting environmental or health and safety impacts.

11.11 Biodiversity

Operation of landfill and other SWM facilities within the sites with disturbed habitat and remote from the protected nature areas valuable for the biodiversity conservation. The Project is not expected to pose significant negative impact on the wildlife. The areas of landfill and other SWM facilities will be fenced. Green belt and vegetation cover for the landfill and any green areas established for other SWM facilities within the Project will include the local plant species. The green belt will prevent spreading of waste by wind and will be attractive for a variety of small birds. Proper coverage of waste during operation of the sanitary landfill should result in reduced number of crows on the site. Some noisy flocks of crows typically visit the dumpsites. Closure of dumpsites and regular covering of waste at the landfill will ensure bird, vermin and rodent control. Generally speaking, the impact of landfill on biodiversity will be negligible.

11.12 Sustainable natural resources management

Issues related to management of natural resources during the landfill operation include optimisation of waste covering with soil (with proper compaction allowing to avoid using too much soil taking some share of the landfill capacity), management of water resources on the site (for keeping the clean runoff separate and available for use within the area), optimisation of vehicle routes, other energy saving measures. One of the measures for minimisation of soil use will be the application of inert waste (e.g. construction and demolition waste) as cover material during the landfill operation.

11.13 Greenhouse gas emissions during operation

Landfill gas containing GHG methane will be generated from waste throughout the landfill operation time, as well as during a long period after the landfill closure. The whole period of landfill gas generation depends on the waste type and waste decomposition processes in the landfill. Experience from other landfills indicates that the period may be as long as 70 years. The landfill gas generation capacity of a landfill changes with time.

In case an existing dumpsite has been on fire, the potential for landfill gas generation from the accumulated waste is low. Taking this into consideration, no active emission reduction measures were recommended at the existing dumpsites.

To reduce emissions of methane from the regional sanitary landfill, a system for landfill gas collection will be installed in parallel with the landfilling operations. The system will be later supplemented by pipelines and other installations for flaring, bio-oxidation or utilisation of landfill gas allowing to decompose the methane into CO₂ and water. The most feasible option could be selected and implemented at a specific stage of the landfill lifetime depending on the actual generation of landfill gas.

It is proposed to close the existing dumpsite by a soil cover with a fertile topsoil layer with grass. A soil layer with humus can ensure bio-oxidation and considerably reduce methane emission as microorganisms will, under favourable conditions, oxidise methane.

The emission reduction potential is difficult to assess as much of the landfill gas will penetrate through fissures, cracks etc. in the top cover, and most likely there will also be areas in the topsoil where humus is not present.

- > The avoidance (or proper collection) of methane emissions, which typically account for 64% and 34% in volume, respectively, of all gas generated from decomposing waste; and
- > The emissions saved when the Project allows for using the landfill gas for the generation of heat and/or electricity and the alternative source for this heat and/or energy implies the use of fossil fuels.

11.14 Climate change and adaptation

Operation of landfill and other components of the proposed SWM system in WMZ-1 will be carried out according to procedures developed during the design adapted to climate. The landfill design and development based on the best international practice allow to mitigate the impacts of extreme temperatures (e.g., lengthy too hot or too cold periods) or precipitation pattern (e.g., heavy rain, thick snow, drought), so that they are negligible for areas adjacent to the landfill. The landfill operation procedures will be updated, if necessary, according to the climate change trends. A trend to draughts (desertification of climate) in Moldova can lead to higher evapotranspiration of leachate generated at the landfill. Harvesting/accumulation of clean rainwater collected within the landfill and other SWM facilities could be relevant for sprinkling of roads, soil, vegetation and compost rows.

Engineering design and operation system of the Project facilities will include measures for strengthening the SWM infrastructure resilience to climate change, e.g., regular maintenance to ensure capacity of surface water runoff and leachate management systems, continuous and safe operation of SWM management system during extreme weather events, security of top cover for waste disposal sites, prevention of waste fires, waste slides and landslides, etc. As water is typically not efficient for extinguishing of landfill fires, the landfill operator will establish procedures and staff training to ensure security system preventing any unauthorised access to the sites, availability of enough soil for regular covering of waste including systematic compaction of waste and soil within the landfill cells, as well as implementation of general fire protection measures at all SWM facilities to keep the risk of fire low.

The following technical options for fire protection are outlined in the Feasibility Study for WMZ-1 (2015) for the landfill site and will be also relevant for the associated facilities: stormwater basin (1,400 m³), fire extinguishers placed in accordance with the local standards, storage of soil, preferably cohesive soil (a minimum capacity 500 m³).

Stormwater management system will include a network of ditches and berms that shall prevent clean water inflow from surrounding areas from entering the SWM facilities and particularly the areas occupied with waste. This will be valid during operation of SWM facilities, but also after capping of the landfill cells.

11.15 Summary of assessment

Environmental impacts of the Project and measures required for mitigating the potential negative impacts during operation of the sanitary landfill and new waste management system for WMZ-1 are briefly summarised in Table 11.1.

Table 11.1 Summary of environmental impacts and mitigation measures during operation of landfill and new waste management system

Impacts	Assessment	Mitigation measures required to reduce the impacts
Change in drainage pattern	Negligible	-
Flooding potential	Negligible	-
Landscape impact of excavation and construction during closure/remediation of dumpsites (when the regional landfill is operational)	Minor positive	-
Contamination of soil, surface water and groundwater	Moderate negative	Filling of waste in cells with installed bottom liner, surface runoff management, spill control, leachate management
Air pollution (dust and emissions from machinery, dust during soil works, spreading of waste by wind and birds)	Moderate negative	Maintenance of equipment, sprinkling of soil, covers during waste and soil transportation, management of green belt, littering control, fire control
Noise from machinery and vehicles	Minor negative	Operation during day hours, use of silencers, low on-site vehicle speed, PPE for workers
Odour	Minor negative	Maintenance of vehicles and machinery, systematic covering of waste, maintenance of buffer zone
Biodiversity	Negligible	-
Management of mineral resources (soil)	Moderate negative	Use local materials where applicable
Greenhouse gas emissions	Moderate negative	Install and operate landfill gas collection
Climate change and adaptation	Negligible	-

12 Social Impacts and Mitigation Measures during Operation

Social impacts and mitigation measures relevant for the operation and maintenance phase of the Project are described in the following sections of this chapter. The summary is provided in Section 12.13.

12.1 Socio-economic impacts

Major socio-economic impact during introduction and operation of the new waste collection system including the sanitary landfill will be related to increase of user charges for households and other customers. As it discussed during comparison of applicable alternatives, the degree of user charge increase will depend on macroeconomic conditions, but mainly on the selected option of the waste management system and the revenue collection rate. The social impacts will be related to affordability of the future user charges. Affordability threshold recommended for waste user charges based on the international practice is 1% of the average income per capita.

Mitigation of social impacts can be achieved by the following measures:

- > Development, implementation and adjustment of user charge setting strategy for households and other customers (shops, organisations, hotels, unorganised tourists, etc.);
- > Monitoring of incomes on annual basis and introducing the improvements making sure that the user charges do not exceed affordability threshold approximately estimated as 1% of average income per capita (management of the user charges will be the responsibility of municipal authorities, who will regulate the user charges for population and other users of the waste management system);
- > Introduction and maintenance of transparent system of waste registration;
- > Improvement of billing and collection system;
- > Raising of public awareness for improved collection of recyclable fractions;
- > Involvement of up to 10 waste pickers in collection of recyclables and arrangements for their marketing.

Direct socio-economic impacts during landfill operation stage include establishment of new jobs for workers involved in waste collection, transportation and disposal at the landfill site, as well as for those involved in landfill operation activities. Indirect impacts will involve new jobs at businesses that support the expanded workforce or provide project materials, and associated income. Meantime, taking into account that the landfill is constructed (probably by an international contractor with recruitment of qualified local workforce) for WMZ-1, the employment impacts on local economy will be positive, but most likely negligible.

Key adverse social impacts of landfill construction usually include the increased traffic, noise, unpleasant odours and property devaluation of land close to the landfill. Therefore the assessment is that the investment in the sanitary landfill will have a positive impact on local employment.

Introduction of organized waste collection will contribute to overall sustainable socio-economic development at local and regional level. The potential social impacts during the landfill operation stage are assessed as positive and considered to be a significant step forward towards sustainable development.

Land use impacts are considered to be minor, as the landfill is located within the community owned land, which can be transferred to other use with adequate compensatory arrangements.

12.2 Impact on cultural heritage

Impacts on cultural resources are also considered to be negligible, as the excavations have been made in the area of former clay quarry before the project, thus probability of finding or impacting cultural resources at the operation stage is almost non-existent. However, the following mitigation measures applicable for construction phase remain valid for operation stage as well, in order to prevent cultural resource impacts:

- > Use existing roads to the maximum extent feasible to avoid additional surface disturbance;
- > Periodically monitor cultural resources in the vicinity of the landfill site (if any);
- > An unexpected discovery of cultural resources during any phase of the project shall result in an immediate stoppage of civil works in the landfill site. The relevant information should be provided to the Ministry of Culture, which after due consideration of the findings will recommend whether the works can be continued, or the design must be revised;
- > Educate workers and the public on the consequences of chance finds and unauthorized collection of chance findings.

12.3 Visual impacts, including view from the main road

It is expected that landfill will be operate during 10-12 hours/day in a 7 days/week. Waste received at the landfill will be placed in cells, covered with a daily soil cover and compacted by tracking plant over the placed waste. It is estimated that the minimum disposal volume at the landfill should the landfill operation for about 20 years.

Every batch of waste disposed in the site will be covered with dredged soil of at least 200 mm thickness on a daily basis, which means that the colour of the

operational cell and the perimeter/surrounding soil bunds will merge with the background (where yellowish-brown colours prevail). The size of the waste mounds at both landfill sites will increase gradually. The expected average height of the landfill cells is approximately 10 m.

As was mentioned above, the areas surrounding the proposed landfill site (combined with sorting station and composting station) are used for agriculture - arable lands and pastures. It is anticipated that the area surrounding the landfill site will not be used for purposes other than agricultural (e.g. recreation, tourism, residential development) and is unlikely to be affected by any "deterioration" of landscape and visual amenity. Thus, it can be concluded that the visual impacts during the operation of the proposed landfill will be low.

The following mitigation measures are recommended to ensure minimum impacts during operation phase:

- > Maintain the site during operation of the facility. Inoperative or damaged equipment and poor housekeeping, in general, creates a poor image of the activity in the eyes of the public;
- > Avoid uncoated galvanized metallic surfaces;
- > Use existing roads and disturbed areas to the maximum extent feasible to avoid additional surface disturbance;
- > Lighting for facilities should not exceed the minimum required for safety and security.

After completion of the operational life of the landfill, all remaining soil mounds will be graded to merge with the surrounding landscape. Therefore, a low residual visual impact is likely, as the mounds will gently merge into the surrounding environment and the office and other facilities will have been removed. Landscaping of the site following closure will replicate as closely as practically possible, the natural features of the surrounding landscape.

12.4 Employment, labour and working conditions

A re-organisation of SWM services is expected in WMZ-1 during the Project implementation. At the present stage of the Project preparation, it is not clear whether the re-organisation would mean redundancies (due to establishment of the Regional Operator as an IMJSC) or need for additional staff to be employed by the Regional Operator and other providers of SWM services ensure including all residential areas in WMZ-1 in the integrated SWM system. The employment and staff management within the Project will be in accordance with the EBRD Performance Requirement 2.

According to the national Labour Code, employers - as a part of operation of landfill and other SWM facilities and collection of SWM in WMZ-1 - need to assess potential risks in order to ensure the safety and health of employees (depending on the size

of the operator, such assessment can either be performed by its specialists or hired experts), as well as inform landfill employees on safety practices, and develop action plans to be followed in case of emergency. The operator can establish a special committee dealing with worker's health and safety issues. The operator shall ensure appropriate working conditions, so as the employees can duly implement their working duties. In particular, the operator shall ensure:

- > Proper working condition of mechanisms, equipment and other devices;
- > High quality and timely provision of materials and tools to be used by employees;
- > Reliable and uninterrupted supply of electricity, gas and other sources of energy to ensure proper operation of landfill facilities;
- > Safe working conditions for employee's health (preservation of safety norms and rules, proper lighting, heating, ventilation, level of noise lower than the minimum norms accepted, vibration, and other factors that may negatively impact the health of employee);
- > Presence of emergency exits that are permanently accessible, free of physical obstacles. All workers should be well aware of location of emergency exits;
- > Availability of fire extinguishers in all the vehicles and landfill facilities;
- > Availability of first-aid kit in all the vehicles and landfill facilities. All the employees shall be periodically trained in delivering first aid, and should be informed about the location of first-aid kit;
- > Monitoring of employee's physical condition, strictly prohibit use of alcohol, psychotropic drugs and narcotics in work sites.

12.5 Population movements

No resettlement, temporary or permanent acquisition of privately owned land, property and other assets is required for landfill construction.

The likelihood of population growth following the in-migration of the operation workers associated with landfill development and associated facilities in communities is very limited, taking into account the scale of the employment opportunities offered as a part of the project.

12.6 Economic impacts

The sanitary landfill operation could require the following staff:

- > Managing Director/Financial administrator: 1
- > Foreman: 1

- > Control office: 2 weighbridge and waste control operators;
- > Vehicle operators: 3
- > Guard at gate: 1 (3 persons working in shifts)
- > Unskilled worker: 3

Operation of the sanitary landfill will allow for closure and remediation of the dumpsites and could result in increasing value of areas adjacent to the former dumpsites.

The overall impact of landfill operation on the regional economy and employment situation is negligible. On the other hand population of WMZ-1 will significantly benefit from establishment of organized waste removal, transportation and disposal process. Indirect positive impact on business opportunities will be related to catering services (e.g. for employees of the landfill operator, drivers of waste collection vehicles), but also assignments for consulting companies (e.g. for monitoring of leachate wells, runoff, groundwater, preparation of reports according to environmental monitoring programme approved by the environmental authorities and the EBRD).

Traffic volumes on the roadways used to access the landfill will increase during the operation period, in order to transport waste to the site. The overall rating of such impacts is minor.

The impact on farming land is likely to be minimal, as the landfilling should have no impact on the ability to farm nearby lands, providing the facility operates within normal conditions, in particular with respect to control of vermin, dust, litter, and management of surface water and groundwater.

During operation the landfill is not expected to generate any additional demands on utility services (water, electricity, etc.). These services are required for the on-site facilities and employees.

12.7 Occupational health and safety issues

Possible impacts to health and safety during landfill operation stage can include accidental injury or death to workers. Health impacts could result from exposures to chemicals and products used and produced in landfill facilities, air emissions, and noise. Potential fires and explosions will cause safety hazards. Gasoline or diesel might also be stored on site. In addition, health and safety issues include working in potential weather extremes and possible contact with natural hazards, such as uneven terrain and dangerous plants, animals, or insects.

Occupational health and safety (OHS) management issues will be addressed within the overall environmental, social, health and safety (ESHS) management system of the operating company. All personnel involved in operation of the landfill and other SWM facilities would utilize appropriate personal protective equipment (PPE), safety equipment and would be properly trained in required occupational health and safety practices.

Measures recommended for mitigation of potential adverse impacts include the following:

- > Carry out and keep updated OHS risk assessment of workplaces; identify and minimise, so far as practicable, the causes of potential hazards to workers; develop and update safety instructions for each workplace;
- > Closely monitor application of appropriate occupational health and safety practices at the landfill site, in particular while working with electrical equipment, welding equipment, heavy and lifting mechanisms, etc.;
- > Consult with local planning authorities regarding traffic and traffic hazards. Address specific issues in a traffic management plan;
- > Identify all applicable occupational safety standards and establish safe work practices;
- > Fence and monitor the landfill site to prevent public access;
- > Use appropriate procedures for storage and transportation of explosive materials, including appropriate signage indicating their location;
- > Train personnel on appropriate actions to be taken in case of fire, leakage, spills, extreme weather and other natural hazards, etc.;
- > Provide appropriate personal protective equipment (uniform, mask, gloves, glasses, boots, etc.) to employees, include measures addressing the COVID-19 risks;
- > Install fire resistance measures, ensure availability of appropriate tools;
- > Ensure availability of first aid kit with appropriate medicaments in all vehicles and buildings at the landfill site;
- > Provide comfortable and clean amenity facilities for workers (men and women) with access to potable water according to national sanitary and hygienic regulations.

12.8 Community Health, Safety and Security

The Project proposed for improvement of waste management system in WMZ-1 will have a major positive impact on the health and safety of population. Closure of dumpsites, clean-up waste heaps and prevention of dumping after establishment of modern waste collection system with the sanitary landfill will improve the environment in residential areas and will lead to better waste management habits of population in WMZ-1.

During the landfill operation the community health, safety and security may be impacted by dust and noise caused by trucks transporting waste from communities to landfill and other SWM facilities. Health risks at landfill and other SWM facilities

are usually associated with exposure to vermin, contact with leachate and emissions of smoke in case of fires.

Taking into account that landfill site is located at a sufficient distance from residential areas, no increase in incidence of communicable diseases, deterioration in health or access to healthcare facilities is expected to occur during landfill operation. Meantime, it should be noted that timely removal of waste from communities and proper operation of landfill would reduce odour impacts, health risks and infectious diseases, which may appear as a result of waste accumulation and its improper disposal in the communities.

To prevent any potential negative impact on community health, safety and security the following measures are proposed for the landfill operation phase:

- > Provide information about waste removal schedule to the communities, ensure that appropriate information leaflets are posted in places of community gatherings (e.g. major office, shops, post office, municipal hall, library, medical station, etc.), so as the population is aware of the new waste collection procedures;
- > Install appropriate warning signs at the entrance of landfill, other SWM facilities and at collection points in communities;
- > Fence landfill and other SWM facilities to prohibit unauthorised access;
- > Use covered/closed trucks for transportation of waste, use vehicles with leachate collection containers to prevent spills;
- > Increase frequency of waste collection at hot season of the year;
- > Plan waste collection routes and limit speed of waste collection trucks passing through the communities to minimize nuisance from noise and vibration and to ensure traffic safety;
- > Obtain feedback from communities and use grievance mechanism for evaluation and adjustment of waste collection and operation of landfill and other SWM facilities;
- > Maintain sanitary protective (buffer) zone of the landfill and other SWM facilities.

12.9 Education

During operation of landfill and other SWM facilities, it is not expected that access to educational institutions will be impacted. Since landfill site is located at a sufficient distance from residential areas, it seems unlikely that the Project would impact operation of educational institutions. The potential minor impacts may include noise and dust nuisance from the trucks that transport the waste. Meantime, educational institutions may benefit from and support the Project implementation by organizing practical lessons and visits to landfill and other SWM facilities within

a course on environmental aspects to ensure better understanding of waste management practices and provide special thematic training for the schoolchildren and youth. Education of children and youth could contribute to general improvement of waste separation practices in households as the children could actively share the information with the parents.

12.10 Social tensions

Introduction of organized waste collection and disposal services requires a change of attitude of the population, services and enterprises that at early stages of the process may cause some social tensions. Population, services and enterprises have to acknowledge that it is their responsibility to care for sustainable and environment friendly development. This responsibility starts with the timely collection of the costs for waste collection and disposal from all stakeholders. The beneficiaries of the municipal waste management system also have to pay at a level that allows the landfill operator to recover the cost of providing a modern, well-regulated and efficient service. In some cases, municipalities, especially rural ones, underestimate landfill operation cost. In some cases representatives of vulnerable groups cannot afford payment for waste collection, which may also lead to creation of social tensions within community.

Overall, addressing the major social concerns depends in large part on raising public awareness of the issues and changing behaviour in waste collection and disposal. The behaviour and capacities of the public sector in managing, supervising and monitoring landfilling project activities also needs to be enhanced.

12.11 Gender aspects during operation

Gender issues will be addressed during operation of the improved waste management system. Establishment of sufficient number of adequately equipped and placed waste collection points, improved schedule of waste collection, clean-up of waste spread near collection points in the streets will be appreciated by the communities in WMZ-1, but particularly by women, who are typically caring of taking the garbage out of homes and also spend more time at home and in the areas close to homes, when they take care of children, kitchen gardens and local shopping.

Special attention will be focused on street illumination conditions to ensure better safety of waste collection operations, if they are carried out during dark hours.

Equal opportunities will be provided for employment and remuneration of men and women with the waste management company. By involving the NGOs and/or consulting companies in opinion surveys the PIU, waste management company and/or the Project municipalities make sure that men and women are consulted during evaluation of the quality of services and assessment of the improvements achieved and still required. Relevant experience is available with the local NGOs and community-based organisations including women councils. The Project would benefit from obtaining from (mostly female) housekeeping personnel of hotels, hospitals, shops, catering companies their feedback on waste collection services.

Men will be consulted with regard to collection of recyclables, technical aspects of waste loading operations at waste collection points and access to them with minimum disturbance for road traffic and parked vehicles. These and other efforts for receiving feedback from various groups of population with attention to the interests of men and women are recommended to prevent negative attitude to the Project and to enhance its positive social impacts, so that men and women could benefit from improvement of waste management system in WMZ-1 during the Project implementation.

12.12 Impacts on vulnerable groups during operation

Key vulnerable groups during operation of the sanitary landfill and other SWM facilities within the system proposed within the Project for WMZ-1 will include households with low income (they will be affected by increased user charges for SWM services) and persons affected due to temporary or permanent restriction of access to productive assets. The assets to be considered include the land plots near the Project sites (as resource for the landowners and land users) and the municipal solid waste (as resource for waste pickers, if any identified).

A system of subsidies for low-income households will be implemented within the Project taking into consideration the affordability issues.

No acquisition of private land is envisaged within the Project. However, owners as well as formal and informal users of land near the Project sites could be affected by pollution (e.g. windblown litter, spills on roads, odour nuisance) from the landfill. The land ownership and use issues will need attention of LPAs to ensure that the local negative impact could be avoided and mitigated (e.g. systematic covering of waste in the landfill cell with soil, minimising the area of open waste in the landfill cell, using mesh fences to prevent spreading of windblown litter from SWM facilities, regular cleaning of adjacent areas from windblown and spilled litter, etc.) or compensated. The Project grievance mechanism will address the issue. On the other hand, it is expected that proposed closure and remediation of the existing dumpsites will have positive local impact on the conditions of the adjacent land plots.

Attention to the informal waste pickers/recyclers (if any identified) could be important, as changes in this area (e.g. closure of dumpsites, restricted access to waste in containers and at the sanitary landfill and other SWM facilities) would have significant consequences for the livelihoods of vulnerable people.

The impacts on vulnerable groups during operation phase of the Project will be addressed line with the EBRD Performance Requirements 1 and 5 in the Environmental and Social Action Plan (ESAP) of the Project. The approach initially elaborated prior to construction of the landfill and other SWM facilities for establishment of the new waste management system could be further developed during the operation stage.

12.13 Summary of assessment

Summary of identified social impacts of the Project and measures required for mitigating the potential negative impacts during operation of the sanitary landfill and other SWM facilities within the new waste management system for WMZ-1 are briefly summarised in Table 12.1. Operation of landfill and other SWM facilities with regular maintenance and replacement of the related equipment is planned for about 20 years and thus will have long-term social impacts.

Table 12.1 Summary of social impacts and mitigation measures during operation phase of the Project

Impacts	Assessment	Mitigation measures required
Increase of user charges, enforcement measures for higher collection rate of user charges	Moderate negative	Increase of public awareness, transparency of setting the user charges for households and other customers, a programme of subsidies
Labour and working conditions, occupational health and safety	Minor positive	-
Visual impacts	Minor positive	-
Population movements	Negligible	-
Economic displacement (users of land adjacent to landfill and other SWM facilities)	Minor negative	Information, avoidance, compensation
Community health, safety and security	Major positive	-
Education	Negligible	-
Social conflict	Minor negative	Activities of Regional Operator and transparent procedure for regulation of user charges
Gender aspects	Minor positive	-

13 Environmental Impacts and Mitigation Measures during Final Closure and Aftercare of the Landfill

This and the following Chapters are related to the Project phase, when the proposed sanitary landfill in WMZ-1 after being operated for about 20 years gets filled up to its planned capacity and should be closed (i.e. it will not receive more waste), get a final cover and then during further 20-30 years will be a subject of an aftercare programme.

Certain impacts could be related to decommissioning of containers and waste collection trucks, equipment at the landfill and other SWM facilities, but they would be practically the same as at some stages of the operation and maintenance phase. That is why the specific environmental impacts and mitigation measures for this phase of the Project should be considered mainly with regard to closure and aftercare of the sanitary landfill.

Many of impacts related to final closure of landfill are expected to be rather similar to impacts of landfill construction and operation phases and remediation of existing landfills. The impacts and issues should be addressed for this phase in a way similar to construction and operation phases. A Landfill Closure and Aftercare Manual (LCAM) should be developed as part of the engineering design prior to the landfill construction and updated during the operation meaning the gradual cell-by-cell development. The LCAM should include the mitigation measures to be implemented at the landfill site during and after the landfill closure, i.e. during and after establishment of the final cover.

The final cover could be constructed as a simple structure consisting of:

- > 0.2 m topsoil
- > 0.8 m subsoil
- > 0.15 m gas drainage layer

An impermeable synthetic top liner is not recommended due to low precipitation, high potential evaporation and steep slopes on final cover (mainly 1:3) which result in high surface water run-off and little leachate generation.

Impacts of aftercare will be mostly related to leachate and landfill gas. They are also discussed in the chapter addressing the residual impacts and risks.

Some of the impacts and mitigation measures at the stage of landfill closure and aftercare are briefly described in the following sections of this chapter. The summary assessment of impacts is presented after the description.

13.1 Landscape

During landfill closure and aftercare it is recommended to:

- > Remove all unnecessary aboveground structures and facilities from the landfill area;
- > Re-establish the terrain and drainage pattern similar to natural conditions of the adjacent areas;
- > Restore the vegetation cover, composition, and diversity commensurate with the ecological setting;
- > Review reclamation efforts and weed control periodically until the site is determined to have been successfully reclaimed;
- > Stabilize all areas of disturbed land using weed-free native shrubs, grasses, and forbs;
- > Use plant species characteristic for the landscape in the course of restoration of the vegetation cover on reclaimed areas;
- > Restrict construction activities on the landfill site after closure – the restrictions should be imposed and enforced by the authorities.

13.2 Pollution of surface water and groundwater

During landfill closure and aftercare, it is recommended to:

- > Regularly inspect and clean drainage ditches/ culverts;
- > Regularly inspect leachate collection and treatment facilities to ensure proper operational technical conditions;
- > All vehicles must be regularly checked, and their normal operational technical conditions shall be ensured. In case any leakage of oil or other liquid is observed, the vehicle must be moved to a paved impermeable area and be immediately fixed;
- > Surface runoff should be managed for directing clean runoff away from sources of possible contamination;
- > Groundwater and surface water quality shall be monitored at regular intervals during operation and decommission phases.

13.3 Summary of assessment

The environmental impacts of the Project and measures required for mitigation of potential negative impacts during the landfill closure will be rather similar to impacts during operation of the landfill. The impacts for closure and aftercare phase of the proposed Project are briefly summarised in Table 13.1.

Table 13.1 Environmental impacts and mitigation measures during landfill closure and aftercare

Impacts	Assessment	Mitigation measures required
Change in drainage pattern	Negligible	-
Flooding potential	Negligible	-
Landscape impact of excavation and construction	Negligible	-
Contamination of soil, surface water and groundwater	Minor negative	Surface runoff management, leachate management, top cover maintenance, sending hazardous waste from temporary storage facility to final disposal
Air pollution (dust and emissions from machinery, dust during soil works, spreading of waste by wind and birds)	Minor negative	Maintenance of equipment, sprinkling of soil, covers during waste and soil transportation, management of green belt, littering control, fire control
Noise from machinery and vehicles	Negligible	
Odour	Minor negative	Maintenance of vehicles and machinery, systematic covering of waste, maintenance of buffer zone
Biodiversity	Negligible	-
Management of mineral resources (clay, soil, gravel, etc.)	Moderate negative	Use local materials where applicable
Greenhouse gas emissions	Moderate negative	Install and operate landfill gas management system
Climate change and adaptation	Negligible	-

14 Social Impacts and Mitigation Measures during Closure and Aftercare

This chapter, like the previous one, is related to the Project phase, when the first sanitary landfill after about 20 years of operation is filled up to its maximum capacity and should be closed (while a new facility for disposal of municipal solid waste is established for WMZ-1). Some of the social impacts and mitigation measures relevant for the landfill closure and aftercare phase of the Project are in described below. The summary of assessment is included in Section 14.9.

14.1 Labour and Working Conditions

It is expected that the waste management company (Regional Operator, RO) and contractor(s) involved in closure and aftercare activities comply with the EBRDs PR2. RO should develop and implement the adequate retrenchment policy, which might include re-training of the staff and offering alternative employment opportunities, e.g. with a unit operating a new landfill for WMZ-1 or for some other region.

14.2 Population movements

No temporary or permanent acquisition of private land, of property or of economic assets is envisaged during closure and aftercare. No migration into or out of area is envisaged after closure of the landfill.

14.3 Economic impacts

The economic impacts and mitigation measures will be identified and determined prior to closure of the landfill and necessary mitigation measures will be included in the Landfill Closure and Aftercare Manual. These impacts could be related to the following spheres:

- > Impact on economic assets including land, access road;
- > Reduction of direct and indirect employment.

14.4 Community Health, Safety and Security

The ESIA may need to identify how the Project could influence the health of the affected communities. There are a number of effects that need to be considered:

- > Environmental conditions created by Project which may lead to deterioration in health;
- > The impact of the Project on access to health care facilities;
- > Security of the site for prevention of access to facilities posing risks (e.g. leachate pond);

- > Signage and information for preventing damage and excavation of landfill top cover.

The potential social impacts associated with the landfill closure and aftercare are expected to be less significant than during construction and operation of the landfill, but a set of measures should be taken to mitigate the potential negative impacts.

14.5 Education

The supplementary environmental and social studies to be completed prior to the start of construction works can address the impact of the Project on access to education facilities. There could also be identified opportunities for the education facilities to benefit from the Project.

14.6 Social conflict

At the present stage it is difficult to foresee social conflicts relevant for the Project. The conflicts could be caused by changes in interests of the Project stakeholders and changes in relations between them. These and other issues will need to be considered further during Project implementation.

14.7 Gender aspects

As discussed above, due to the different roles of men and women in waste collection and with respect to waste picking, the impacts of the Project will also be different. These will need to be monitored during implementation to see if any measures are required.

14.8 Impacts on vulnerable groups

The impacts and mitigation measures will be assessed as part of the supplementary environmental and social studies to be completed prior to the start of construction works.

14.9 Summary of assessment

It is assumed that by the time of the proposed landfill closure and aftercare a new option for waste disposal (e.g. a new landfill) will be available for the region. Social impacts of the Project and mitigation measures required during the landfill closure and aftercare phase of the proposed Project are briefly summarised in Table 14.1.

Table 14.1 Social impacts and mitigation measures during landfill closure and aftercare

Impacts	Assessment	Mitigation measures required
Increase of user charges	Major negative	Availability of affordable new waste disposal option
Labour and working conditions, occupational health and safety	Negligible	-
Visual impacts	Minor positive	-
Population movements	Negligible	-
Economic displacement	Negligible	-
Community health, safety and security	Major positive	-
Education	Negligible	-
Social conflict	Negligible	-
Gender	Negligible	-

15 Management of Residual Impacts and Risks

The residual impacts and risks of a project are typically considered in terms of the potential for accidents and incidents (such as oil spills, explosions, contaminant release, dam failure, etc.). The nature of key residual impacts should be described, and their significance assessed in the ESIA.

15.1 Residual environmental impacts and risks

Management of residual environmental impacts and risks should be the subject of contingency planning. The Project will include development of emergency preparedness and response plan for the landfill management unit. It will also include requirement for emergency preparedness and response planning in tender documents and in the contracts.

The Emergency Preparedness and Response Plans should be coordinated with the local authorities and establishments of the Ministry of Emergency Situations.

Closed landfills with the proper cover and aftercare measures typically do not pose major environmental risks. There is even an internationally known practice of urban development projects implemented on top of former landfills. However, the following risks are to be addressed in the Project:

- > fire (even though this risk is lower than during operation of the landfill);
- > disruptions of power supply, water supply, telecommunication lines (the back-up arrangements should be included in the Project design);
- > escape of landfill gas (and its possible impact on indoor climate);
- > spills of leachate (due to malfunctioning of leachate management system);
- > erosion or damage of the landfill cover.

For the specific conditions of Moldova it is important that the buildings and installations of the landfill are constructed taking into consideration the high level of seismic activity and the climate change trends.

15.2 Residual social impacts and risks

Social risks are very context-specific and could be related to the following factors:

- > Economic changes such as inflationary trends;
- > Political changes which may make it difficult to implement particular mitigation measures;
- > Unforeseen events such as natural disasters;

- > Conflicts between municipalities participating in the Project, collapse of cooperation;
- > Lack of skilled people to implement mitigation measures;
- > Weakness of enforcement measures (e.g. for prevention of waste dumping, for collection of revenues);
- > Insufficient capacity for supervision and monitoring.

More detailed information about residual social impacts and risks will become available once the supplementary environmental and social studies are completed.

16 Project Benefits and Opportunities for their Enhancement

The Project is expected to provide major environmental and social benefits for WMZ-1 as a result of introduced sound collection and disposal of municipal solid waste, prevention of waste dumping and its burning.

The following specific benefits could be achieved during the Project implementation:

- > Improved quality of collection and transportation of waste in WMZ-1;
- > Increased service area of waste collection system WMZ-1;
- > Improved sanitary conditions and visual image of residential areas and their surroundings;
- > Sound disposal of waste;
- > Improved working conditions of waste management operators;
- > Addressing of gender aspects in the Project;
- > Improved environmental awareness, education, public participation;
- > Improved attractiveness of the region for tourists;
- > Local business development and capacity building;
- > Improved governance and transparency.

It is expected that the environmental and social benefits of the Project will have a long-lasting effect for WMZ-1 but will also have a demonstration effect for other regions. The environmental and social benefits could be enhanced within implementation of the Environmental and Social Action Plan in cooperation with the local stakeholders. Opportunities for enhancement of environmental and social benefits of the Project, as well as the information on the actions in progress and the already completed actions should be presented in the Stakeholder Engagement Plan, which should be systematically updated during the Project.

16.1 Enhancement of environmental benefits

16.1.1 Remediation and Clean-up of contaminated sites

Availability of sanitary landfill will provide background for remediation and clean-up of sites in WMZ-1 currently occupied by dumpsites and heaps of waste.

16.1.2 Habitat enhancement

The Project will contribute to protection of natural habitats and improvement of modified habitats.

To avoid impacts on natural habitats, it is proposed to establish the landfill within the modified habitat area of hay land/grassland affected by roads, high-voltage line and the existing dumpsite.

Habitat enhancement will be ensured by lowering risks of further spreading of dumpsites in natural and modified habitats. This will require enforcement of safe disposal of waste at the sanitary landfill.

16.1.3 Energy and Resource Efficiency

The Project includes procurement of modern vehicles and machinery of waste collection, transportation and disposal at the sanitary landfill. Tender specifications for procurement of all equipment, vehicles and machinery will include requirements regarding energy efficiency.

Resource efficiency of the Project will be achieved in case of gradual purchase of equipment and gradual development of the landfill.

Gradual purchase of equipment and its installation will allow avoiding the purchase of equipment, e.g. trucks and containers, not fitting the local physical conditions, waste collection practice and habits.

Gradual development of the landfill will assume construction of the cells according to the filling progress and demand. It is also proposed that installation of the landfill gas collection system should be considered at later stage of the landfill development, e.g. after closure of its first cell.

For efficient use of vehicles and machinery the SWM service providers will operate a set of equipment sufficient for daily operations at a current stage of the landfill development. For example, equipment for picking up the leachate from the leachate pond and spreading it over the body of accumulated waste could be purchased later or rented (e.g. from a wastewater collection company).

One more aspect of resource efficiency will be collection of recyclable waste fractions, as well as the use of locally available construction materials, wherever applicable.

The Project will assume clean-up of areas contaminated with waste along the roads and in minor dumpsites.

Considerable benefit of the Project could be expected in case the recycling schemes are implemented for a few waste fractions at early stage of the system operation and further developed by covering additional fractions at later stage of the Project.

16.1.4 Cleaner Technology

The Project implementation will ensure introduction of the cleaner technologies for waste collection, transportation and disposal. Enhancement of the Project's benefit could be achieved by a set of arrangements with recyclers of selected waste fractions. At a later stage of the Project it would be advisable to consider opportunities for collection of landfill gas and utilisation of its flaring energy, e.g. for district heating, hot water supply or heating of greenhouses.

16.1.5 Institutional Strengthening

The Project will result in establishment of the first Project Implementation Unit for operation of waste management system with sanitary landfill the WMZ-1. Institutional strengthening will be enhanced for providing services in urban and rural municipalities with the PIU's support to authorities in establishment of an efficient institutional setup for intermunicipal cooperation.

16.1.6 Capacity Building

The Project benefits related to building of the local waste management, community mobilisation and environmental management capacity could be enhanced by involving the staff of municipal waste management companies in the training sessions and workshops.

Enhancement of the Project benefit for the local capacity building could be supported by including the requirements for training of the local staff into the tender documents and contracts for the equipment and machinery suppliers.

16.2 Enhancement of social benefits

Whilst social impact assessments are generally concerned with mitigation of negative impacts, they also present an opportunity for impacted people to take advantage of and benefit positively from the Project. Areas of the Project benefit may include:

- > temporary and permanent jobs within the Project;
- > opportunities for local firms to sub-contract services;
- > opportunities for local firms to supply goods;
- > in cases where economic displacement (transformation of pasture area to landfill area) is required there may be opportunities to improve the living condition of people relocated;
- > Project may be able to link up with local schools and other educational centres to create opportunities for learning, for improvement of hygienic habits.

Like many other projects financed by the EBRD and other international organisations, the proposed Project in WMZ-1 will have its particular opportunities for facilitating the local development. These opportunities should be considered in dialogue with the local authorities and during the public consultation.

In exploring the strategy for development opportunities, particular attention should be given to vulnerable categories within the area of impact. Unless very specific measures are taken, they are likely to be excluded from development gains. It is important to remember that particularly with this group of people, participatory or community demand driven approach to campaigning will not necessarily ensure that they are included in the benefits. Moreover, special measures may be required to enable certain categories to take part in activities, for example employment of disabled people may require the setting of special facilities.

Communities participating in the Project will consider involving the elderly and disabled people in communicating the advantages of the new waste collection system in urban and rural communities. Women, the elderly and disabled people should be consulted to ensure convenient equipment of waste collection points. The Project would advise the municipal waste management companies to make sure that the elderly and disabled persons receive adequate support for collection of their waste. The NOIEP and SWM service providers could arrange workshop(s) to discuss the lessons learned and to promote the best practice.

Gender aspects

Gender aspects of social benefits and opportunities for their enhancement should be identified and addressed during the Project. Questions that need to be discussed could be as follows:

- > What are men and women's social and economic roles in municipalities involved in the Project?
- > Will the Project adversely and differently impact social and economic roles of men and women?
- > What institutional arrangements have been made for consulting with women?
- > Are there equal opportunities for both men and women to benefit from the Project?
- > Are there barriers to women's participation and how can they be overcome without creating tensions within the community?

Public monitoring

Elderly and disabled people, who spent most of their time at home, could be involved in selecting the optimal location of waste collection points and in monitoring the performance and status of the waste collection points. Elderly people and local community-based organisations are typically rather attentive to cases of vandalism, incompliance with established rules, spreading of waste, disruptions in services, etc. Local activists are used to conveying messages to local authorities on phone and during meetings. This experience can be used for a public monitoring system, which can facilitate for improvement of waste collection services in WMZ-1. At the same time many people are very much interested in improvements and

are opened for expressing their opinions in telephone or in-person meetings. This kind of social feed-back and public monitoring services could be remunerated (payment, presents, promotional items with logo, etc.) by the municipal waste management company or authorities.

Public monitoring and community mobilisation could be an efficient measure for prevention of unauthorised dumping of waste in recreational zones and tourist destinations in WMZ-1. This measure should be combined with other measures, e.g. with introduction of a fee for cars entering the most visited tourist sites. Experience from various countries shows that even a very low "symbolic" fee will facilitate for more precise assessment of the number of visitors and quantities of their waste during the year and at the same time can cover some of the costs related to collection and disposal of waste generated by the unorganised tourists.

Enhancement of Project benefits for building of the local capacity for waste management could be achieved by training sessions and workshops arranged by the Project for staff of waste management operator. One of the key issues during then training sessions would be the local capacity building for environmental management in line with the EBRD Performance Requirements.

17 Environmental and Social Monitoring

Monitoring of the Project performance should focus on key indicators agreed with the EBRD and the MoEnv for assessment of the social and environmental impacts. Indicators should be aligned to elements of the existing pre-project baseline and be specific, measurable, achievable, relevant and conducted following an appropriate time schedule.

In order to verify the effectiveness of mitigation measures and the compliance of the Project with the national regulations and the EBRD Performance Requirements, the Project implementation will include establishment and implementation of the following three major monitoring programs:

- > Contractor/Supplier Compliance Monitoring Program (CCMP);
- > Environmental Monitoring Program (EMP) for the landfill;
- > Social Monitoring Program (SMP) focused on the Project impact on the communities.

The programs will provide information on the actual impacts and could also serve as tools for identification of unforeseen and not addressed impacts.

The CCMP will be carried out as part of contractor supervision during construction works.

17.1.1 Environmental monitoring program (EMP) for the landfill

The EMP will include baseline monitoring activities that will be started during construction of the landfill and other SWM facilities. It will be continued throughout the operation, closure and aftercare of the landfill.

Objectives of monitoring

Environmental monitoring program will be an integral part of the Landfill Operation Manual. The objectives of the monitoring are as follows:

- > collection of information on the situation before landfill establishment and before landfill closure;
- > assertion of the effect of environmental measures as provided in the design;
- > evaluation of processes within the waste mass;
- > assertion of compliance with the permit provisions.

The monitoring program will include field measurements, laboratory analyses and preparation of reports. Some of the field measurements could be carried out by the landfill operating staff; however, most of the monitoring activities should be assigned to competent contractors.

Maximum allowable/permitted concentrations (limit values)

These are parameter values indicating significant environmental pollution and the need for corrective actions aimed at evaluation and prevention in case of exceeded limit values. These values must be specified in the permit for landfill operation and assessed by a landfill operator. The limit values are established by the national regulatory authorities typically with reference to the national or international (EU) standards. They are case specific for each landfill and should be identified based on the results of baseline monitoring and verified during the monitoring of landfill compliance with the permit. The exceeded values of main parameters demanding implementation of corrective action program must be indicated in the environmental permit for landfill establishment and operation or approved by the national regulatory authorities.

Scope of EMP

Monitoring is required during the whole lifetime of a landfill. The monitoring program typically includes pre-operational, operational and post-operational phases. The monitoring program will be launched before the landfill operation. The monitoring results will be regularly evaluated, so that the monitoring program can be adjusted, and a corrective action implemented, if required.

A scope of monitoring program for landfills typically includes the following environmental aspects that may be influenced during landfill operation:

- > Waste acceptance;
- > surface water;
- > groundwater;
- > leachate;
- > landfill gas;
- > meteorological data;
- > odour;
- > noise;
- > dust;
- > flora and fauna;
- > landfill stability and settlement of disposed waste.

For the sanitary landfill in WMZ-1 the key aspects of monitoring will include monitoring of surface water, leachate, landfill gas and groundwater.

Waste Acceptance Monitoring

A topographic survey of the waste disposal area will be carried out prior to commencement of the waste deliveries to the landfill and then on an annual basis for monitoring of amount and settlement of waste deposited.

During the landfill operation in WMZ-1 the RO will carry out a routine monitoring of waste received at the landfill and prepare monthly and annual reports including, inter alia, the following information on the landfill operations:

- > Types and amounts of waste (in tonnes) delivered and disposed of at the site;

- > Estimated volume of waste disposed of (based on topographic survey);
- > Estimated remaining disposal volume at available disposal units (cells);
- > Mileage and/or number of operating hours for trucks and other movable equipment belonging to the Company;
- > Fuel consumption;
- > Staff employed at the plant during the year;
- > Costs.

The results should be analysed, evaluated and recommendations made to management for improving performance. The remaining capacity of the landfill and its life span should also be evaluated.

Surface water monitoring

The landfill site is located in the closed basin on the bottom of the former clay quarry. Surface water entering the landfill site from adjacent territory (e.g. during snow melting or heavy rains) and from precipitation on the landfill territory will be collected in ditches, and thus prevented from contact with waste, and accumulated in a surface water collection pond established in the lowest elevation area in the northern part of the landfill site. The monitoring will be carried out for assessment of amount and quality of surface runoff from the landfill area. It is expected that no discharge will occur from the landfill area to any surface water bodies located off-site, because the surface water accumulated in the pond will evaporate during summer months, as it happened before construction of the landfill.

The quality of water in the pond will deteriorate if the surface runoff management system on the landfill site is not efficient. Water samples from the pond will be collected on a quarterly basis and analysed for presence of components typical for leachate (see Table 17.2 further below).

If the social survey performed during the supplementary environmental and social studies to be carried out prior to construction of the landfill reveals that access to water accumulated in the surface water pond within the site area is important for cattle owned by residents of areas adjacent to the landfill site, possible alternative solutions will be assessed and agreed with the cattle owners.

Leachate monitoring

Aerobic and anaerobic biological decomposition processes of organic matter, resulting in the production of soluble organic and non-organic components and water, will take place on the landfill. Leachate is the most frequent source of environmental pollution causing serious consequences. The objectives of the leachate monitoring program are the following:

- > checking conformity of the leachate handling system to the design criteria;
- > obtaining information on biodegradation processes in the waste;
- > timely review of the parameters for the underground and surface water analyses based on the information about leachate composition changes.

The concentration of organic matter in the produced leachate may reach several tens of grams per litre. The intensity and duration of the process, concentrations of various substances in the leachate, the amount of the leachate depend on the origin of the organic waste, the compression level, thickness of the waste layer, humidity, temperature, aeration conditions, etc.

At the landfill in WMZ-1 the leachate will be re-circulated, i.e. flow from waste cells via leachate collection system into the leachate pond (established for leachate accumulation and evaporation), and then will be spread over the surface of waste cells (e.g. in a way similar to irrigation), where from it can be evaporated.

Level of leachate for assessment of leachate volume will be measured in the leachate pond and in the leachate collection system of cells. Samples of leachate will be taken from leachate pond. Frequency for leachate monitoring activities is specified in Table 17.1.

Table 17.1 Frequency of leachate monitoring

Parameters	Operation phase	Closure and aftercare phase
Leachate level	Every week	Every month
Leachate volume (amount)	Every month	Every 6 months
Leachate composition	Every 3 months	Every 6 months

Leachate composition depends on landfill age, waste composition, intensity of waste biodegradation processes, amount of precipitation in the waste, and temperature. The leachate analyses could be selected considering the impact from each of the above factors. Standard leachate analyses include parameters listed in Table 17.2. The analyses will be made by an accredited laboratory.

Table 17.2 Leachate monitoring parameters

pH	Total dissolved solids TDS
Temperature	Lead Pb
Ammonia nitrogen NH ₄ -N	Magnesium Mg
Biochemical oxygen demand	Manganese Mn
Chemical oxygen demand	Nickel Ni
Conductivity EL	Potassium K
Calcium Ca	Sodium Na
Cadmium Cd	Sulphates SO ₄
Chrome Cr	Zinc Zn
Chlorides Cl	Total alkalinity (CaCO ₃)
Copper Cu	Total organic carbon C org tot
Mercury Hg	Total nitrogen oxides NO tot
Iron Fe	Total petroleum hydrocarbons TPH

Evaluation of leachate monitoring, groundwater monitoring and surface water monitoring data will be carried out to verify that the leachate is adequately re-circulated within the landfill and is not polluting the surface water and groundwater.

Monitoring of landfill gas

Landfill gas composition will be monitored at the top of the gas collection wells. The landfill gas typically contains methane and hydrogen which can form flammable mixtures with air. The critical flammable concentration limits are known as Lower

Explosive Limits (LEL). The measurements of methane and hydrogen concentrations in landfill gas will be carried on a quarterly basis by means of standard gas monitoring equipment. When concentration of the flammable gases in the landfill gas reaches 5% of LEL, the measurements will be carried out more frequently. The monitoring results will be used for assessment of the waste decomposition process and for assessment of possible utilisation options. Quarterly measurements of air quality in various points within the landfill may be used for assessment of the landfill cover and the landfill gas collection system. Air quality measurements within the sanitary protective zone will be carried out for identification of any landfill gas leakage zones.

The results of leachate and gas analyses will be displayed in a graphic form (concentration versus time), the resulting trends analysed and where necessary remedial actions implemented.

Groundwater monitoring

At the site selected for landfill no groundwater has been encountered during the Feasibility Study, but according to data of regional hydrogeological investigations, the groundwater could be reached at depth about 100 m below the terrain. Due to presence of thick layers having low permeability, the groundwater is well protected from contamination sources based on the land surface. Groundwater intake (one abstraction well) will be established for the on-site water supply system. Groundwater will be monitored for checking the efficiency of implemented protection measures and identification of possible leachate intrusion and groundwater contamination. In order to select correct sampling points and receive the results of analyses reflecting on the situation, the hydrogeological site conditions should be very well known. Groundwater level will be measured, and groundwater samples will be taken 4 times a year in the abstraction well and monitoring wells installed within the landfill site perimeter. Only three monitoring wells will be installed during construction of the landfill. Groundwater levels in them will be measured once a month during construction of the landfill, so that the groundwater flow direction and seasonal fluctuations could be determined and during the first year of the landfill operation the additional monitoring wells could be installed: one downstream the landfill (for monitoring of groundwater passing the landfill) and one upstream and far from the landfill, e.g. at the border of sanitary protective zone (as a reference point for monitoring of groundwater definitely not affected by the landfill). Since groundwater monitoring wells are significantly different in design from drinking water wells, the wells should be installed by a certified well driller with experience in the construction of groundwater monitoring wells.

Groundwater samples will be analysed for determining the baseline/background concentrations of various components before operation of the landfill. During the following years the analyses will be carried out for identification of changes in groundwater quality due to contaminants potentially originating from leaks of leachate. The results of the analyses will be displayed in graphic form (concentration versus time), and compared with the baseline concentrations and/or national/international standards for drinking water.

Table 17.3 provides a list of parameters recommended for baseline monitoring and for compliance monitoring.

Table 17.3 Parameters for groundwater analyses

Monitoring parameter	Baseline monitoring	Compliance monitoring
PH	•	•
Conductivity EL	•	•
Total dissolved solids TDS	•	•
Temperature	•	•
Ammonium nitrogen NH ₄ -N	•	•
Oxygen O ₂	•	•
Residue after evaporation (180°)	•	•
Calcium Ca	•	•
Cadmium Cd	•	•
Chrome Cr	•	•
Chlorides Cl	•	•
Copper Cu	•	•
Cyanides CN, tot	•	•
Iron Fe	•	•
Lead Pb	•	•
Magnum Mg	•	•
Manganese Mn	•	•
Nickel Ni	•	•
Zink Zn	•	•
Potassium K	•	•
Sodium Na	•	•
Mercury Hg	•	•
Sulphates SO ₄	•	•
Tot alkalinity (CaCO ₃)	•	•
Tot organic carbon C org tot	•	•
Total amount of nitrogen oxides NO tot	•	•
Total petroleum hydrocarbons TPH	•	•
Arsenic As	•	
Barium Ba	•	
Boron B	•	
Fluorides F	•	
Phenols	•	
Phosphorus P	•	
Antimony Se	•	
Silver Ag	•	

An evaluation monitoring exercise should be started when the results of the compatibility monitoring show the parameter values exceeding the ambient level.

The purposes of the evaluation monitoring are the following:

- > identification of pollution emission source;
- > identification of pollution origin, amount and flow;
- > environmental risk and human health hazard assessment;
- > evaluation of pollution elimination or reduction measure;
- > collection of required information for the implementation of corrective project.

Evaluation monitoring program may require an increased number of borings, increased sampling frequency and additional pollution dissemination analyses. A number of software modules for contamination transport modelling are used to identify contamination spreading direction and conditions.

The output of the evaluation monitoring exercise should be the clearly defined corrective measures aimed at reduced pollution emission and environmental impact.

Air quality

Air quality monitoring for assessment of dust, emissions from waste and odour nuisance will be carried out on a quarterly basis at the border of sanitary protective zone established for the landfill. An accredited contractor will be hired by the landfill operator.

Meteorological data

Registration of meteorological data will be an obligatory part of a landfill monitoring program. Precipitation, temperature, evaporation and humidity are important factors having effect on the total amount and composition of the leachate produced. The data will be used for the estimation of the water balance, required for operation of leachate collection and recirculation systems. Exact water balance may be estimated based on the meteorological data from the landfill site. Applicable meteorological data may be received from measurements on the site and from the nearest meteorological station.

Parameters and their registration frequency required for water balance estimations and evaluation of leachate generation are included in Table 17.4.

Table 17.4 Frequency of meteorological registrations for monitoring

Parameter	Operation	Closure and aftercare
Amount of precipitation	Daily	Every month
Temperature min/max	Daily	Average monthly
Wind speed and direction	Daily	Not required
Evaporation	Daily	Every month
Air humidity	Daily	Average monthly

Flora and fauna

It is important for the landfill operation to have no significant effect on the ecosystems. Thus, regular observations of the flora and fauna around the landfill should be performed and any changes or stress traces of the ecosystem should be registered. Landfills attract birds and small rodents and provide favourable conditions for the development of some vermin, worms, and flies. The information provided by the monitoring will be used for the selection of means to prevent the appearance of unwanted fauna, e.g. for bird control measures.

Landfill stability and subsidence

Stability monitoring will be carried out to assess the integrity of the landfill structure. The sliding of landfill disposal slopes may produce certain human health hazard, thus regular landfill slope monitoring should be carried out. Slope stability should be evaluated once per year by a qualified inspector.

The waste volume settles primarily due to the increasing waste density, when some biological materials degrade and the space is filled by others, while the relative waste weight is increasing. The settling rate is difficult to predict, since it depends on a number of factors, specific to each particular landfill, such as humidity, composition, density. The settling process may also start due to the damages of the bottom or top insulation, leachate collection, gas collection or drainage systems. Regular monitoring during the operational and post-operational periods should facilitate the identification of required changes in the operational procedures aimed at reducing the risk of uneven settling. The evaluation of settling should be made by a qualified inspector at least once a year.

Documents

Annual reports will be issued with a full monitoring program description, implementation report and summary of monitoring results. These reports will be kept on the landfill premises and will be accessible for the EBRD, for the controlling institutions and for the public.

Review of the program

Landfill operator performs periodical check-ups to ensure the compatibility of the program with the monitoring objectives and, if required, update the program. The check-ups are important for program quality, efficiency and continuous appropriateness. The interval between check-ups should not be more than 12 months.

Duration of monitoring

Landfill constructed on the proposed site in WMZ-1 will receive waste for about 20 years. After the final cover is established the landfill aftercare might be carried out for more than 50 years.

There are no national criteria for landfill aftercare and monitoring duration. Article 13(d) of the European Landfill Directive (states: *'... for as long as the competent authority considers that a landfill is likely to cause a hazard to the environment..., the operator of the site shall be responsible for monitoring and analysing landfill*

gas and leachate ... and groundwater regime in the vicinity of the site Accordingly, aftercare cannot be ended, or in other words landfill aftercare completion cannot be agreed upon, until the competent authority can be convinced that the landfill is no longer causing a hazard.

In many countries the authorities accept that landfills can be released from aftercare if they do not endanger the well-being of society and in particular do not endanger the groundwater protection. The criteria for the competent authority to assess this situation are to a large extent related to degradation of organic matter and stability of the landfill.

The period for aftercare will be decided during the preparation of the Landfill Closure and Aftercare Plan considering the emission limit values and the assessment of the compliance of an entire landfill with these limit values.

17.1.2 Social monitoring program (SMP)

Social monitoring program of the Project will be carried out in WMZ-1. It will be particularly important during the first years of the Project, i.e. during construction of landfill and the first years of its operation with roll-out of the improved waste collection system. The SMP will include the following key elements:

- > Monitoring of user charges for waste management services as a percentage of household income with special attention to incomes of vulnerable groups;
- > Monitoring of waste fee collection procedures/practice and collection rate;
- > Monitoring of grievances and comments received from the public and response to them;
- > Monitoring of grievances and comments received from the workers and response to them;
- > Social surveys for evaluation of new waste collection system (with assessment breakdown according to various communities, population groups, men and women) and response to them;
- > Monitoring of livelihood restoration for waste pickers and job opportunities or informal recyclers;
- > Monitoring and evaluation of public outreach activities related to implementation of the new waste management system in WMZ-1;
- > Review of social benefits from the Project, including coordination with other development initiatives.

Project performance in line with the Environmental and Social Policy and Performance Requirements of the EBRD will be presented in regular (typically annual) reports submitted by the Project Implementation Unit to the EBRD. The reports will contain information on progress in implementation of the ESAP.

18 Preparation and Implementation of Environmental and Social Action Plan

According to the Environmental and Social Policy of the EBRD, an Environmental and Social Action Plan (ESAP) is developed for and should be implemented during the Project. The ESAP includes the programmes and systems to address, in an integrated and comprehensive fashion, environmental and social impacts, issues and opportunities should be established with clearly stated outcomes or targets, timeframes, responsibilities and resources required.

The ESAP is based on adaptive management and include appropriate monitoring activities to ensure that:

- > mitigation measures are effective;
- > unforeseen negative impacts or trends are detected and addressed;
- > expected project benefits or opportunities are achieved.

The ESAP prepared for the Project should also include a provision for:

- > capacity building such as training of project staff and/or third parties (if appropriate);
- > contingency and emergency response plans and measures (including adequate resources).

Appendix A Names of those responsible for preparing the E&S Assessment

The following specialists within a team of the Danish consulting company COWI A/S contracted by the EBRD were involved in the feasibility assessment of the proposed Project and its E&S Assessment in 2021-2022:

Name	Position
Mr Ekkehard Schwehn	Team Leader
Mr Vladislav Cantea	SWM Specialist, Deputy Team Leader
Mr David Toft	Financial Specialist
Ms Nijolė Vrubliauskienė	Institutional Expert
Ms Larissa Lauritzen	ESIA Specialist
Mr Ion Melesteian	Financial Specialist (local)
Mr Ion Beschieru	Legal and Institutional Expert (local)

Appendix 3B Compliance Summary Table

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

COMPLIANCE SUMMARY TABLE



PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

COMPLIANCE SUMMARY TABLE

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PROJECT NO.

A226634

DOCUMENT NO.

WMZ-1 ESA2

VERSION

01

DATE OF ISSUE

22.02.2023

DESCRIPTION

Compliance Summary Table

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

Abbreviations

AESR	Annual Environmental and Social Report
CESMP	Construction Environmental and Social Management Plan
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPRP	Emergency Preparedness and Response Plan
ESAP	Environmental and Social Action Plan
ESHS	Environmental, Social, Health and Safety
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
GET	Green Economy Transition
GIP	Good International Practice
ILO	International Labour Organization
IMCA	Inter-Municipal Cooperation Agreement
LARF	Land Acquisition and Resettlement Framework
LCAM	Landfill Closure and Aftercare Manual
LPA	Local Public Authority
LRF	Livelihood Restoration Framework
LRP	Livelihood Restoration Plan
MoEnv	Ministry of Environment of the Republic of Moldova
MSW	Municipal Solid Waste
NOIEP	National Office for Implementation of Environmental Projects (before 2023, NOIEP)
OESMP	Operation Environmental and Social Management Plan
PPE	Personal Protective Equipment
PPC	Pollution Prevention and Control
PR	Performance Requirement
RE	Resource Efficiency
RO	Regional Operator
RP	Resettlement Plan
SEP	Stakeholder Engagement Plan
SPGE	Strategy for the Promotion of Gender Equality
TA	Technical Assistance
TAC1	Project Implementation Support, Engineering Design and Contract Supervision Consultant

TAC2	Corporate Development and Stakeholder Participation Programme (CDSPP) Consultant

Introduction

The Table contains a brief assessment of the current SWM system and an outline of recommended improvements with reference to specific lines of the ESAP.

The Compliance Summary Table and the ESAP are based on the following organizational setup envisaged for the Project implementation:

NOIEP will coordinate the Project on behalf of the Ministry of Environment (MoEnv) and will be assisted by the staff assigned for this purpose within the Regional Operator (RO) of the proposed integrated SWM system in WMZ-8.

Regional Operator (RO) as an inter-municipal JSC will be established by LPAs of the largest municipalities in WMZ-1. The RO will be the key responsible for SWM collection in WMZ-1 and for operation of the proposed Project facilities by the time of their commissioning. The RO will assign staff responsible for assistance to NOIEP throughout the Project implementation.

LPAs will be responsible for SWM services in their respective municipalities in WMZ-1. All or as many as possible of them will enter the Inter-Municipal Cooperation Agreement (IMCA) and the Public Service Contracts with RO.

Small LPAs that choose not to enter the recommended IMCA and Public Service Contracts with the RO may decide to have their own **Local Operators** for SWM collection and delivery to the regional installations (TS or regional landfill). In this case, the fees for SWM acceptance would be higher than to those LPAs who are the parties to the Public Service Contracts and, as appropriate, the IMCA.

Regional Operator and Local Operators are the **SWM Service Providers**.

Contractors and **Suppliers** will be contracted by NOIEP for construction of new SWM facilities proposed within the Project (a regional landfill, a sorting station, a composting station and two transfer stations) and supply of equipment.

Technical Assistance Consultants (**TA Consultants**) contracted by the NOIEP to finance with technical assistance funds to be identified with the support of EBRD after signing the loan agreement will provide support to the NOIEP, the Regional Operator and LPAs. One TA Consultant (**TAC1**) will focus mainly on the engineering design and procurement tasks and the second (**TAC2**) will be focusing on the corporate development of the Regional Operator and the stakeholder participation programme.

EC	Exceeding Compliance: The project has gone beyond the expectations of EBRD's PR requirements. EBRD should be able to use projects rated EC as a role model for positive Environmental and Social effects.
FC	Full Compliance: The project is fully in compliance with EBRD's requirements, and EU and local environmental, health and safety policies and guidelines.
PC	Partial Compliance: The project is not in full compliance with EBRD's requirements, but has systems, processes or mitigation measure in place which are working towards addressing the deficiencies.
MN	Material Non-compliance: The project is not in material compliance with EBRD's requirements, and the systems, processes and mitigation measures in place are not working towards addressing the deficiencies.
NIA	No Information Available. There is currently no information available however is expected at a future stage in the project.
NA	Not Applicable

Compliance Summary Table

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1	Assessment and Management of Environmental and Social Impacts and Issues				
	Summary: The national EIA was prepared in 2015 for the project concept not including Comrat Rayon. The Environmental Decision issued regarding the EIA has expired. The EIA includes the Environmental Management Plan. The existing NOIEP in MoEnv and staff of Regional Operator of the future SWM system in WMZ-1 (when established) assigned to support the NOIEP will require capacity building for ESHS management. Contractors will employ Environmental, Social, Health and Safety (ESHS) specialists, prepare and implement site/lot - specific ESMMPs for construction of new SWM infrastructure facilities and closure/remediation of existing dumpsites. The Regional Operator will be responsible for operation of the new SWM infrastructure (landfill, sorting station, composting station, 2 transfer stations) and for post-closure aftercare of the landfill.				
1.1	Environmental and Social Assessment	PC	The Project is categorised B. The EIA meeting the national requirements was prepared in 2015 for the earlier concept of the proposed project. The Environmental Decision (valid 4 years) issued on 15 June 2017 had 14 June 2021 as the expiry date. Most of environmental baseline topics, impacts and mitigation measures were covered in the EIA. A more detailed hydrogeological study is required for revised design of the regional landfill, sorting station, composting station located next to each other. The social and gender sections were not elaborated during the EIA.	Update EIA according to the latest Project concept, obtain new/extended Environmental Decision. Ensure that the requirements for implementation of E&S mitigation and monitoring measures, obtaining of respective permits and establishing the grievance mechanism are included and followed-up as requirements for contractors. Identify and consult vulnerable groups that might be disproportionally affected by the Project. Implement Stakeholder Engagement Plan throughout the Project.	1.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1.2	Environmental and Social Management Systems	PC	The existing NOIEP in MoEnv has got experience in developing and implementing ESMS/ESHS management system for various projects. Training and capacity building is required for ESHS management of contractors. Training and capacity building of the Regional Operator (yet to be established) in WMZ-8 is required to ensure compliance with PRs.	Develop an integrated Project ESHS management system. Appoint, train and maintain specialist(s) responsible for ESHS. Ensure contractors have competent ESHS managers, implement ESHS measures and report accordingly. Monitor compliance with the ESHS management requirements.	1.1
1.3	Environmental and Social Policy	PC	NOIEP in MoEnv is an institution with experience of implementing the international projects in Moldova. Environmental and Social Policy for the Project in WMZ-8 is to be developed (by NOIEP and RO staff) in line with EBRD ESP.	Establish and implement Project policy for ESHS management in WMZ-8. Contractors shall be required to comply with the policy.	1.1
1.4	Environmental and Social Management Plan	PC	The available EIA prepared in 2015 includes EMP covering the main environmental mitigation and monitoring measures. Social and gender related measures were not elaborated.	NOIEP to elaborate ESMP per the adjusted Project concept and in line with the EBRD ESP and SPGE¹. Include measures supporting vulnerable groups that might be disproportionately affected by the Project. Require contractors to develop and implement site/lot - specific CESMPs and procedures for E&S monitoring. Enforce compliance of contractors and SWM service providers with EBRD PRs, prepare reports per the EBRD PRs. The NOIEP is to ensure contractor compliance with CESMP. Prior to operation, NOIEP and RO to develop the OESMP. Ensure OESMP implementation. Report accordingly.	1.1

¹ Strategy for the Promotion of Gender Equality

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1.5	Organisational Capacity and Commitment	PC	The NOIEP with experience in management of international projects is available in MoEnv. Due to reorganisation of the Government in 2021, the NOIEP capacity for ESHS management of the Project needs strengthening. The RO has not been established yet – it will require capacity building for ESHS management. The contractors have not been appointed yet, so there is not enough information to assess their organisational capacity.	Appoint, train and maintain person(s) to be responsible for ESHS management in NOIEP of RO. Ensure competent ESHS managers employed by contractors and the capacity of contractors to implement CESMP and OESMP. Ensure capacity of SWM Service Providers to implement OESMP.	1.2
1.6	Supply Chain Management	NIA	The supply chains of the Project will include suppliers of materials and equipment for waste collection, for construction of landfill, sorting station and composting station, transfer stations, as well as for remediation of non-compliant landfill and dumpsites. According to the national Labour Code, there should be no child labour or forced labour in the supply chain.	NOIEP to develop and implement a Supply Chain Management Plan, include in tender documents and contracts the requirement for contractors and suppliers to have and implement ESMPs. Verify mineral material supply from authorised borrow pits, regularly inspect labour conditions, health and safety at workers' camps of contractors.	1.3

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1.7	Project Monitoring and Reporting	NIA	No information about monitoring of existing waste disposal sites in MWZ-8 is available. E&S monitoring and reporting program shall be established for: - Amounts of waste accepted at landfill, sent for recycling, sent for composting; - Wind, temperature, precipitation; - Air quality, odour nuisance; - Dust; - Landfill gas; - Leachate amounts and quality; - Noise and vibration; - Surface water runoff and quality; - Groundwater levels and quality; - Landfill stability, remaining capacity; - Accidents and incidents; - Grievances. The CESMP and OESMP will define monitoring and reporting procedures during construction phase and operation/aftercare phase, respectively.	NOIEP of MoEnv to develop and implement an ESMP identifying specific monitoring and reporting requirements during construction phase, while NOIEP and RO staff to develop and implement an ESMP for operation and aftercare phases in accordance with the Project ESHS management system. NOIEP to conduct regular audits/inspections of contractors' ESHS performance during contractors' construction works and in camps, as well as audits/inspections of SWM service providers. Enforce corrective actions and arrange for training, when required. NOIEP and RO staff to maintain records of accidents and incidents, arrange for follow-up training to reduce risks of similar cases. RO staff regularly prepares and submits environmental and social reports according to requirements of the EBRD and EIB.	1.4
2	Labour and Working Conditions Summary: Management of decent labour and working conditions during construction, operation and aftercare phases of the Project implementation is a high priority for improvements proposed within the Project and shall be addressed in the ESMMP. NOIEP is available and will manage the construction phase. No contractors have been appointed so far. The RO will be established by the time of the operation start. Legislation and regulations in Moldova are being developed in line with the ILO conventions ratified by Moldova and for harmonisation with the EU legislation.				

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
2.1	Human Resource Policies and Working Relationships	NIA	Contractors and RO are not in place yet, no information is available in the FS and EIA regarding the current HR policies and the working relationships of SWM service providers. The SWM service providers in WMZ-8 will be required to comply with policies set out in the Project ESHS system per the national legislation and EBRD PRs/GIP and have ESMMP including the HR Policy, Labour Management Plan and a grievance mechanism for Project workers.	NOIEP to include in the tender documents and contracts as well as in contracts with SWM service providers a requirement to follow Project ESHS policies. HR policies, Labour Management Plan and grievance mechanism for Project workers should be available for review and the respective practices for inspection by NOIEP and/or RO staff throughout the Project implementation. Information about Labour Management Plan and grievance mechanism of contractors and SWM service providers should be available in language(s) of the workers. The Project grievance mechanism managed by NOIEP and RO staff will also cover grievances of Project workers.	2.1
2.2	Child and Forced Labour	PC	Persons of age below 18 are currently not employed by SWM service providers. Contractors and SWM service providers they will be required to comply with policies set out in the Project ESHS system per the national legislation and EBRD PRs/GIP and have ESMMP including a Labour Management Plan and a grievance mechanism for Project workers.	NOIEP and RO staff will require contractors and SWM service providers to meet the standards defined by Moldova's Labour Code, ILO conventions and EBRD PR2 - not employ people of age below 18, not employ forced labour (people under penalty, prisoned, bonded or other involuntary labour arrangements), will not force workers for long hours, not retain their documents and monitor labour and working conditions of their sub-contractors and suppliers.	2.1
2.3	Non-Discrimination and Equal Opportunity	PC	National Labour Code and policy documents on employment, working conditions and salaries prohibit discrimination based on gender, age, physical ability, race, ethnical origins, etc.	Contractors will be required to comply with the national legislation and EBRD PRs NOIEP and RO staff will monitor performance of contractors and SWM service providers.	2.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
2.4	Workers Organizations	NIA	Contractors and RO are not in place yet; thus no information is available regarding their policies. According to the Labour Code, employers are encouraged to support the rights of employees for workers' organisation. Contractors and RO are not in place yet; thus no information is available regarding their policies.	Contractors will be required to comply with legislation of Moldova and EBRD PR2. Once appointed, HR policies and practices of contractors should be reviewed, and performance monitored by NOIEP and RO staff to ensure the compliance.	2.1
2.5	Wages, benefits, and conditions of work and accommodation	PC	The national law defines, inter alia, the minimum wage level. Wages of contractors and SWM service providers should comply with the national law. Existing staff premises of SWM service providers need upgrading to meet requirements of the national regulations. Contractors are not yet appointed; the camps are not established.	NOIEP and RO staff will require contractors and SWM service providers to comply with the national law of Moldova regarding the minimum wage level, work conditions, staff premises, etc. NOIEP and RO staff will regularly inspect construction worker camp to ensure meeting EBRD requirements on worker accommodation.	2.1
2.6	Retrenchment	NIA	RO is not in place, thus no information regarding its policy and practices is available for review. Current SWM service providers lack younger staff.	NOIEP and RO staff will require contractors and SWM service providers to establish and follow HR policy and Labour Management Plan addressing any possible retrenchment issues according to national legislation of Moldova, EBRD PR2 and GIP.	2.1
2.7	Grievance Mechanism for Project workers	NIA	RO and contractors are not in place, their grievance mechanism is not known so far.	Implement Project SEP with grievance mechanism convenient for Project workers, contractors. NOIEP and RO staff to monitor and, if necessary, to adjust the grievance mechanism.	2.2, 4.1, 4.3, 4.6
2.8	Non-Employee Workers	NIA	No information is so far available on non-employee workers.	As part of the tender / bidding process, environmental and social practices of bidders should be evaluated by NOIEP. Once contractors have been selected, the NOIEP and RO staff will review their practices regarding non-employee workers.	4.1, 4.3, 4.4, 4.5, 4.6

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
2.9	Supply Chain	NIA	The contractors and equipment suppliers (i.e., the primary supply chain) are not appointed yet. The national requirements and practices for supply chain audits are available (e.g., from food industry).	NOIEP and RO staff will arrange for independent audits and training to be carried out throughout the supply chain to ensure that social issues such as terms and conditions of employment are compliant with EBRD requirements.	1.3, 2.1, 3.6, 4.4
3	Resource Efficiency and Pollution Prevention and Control Summary: Resource Efficiency (RE) and Pollution Prevention and Control (PPC) measures within the Project will allow (i) introducing recovery of recyclable fractions from waste thus reducing the amount of waste subject to landfilling, (ii) preventing contamination of soil, groundwater and surface water, (iii) prevent smoke from open burning of waste and emissions from dumpsites, reduce spreading of dust and windblown litter, reduce emissions from waste transportation vehicles due to operation of transfer stations, (iv) regularly compact waste, cover it with soil or inert waste to increase lifetime of new landfill.				
3.1	Resource Efficiency	PC	A national system for WEEE management is in operation, EPR schemes are under development. The proposed Project includes segregation of certain waste fractions for further use thus contributing to resource efficiency and reduction of landfilled amounts of waste.	NOIEP and RO staff will require that resource efficiency measures to be included in the CESMP (for implementation by contractors) and in OESMP (for implementation by SWM service providers) will allow introducing recovery of recyclable fractions from waste thus reducing the amount of waste subject to landfilling, regularly compact received waste, cover it with soil or inert waste to increase lifetime of the new landfill.	3.1, 3.2, 3.4, 3.6, 4.4
3.2	Pollution Prevention and Control – Air emissions	PC	The EIA describes the current conditions and needs improvements for air pollution control with particular focus on prevention of waste burning, GHG emissions from dumpsites, on control of dust and emissions from vehicles and machinery.	When the regional landfill is operational, the RO staff will manage contractors for remediation of existing dumpsites to prevent smoke from waste burning, GHG emissions, spreading of windblown litter, odour nuisance. RO staff will ensure implementation of measures for optimisation of waste transportation, dust control measures during construction works and waste transportation, reduced emissions from waste transportation vehicles due to operation of transfer stations, establishment and operation of landfill gas management system, air quality management monitoring programme preparation and implementation with particular reference to dust and emissions from vehicles (PM ₁₀ particulates and NO ₂).	1.1, 1.2, 1.3, 1.4, 3.1, 3.2, 3.3, 3.4

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
3.3	Pollution Prevention and Control – Wastewater	MN	The leachate management system at existing landfill is not operational. No data are available on leachate management at the existing landfill according to the generation and evaporation balance. No leachate management systems are in place at existing dumpsites.	Closure and remediation of existing landfill and dumpsites as soon as the regional landfill is operational. Construction, operation and aftercare of the new landfill with synthetic base liner. Leachate management at the new landfill and other Project facilities to ensure protection of soil and groundwater from leachate. A septic tank and treatment plant for sewage to prevent pollution of soil, surface water and groundwater. Monitoring of leachate management Monitoring of sewage management.	1.1, 1.2, 1.3, 1.4, 3.6
3.4	Greenhouse Gases (GHG), Climate Change and GET	PC	Calculations of GHG emissions for current and future SWM scenarios are available. Future landfill gas management system is proposed as venting. Alternatives have been considered at the FS stage. GET Analysis has been conducted.	Follow-up on findings from GET Analysis. Monitor landfill gas generation after covering the new landfill cells and remediation of the existing landfill. Perform a separate study after closure of landfill cells for planning of further gas management system. Arrange for timely implementation of gas collection and venting/bio-oxidation/flaring/utilisation system.	1.1, 1.2, 3.4
3.5	Water	MN	Existing open dumpsites pose risks for contamination of surface runoff and groundwater. Baseline information is required on assessments of water pollution risks near the Project sites and available water resources.	Additional investigations of hydrogeological conditions and surface water runoff conditions taking into consideration the extreme weather events. Develop and implement a detailed water management plan with measures to reduce losses of potable water, to protect local surface water bodies and groundwater sources from contamination. The Project sites will have a system for monitoring of groundwater quality and ensure diversion of surface runoff to keep it clean. The installation of a base liner, top cover and leachate management system will largely stop leachate from the landfill from entering the environment in an uncontrolled way.	1.1, 1.2, 1.3, 1.4, 3.4, 3.6,

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
3.6	Waste	NIA	Waste from the construction phase should be managed in an appropriate way and should be reused as cover for waste and landfill roads where possible. Excavated soil and residual waste from operation of waste sorting/treatment facilities should, ideally, be stored on landfill site and used as a source of daily and intermediate cover during landfill operations.	Develop and implement a detailed waste management plan, operation manuals for SWM facilities. Include and implement resource efficiency and pollution prevention and control measures related to waste management as part of CESMP and OESMP.	1.1, 1.2, 1.3, 1.4, 3.1, 3.2, 4.4
3.7	Hazardous Substances and Materials	NIA	Hazardous substances and materials used in the Project (i.e., during the construction and operation of the landfill and other Project facilities) should be managed in accordance with relevant plans for health and safety, hazardous substances, and emergency plans, etc.	Develop and implement a hazardous materials management plan as part of CESMP/OESMP. Develop and implement Emergency Preparedness and Response plan as part of CESMP/OESMP.	1.2, 1.3, 1.4, 3.1
4	Health, Safety and Security Summary: Health, safety and security issues revealed during the site visits include, inter alia, the need for Occupational Health and Safety management improvements and restricting the site access for the public.				
4.1	Occupational Health and Safety	PC	Existing SWM service providers have OHS systems that are fragmental and need improvements. The construction contractors are required to follow the national laws of Moldova on OHS.	Contractors and SWM service providers develop OHS policies and practices that shall be reviewed upon selection and appointment. Implement the ESMP including occupational health and safety training, PPE and other measures in line with workplace risk assessment for Contractors and SWM service providers. RO staff monitors the implementation. Measures addressing the risk of COVID-19 shall be in place.	1.2, 1.3, 1.4, 2.1, 2.2, 3.1, 4.1, 4.3, 4.4, 4.5, 4.6

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.2	Community Health and Safety	MN	Existing dumpsites pose risks for community health and safety. They are located close to residential areas and are not fenced.	The CESMP and OESMP shall include measures required with regard to community health, safety and security. The NOIEP and RO staff to ensure that the provisions within the CESMP, OESMP, and emergency response plan pertaining to community health and safety are adhered to.	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1-3.6, 4.2, 4.3, 4.4, 4.5, 4.6, 5.1, 10.3
4.3	Gender-Based Violence	PC	The issue is addressed at the national level and should be addressed in the updated EIA.	NOIEP and RO staff shall include requirements for contractors and SWM service providers to elaborate and implement Gender Equality Plans.	2.1, 2.2
4.4	Infrastructure, Building, and Equipment Design and Safety	NIA	The design, construction, and operation of the landfill and other Project facilities are to be in line with international best practice, specifically the requirements of the EU's Landfill Directive as applicable in Moldova. Seismicity conditions of the Project area are to be considered.	Appropriate procedures are to be put in place by the NOIEP to ensure that the construction of the landfill is fully in line with the EU Landfill Directive, e.g., review of Project development by qualified external experts throughout all stages (design, construction, commissioning, operation, closure, remediation, aftercare). The NOIEP and RO staff should also ensure that prior to and during operation of each Project facility the respective manual is prepared, introduced, followed and updated as necessary to ensure that all the Project facilities are operated in line with international standards.	1.2, 1.3, 1.4, 4.2
4.5	Hazardous Materials Safety	NA	See section 3.7.	See section 3.7.	1.2, 1.3, 1.4, 3.1
4.6	Product Safety	PC	Compost and recyclables are planned as products of the improved SWM operations.	NOIEP and RO staff to include requirements for contractors and SWM service providers to ensure safety of compost and recyclables through good design of facilities and the operation practices.	4.4
4.7	Health and Safety Risks in Community Services	PC	Safe services are not available to manage all MSW generated in the Project area. A set of operation manuals will need to be developed as a basis for improving the safety.	RO staff to ensure that SWM operations within the Project are in line with a set of operation manuals to be prepared following the international best practices and the Project ESHS management system.	1.2, 1.3, 1.5, 1.6, 4.1-4.6

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.8	Traffic and Road Safety	PC	The construction works and new SWM system will cause traffic increase of large trucks and need for a traffic management plan in order to minimise risk of traffic incidences.	NOIEP and RO staff to ensure that a traffic management plan is part of the CESMP and OESMP obligatory for contractors and SWM service providers.	4.6, 10.1-10.3
4.9	Natural Hazards	PC	Risks related to natural hazards in the Project area are largely identified in the EIA. Information will be further elaborated in the updated version of EIA.	NOIEP and RO staff to ensure that the management of natural hazards is incorporated in the CESMP, OESMP and/or the emergency response plan.	1.2, 1.3, 1.4, 4.2, 4.4
4.10	Exposure to Disease	PC	Assessment of risks of exposure to diseases (including COVID-19) provides basis for planning of current operations and PPE management requirements.	RO staff to establish a set of operation manuals defining waste acceptance procedures to ensure that no infectious wastes are disposed of to the landfill. Landfill operation should closely follow the ESHS management system, with workers provided with appropriate PPE and trained for using it. NOIEP and RO staff to ensure that contractors and SWM service providers perform measures addressing the risk of COVID-19.	1.2, 1.3, 1.4, 3.1, 4.1, 4.2, 4.3, 10.1, 10.2, 10.3
4.11	Emergency Preparedness and Response	PC	The requirement for a detailed Emergency Preparedness and Response Plan (EPRP) is identified in the EIA, together with measures to be addressed in the EPRP.	NOIEP and RO staff ensure that contractors and SWM service providers develop and maintain Emergency Preparedness and Response Plans. The plans to be prepared and kept updated in liaison with relevant local institutions. RO staff to review and approve the EPRPs, ensure the reporting and coordination procedures. NOIEP and RO staff ensure first-aid points to be set up at the Project sites, the staff shall be trained in first-aid procedures.	1.1, 1.2, 1.3, 1.4, 2.1, 4.1, 4.2, 4.5, 10.1, 10.2

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.12	Security	NIA	Security threats posed by the Project to workers and communities will be identified and addressed.	Appointed contractors and SWM service providers to ensure compliance of security personnel with the national legislation of Moldova. NOIEP and RO staff will verify the security arrangements, follow-up on grievances and unlawful acts.	1.1, 1.2, 1.3, 1.4, 2.1, 4.1, 4.2
5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement Summary: The key Project facilities are planned within sites of abandoned industrial facilities or currently used for waste management.				
5.1	Avoidance and Minimisation of Displacement	PC	No resettlement issues have been identified. Land allocation sufficient for the key Project facilities is documented in EIA (2015) and will be verified during its update per the revised Project design. No activities of waste pickers were observed during the site visits in 2022.	Any potential land acquisition, involuntary resettlement or economic displacement is to be planned and implemented based on the Land Acquisition and Resettlement Framework (LARF) adopted for the Project. In case of economic displacement (e.g., of waste pickers), the livelihood restoration measures are to be elaborated and implemented per EBRD PR5.	1.1, 4.2, 5.1, 10.1, 10.2, 10.3
5.2	Consultation on RP/LRP	PC	Stakeholder consultation documentation for land allocation is available for EIA (2015). It will be updated within SEP.	NOIEP to conduct and document stakeholder consultation regarding land acquisition, RP/LRP, if relevant for the Project.	1.1, 10.1, 10.2, 10.3
5.4	Grievance mechanism for RP/LRP	NIA	No RP/LRP issues have been identified at the FS stage.	The responsibility for management and resolution of grievances will rest with MoEnv/NOIEP	5.1, 10.3
5.7	Monitoring of RP/LRP	NIA	No RP/LRP issues have been identified at the FS stage.	Monitor and reflect in AESR the implementation of RP/LRP, if relevant, and grievances.	5.1
6	Biodiversity and Living Natural Resources Summary: The key Project sites are located at distances of above 10 km from the nearest protected nature areas. As per the Project design of 2017, the Project area has no protected species and/or critical habitats that could be adversely affected by the Project.				
6.1	Assessment of Biodiversity and Living Natural Resources	PC	Biodiversity has been briefly assessed in the EIA (2015) for the three key sites in terms of their distance (more than 10 km) from the nearest protected nature areas. The assessment could be updated, if required for renewal of the Environmental Decision.	NOIEP to ensure update of biodiversity baseline and impact assessment in EIA per the adjusted Project concept. Propose impact mitigation measures, if relevant. Disclose the EIA to raise awareness of contractors and SWM service providers.	1.1, 6.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
6.2	Conservation of Biodiversity	PC	As many of the Project sites have been earlier affected by waste dumping and economic activities, they are not considered being biologically and ecologically important areas, and no protected species and/or no critical habitats/ecosystems were observed that could be adversely affected by the Project (2015). The update is required.	NOIEP and RO staff to include in CESMP and OESMP, keep them updated and implement throughout Project the measures for biodiversity conservation, if relevant.	1.1, 6.1
6.3	Sustainable Management of Living Natural Resources	NA	NA	NA	NA
7	Indigenous People – Not applicable since there are no Indigenous People in Moldova				
8	Cultural Heritage Summary: The Project sites are mainly located within the areas developed throughout many years of industrial or waste disposal activities. No cultural heritage was identified in 2015 that could be potentially affected by the Project in the site surroundings. The likelihood of chance find is low.				
8.1	Assessment and Management of Impacts on Cultural Heritage	PC	Cultural heritage issues are briefly assessed in the EIA (2015). The likelihood of chance finds could be revisited during updating the EIA.	Update the assessment of cultural heritage and chance find likelihood the EIA.	1.1, 8.1
8.2	Consultation with affected communities and other stakeholders	NA	The project will not affect cultural heritage of communities.	NA	NA
8.3	Project use of Cultural Heritage	NA	The project will not use cultural heritage.	NA	NA
10	Information Disclosure and Stakeholder Engagement Summary: The Project has identified and consulted the key stakeholders. Draft SEP has been prepared, will be implemented and updated by NOIEP and RO staff throughout all stages of the Project				
10.1	Stakeholder Engagement Plan	FC	Draft SEP has been prepared during the FS updating. It includes information on earlier stakeholder engagement activities, sets out the programme for future engagement and suggests the grievance redress mechanism.	RO staff to develop, keep updating and implementing the Project SEP throughout the Project.	10.1, 1.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
10.2	Operational Grievance Mechanism for Public	NIA	Contractors, SWM service providers and RO staff will establish procedures for filing and timely redressing the Project related grievances.	Grievance mechanism outlined in the SEP to be implemented.	10.2, 4.2, 5.1
Overall Compliance					
	National Environmental, Social, Health and Safety Requirements	PC	The EIA (prepared in 2015) reflects many of the national environmental regulatory requirements, while the information regarding social, health and safety regulatory requirements is very limited. The EIA will be updated to ensure assessment of the adjusted Project concept and prolongation of Environmental Decision validity according to the national legislation.	Implementation of the national EIA procedure. Planning and performing the Project works in compliance with the national laws and regulations of Moldova.	
	EU Environmental, Social, Health and Safety Requirements	PC	As per comments/issues in this table.	Preparation and implementation of CESM and OESM as identified in this table.	

Appendix 3C Environmental and Social Action Plan

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

ENVIRONMENTAL AND SOCIAL ACTION PLAN



PROJECT FEASIBILITY ASSESSMENT

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FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

ENVIRONMENTAL AND SOCIAL ACTION PLAN

PROJECT NO.

A226634

DOCUMENT NO.

WMZ-1 ESA3

VERSION

01

DATE OF ISSUE

24.02.2023

DESCRIPTION

ESAP WMZ-1

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

Abbreviations

AESR	Annual Environmental and Social Report
CESMP	Construction Environmental and Social Management Plan
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPIU	Environmental Projects Implementation Unit in the Ministry of Environment of the Republic of Moldova (before 2023)
EPRP	Emergency Preparedness and Response Plan
ESAP	Environmental and Social Action Plan
ESHS	Environmental, Social, Health and Safety
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
GET	Green Economy Transition
ILO	International Labour Organization
LCAM	Landfill Closure and Aftercare Manual
LPA	Local Public Authority
LRF	Livelihood Restoration Framework
LRP	Livelihood Restoration Plan
MSW	Municipal Solid Waste
NOIEP	National Office for Implementation of Environmental Projects (former EPIU)
OESMP	Operation Environmental and Social Management Plan
PPC	Pollution Prevention and Control
PPE	Personal Protective Equipment
PR	Performance Requirement
RE	Resource Efficiency
SEP	Stakeholder Engagement Plan
SPGE	Strategy for the Promotion of Gender Equality
SWM	Solid Waste Management
TA	Technical Assistance
TAC1	Project Implementation Support, Engineering Design and Contract Supervision Consultant
TAC2	Corporate Development and Stakeholder Participation Programme (CDSPP) Consultant

Introduction

This **Environmental and Social Action Plan** (ESAP) is developed within the document package for the Moldova Solid Waste Project component for WMZ-11 considered for financing by the EBRD. The Project includes procurement of new containers and trucks for improvement of regular waste collection services with separate collection of recyclable fractions. The improved services are expected to cover practically all residential areas in WMZ-11 located in the southern part of Moldova and consisting of Cahul Rayon¹, Cantermir Rayon, Taraclia Rayon (the three Rayons are part of South Development District) as well as Comrat Rayon, Ceadir-Lunga Rayon, and Vulcanesti Rayon comprising the Autonomous Territorial Unit of Gagausia (ATUG).. As a part of the proposed Project a regional landfill, a waste sorting station, a composting station will be established at the site allocated by Cahul community within the area near the existing dumpsite of the city of Cahul. Rayon. Other SWM facilities will include a transfer station on a site next to the existing dumpsite of Comrat, a transfer station within a pasture land owned by Cania LPA in Cantemir Rayon and adjacent to the national road R56, as well as a transfer station within the former livestock farm land plot owned by Taraclia town.. As soon as the new regional landfill is operational, all existing dumpsites in WMZ-11 shall be closed and the sites remediated.

The ESAP is based on the findings of the conducted Environmental and Social Assessment which identified a number of potential issues to be addressed by the National Office for Implementation of Environmental Projects (NOIEP) of MoEnv to prevent, mitigate, moderate or compensate for the identified potential impacts. The ESAP is to be adopted by the MoEnv as the Project owner responsible for its implementation during the detailed design stage and further throughout the Project.

The following organizational setup is envisaged for the Project implementation:

NOIEP will coordinate the Project on behalf of the Ministry of Environment (MoEnv) and will be assisted by the staff assigned for this purpose within the Regional Operator (Regional SWM Operator) of the proposed integrated SWM system in WMZ-11.

Regional Operator (Regional SWM Operator) as an inter-municipal JSC will be established by LPAs of the largest municipalities in WMZ-11. The Regional SWM Operator will be the key responsible for SWM collection in WMZ-11 and for operation of the proposed Project facilities by the time of their commissioning. The Regional SWM Operator will assign staff responsible for assistance to NOIEP throughout the Project implementation.

LPAs will be responsible for SWM services in their respective municipalities in WMZ-1. All or as many as possible of them will enter the Inter-Municipal Cooperation Agreement (IMCA) and the Public Service Contracts with Regional SWM Operator.

Small LPAs that choose not to enter the recommended IMCA and Public Service Contracts with the Regional SWM Operator may decide to have their own **Local Operators** for SWM collection and delivery to the regional installations (TS or regional landfill). In this case, the fees for SWM acceptance would be higher than to those LPAs who are the parties to the Public Service Contracts and, as appropriate, the IMCA.

Regional Operator and Local Operators are the **SWM Service Providers**.

Contractors and **Suppliers** will be contracted by NOIEP for construction of new SWM facilities proposed within the Project (a regional landfill, a sorting station, a composting station and two transfer stations) and supply of equipment.

Technical Assistance Consultants (**TA Consultants**), contracted by the NOIEP and to finance with technical assistance funds to be identified with the support of EBRD after signing the loan agreement, will provide support to the NOIEP, the Regional Operator and LPAs. One TA Consultant (**TAC1**) will focus mainly on the engineering design and procurement tasks and the second (**TAC2**) will be focusing on the corporate development the Regional Operator and the stakeholder participation programme.

¹ According to the official sources, the term "Rayon" refers to a territorial administrative unit made up of villages (communes) and cities united by the territory, economic and social cultural relations", ref. <https://moldova.md/en/content/administrative-territorial-organization-moldova>

Environmental and Social Action Plan

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
PR1 Assessment and Management of Environmental and Social impact issues							
1.1.	Conduct/Update and disclose EIA according to the adjusted concept of the Project, obtain new/extended Authorisation. Ensure that E&S management, mitigation and monitoring measures with obtaining of respective permits and with grievance mechanism are included and followed-up as requirements for contractors and SWM service providers. Prepare, keep updated and follow Operation Manuals for SWM facilities. Develop and implement ESHS Policy and an Environmental and Social Management System (ESMS) based on ISO 14001 to address ES impacts, including impacts on vulnerable groups that might be disproportionally affected by the Project, at all stages of the Project. Prepare ESMP for the Project, include requirements for CESMP (for contractor) and OESMP (for SWM service providers) implementation. Update as necessary and implement Stakeholder Engagement Plan throughout the Project.	Compliance with EBRD PRs, with EIB ES Standards and Climate Strategy	EBRD PR 1, EIB ESS1: KPI 1.1 Environmental and Social Assessment, KPI 1.2 Environmental and Social Management Systems, KPI 1.3 Environmental and Social Policy KPI 1.4 Environmental and Social Management Plan Other EBRD PRs, except for 7 and 9 Other EIB ESSs Good International Practice; ISO 14001 or equivalent certification; Voluntary and best practice EU and National legislation	Responsibility: NOIEP during pre-construction and construction. SWM service providers during operation and aftercare Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TA TAC1 during pre-construction and construction; TAC2 when contracted; national budget, as appropriate	Preparation pre-construction- by Project Implementation Support and Construction Supervision Consultant (TAC1); and, once contracted, by Corporate Development and Stakeholder Participation Programme Consultant (TAC2) Implementation throughout the Project	Annual ES Reports submitted to EBRD and EIB on progress in development and implementation of ESHS Policy, ESAP, SEP, CESMP and OESMP.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
1.2	Ensure competent ESHS managers employed by contractors and the capacity of contractors to implement CESMP. Ensure employment and training of competent staff responsible for ESHS management in NOIEP and SWM service providers. Ensure capacity of SWM service providers to implement OESMP.	Benefits: Responsibilities defined. Competent staff available	EBRD PR1 KPI 1.5 Organizational Capacity and Commitment EIB ESS1	Ditto	Preparation pre-construction; commissioning (staffing for operation) Implementation throughout the Project	Staffing and training schedules of NOIEP and SWM service providers. Requirements in tender documents and contracts for contractors and SWM service providers	
1.3	NOIEP to develop and implement a Supply Chain Management Plan, include in tender documents and contracts the requirement for contractors to have and implement ESMPs. Verify mineral material supply from authorised borrow pits, regularly inspect labour conditions, health and safety at workers' camps of Contractors.	Contractor / Supply chain management	EBRD PR1 KPI 1.6 Supply Chain Management EIB ESS1	Responsibility: NOIEP Resources: NOIEP, contractors Investment needs: TAC1; national budget, as appropriate	Preparation pre-construction Implementation throughout the Project	AESRs include section on implementation of Supply Chain Management Plan	
1.4.	Develop, update as necessary and implement a monitoring program, prepare reports on implementation of measures for compliance with EBRD PRs Monitoring and reporting program will be established for: - Amounts of waste accepted at landfill, sent for recycling, sent for composting; - Wind, temperature, precipitation, evaporation; - Air quality, odour nuisance;	Benefits: Regular monitoring for timely detecting potential noncompliance risks and implementing the corrective actions	EBRD PR1 KPI 1.7 Project Monitoring and Reporting EBRD PRs 1 – 6, 8, 10 EIB ESS1 – ESS10	Responsibility: NOIEP during pre-construction and construction. Regional SWM Operator staff during operation and aftercare Resources: NOIEP, Regional SWM Operator staff, contractors, SWM service providers	Preparation pre-construction Implementation throughout the Project	Requirements included in tender documents and contracts. Monitoring programme is in place, being implemented and updated, results are presented in AESRs submitted to EBRD and EIB.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
	- Dust; - Landfill gas; - Leachate amounts and quality; - Noise and vibration; - Surface water runoff and quality; - Groundwater levels and quality; - Landfill stability, remaining capacity; - Accidents and incidents; - Grievances.			Investment needs: TAC1; national budget, as appropriate			
PR2 Labour and Working Conditions							
2.1	Develop and implement HR Policy Statement and associated procedures that should cover as a minimum the following: i) Non-discrimination, equal rights, equal pay; ii) Prohibition of all forms of child labour and forced labour; iii) Workers' rights and obligations (including worker code of conduct); iv) Freedom of association and right to collective bargaining; v) Informing workers about their rights, obligations, liabilities, and entitlements; vi) Terms of employment including recruitment, hours of work, overtime arrangements and overtime compensation, rights to refuse overtime requests; vii) Contractor management;	Benefits: Decent employment and working conditions Employment opportunities for local people	EBRD PR 2 KPI 2.1 Human Resource Policies and Working Relationships KPI 2.2 Child and Forced Labour KPI 2.3 Non-Discrimination and Equal Opportunity KPI 2.4 Workers Organizations KPI 2.5 Wages, benefits, and conditions of work and accommodation EBRD SPGE EIB ESS8 National legislation Best practices	Responsibility: NOIEP during pre-construction and construction. Regional SWM Operator staff during operation and aftercare Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC2	Preparation pre-construction; commissioning (staffing for operation) Implementation throughout the Project	Requirement is included in tender documents and contracts. Outcome of on-site monitoring are to be reflected in AESRs submitted to EBRD and EIB.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
	viii) Worker's accommodation: processes and standards – guidance notes by IFC and EBRD 2009; ix) Occupational health and safety; x) Commitment to apply zero tolerance for any proven case of gender-based violence, workplace harassment and sexual exploitation and abuse; xi) Whistle-blower protection; xii) Formal grievance mechanism. Ensure that the HR Policy, and associated procedures are communicated across its entire workforce in writing.						
2.2	Grievance Mechanism for the Project Employees and Non-Employee Workers Establish, disclose and maintain (for staff of NOIEP, Regional SWM Operator staff , contractors and SWM service providers) grievance mechanism for employees could submit grievances and get them properly registered and redressed.	Benefits: Feedback from employee allowing to improve HR and OHS management prior to raising legal cases	EBRD PR2 KPI 2.5 Wages, benefits, and conditions of work and accommodation KPI 2.6 Retrenchment EBRD PR1 – KPI 1.5 Organizational Capacity and Commitment EIB ESS8, ESS9 National legislation Best practices	Responsibility: NOIEP throughout the Project. Regional SWM Operator staff during operation and aftercare Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1 (tender and supervision), TAC2 when contracted; national budget, as appropriate	Preparation pre-construction, commissioning (pre-operation) Implementation throughout the Project	Grievance mechanism is disclosed, further information is provided regularly. Grievances are redressed within 5 working days. Records are summarized in AESRs submitted to EBRD and EIB .	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
PR3 Resource Efficiency (RE) and Pollution Prevention and Control (PPC)							
3.1	Include and enforce requirement for contractors to plan and implement RE and PPC measures (<i>inter alia</i>, measures related to hazardous substances and materials) as part of CESMP. Develop, keep updating and follow Operation Manuals for Project SWM facilities in line with international standards. Landfill Operation Manual shall include systems for waste registration, compaction, covering, protection of soil and groundwater, management of leachate, surface runoff, landfill gas. Include and enforce requirement for SWM service providers to plan and implement RE and PPC measures (<i>inter alia</i>, measures related to hazardous substances and materials) as part of OESMP including the staff training programmes. Include and enforce RE and PPC measures to be implemented by contractors within Landfill Closure and Aftercare Manual (LCAM) and during closure and remediation of dumpsites.	Benefits: RE and PPC measures are planned and implemented as part of ESMS for the Project	EBRD PR 3 KPI 3.1 Resource Efficiency KPI 3.2 Pollution Prevention and Control – Air Emissions KPI 3.3 Pollution Prevention and Control – Wastewater EIB ESS2, ESS4, ESS9 National legislation and regulations EU Landfill Directive International best practices	Responsibility: NOIEP and contractors during construction works. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1 (tender and supervision),TAC2 (when contracted); national budget, as appropriate	Preparation pre-construction Implementation throughout the Project	Operation manuals including RE and PPC measures for construction and operation of SWM facilities are available, systematically updated and followed. Implementation status is reflected in AESRs.	
3.2.	Implement mitigation measures related to air emissions and noise/vibration from machinery/equipment. Ensure that all machinery and equipment used during construction and operation are in compliance with national EHS	Benefit: Avoidance / minimise action of accidents and associated liability	EBRD PR 3 KPI 3.1 Resource Efficiency KPI 3.2 Pollution Prevention and Control – Air Emissions	ditto	Preparation pre-construction Implementation throughout the Project	AESRs submitted to EBRD and EIB include section on measures implemented for reduction of	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
	standards & regulations. Regularly monitor noise levels and mitigate as appropriate (e.g., noise barriers; shielding of machinery). Ensure that all staff exposed to noise (inclusive of contractors) use adequate PPE.		KPI 3.3 Pollution Prevention and Control – Wastewater EIB ESS9 National legislation and regulations Best practices			emissions and noise/vibration from machinery/ equipment	
3.3.	Implement mitigation measures related to dust control : Ensure that working practices throughout the Project include dust prevention and control measures. Provide staff training. Ensure that all staff exposed to dust (inclusive of contractors) use adequate PPE.	Benefit: Avoidance / minimise action of nuisances / accidents and associated liability	EBRD PR 3 KPI 3.2 Pollution Prevention and Control – Air Emissions EIB ESS9 National legislation and regulations Best practices	ditto	Preparation pre-construction Implementation throughout the Project	AESRs submitted to EBRD and EIB include section on dust control measures implemented.	
3.4	Develop and implement measures addressing climate change impacts of the Project (to reduce emissions of GHGs) and on the Project (to ensure resilience of SWM operations, e.g., in case of extreme weather events). Include in CESMP, OESMP and SEP measures for raising awareness of climate change for staff of contractors, SWM service providers, the local communities and other stakeholders.	Benefits: Contribution to reduction of GHG emissions. Enhanced resilience of Project operations to climate change	EBRD GET Approach EIB ESS4 National legislation and commitments according to international agreements	Responsibility: NOIEP and contractors during construction works. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill	Preparation pre-construction; commissioning (pre-operation) Implementation throughout the Project	AESRs submitted to EBRD and EIB include section on climate change impact mitigation measures.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
				Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1 (tender and supervision), TAC2 (when contracted); national budget, as appropriate			
3.5.	Implement mitigation measures related to onsite traffic . Ensure preparation and implementation of traffic management plans at construction and operation sites. Instruct and monitor all contractors and their drivers; ascertain that all drivers have the correct licenses and are trained for this Project.	Benefits: Avoidance / minimise action of nuisances / accidents and associated liability	EBRD PR2 & PR3 EIB ESS9 National regulations Best practice	ditto	Preparation pre-construction Implementation throughout the Project	AESRs submitted to EBRD and EIB include section on audits of onsite traffic management.	
3.6.	Develop and implement within CESMP and OESMP a detailed water management plan and mitigation measures to reduce losses of potable water, to ensure efficient use of technical water, to protect surface water bodies and groundwater from contamination.	Benefits: Efficient use and protection of water resources	EBRD PR3 KPI 3.3 (PPC - Wastewaters & Water used) EIB ESS2, ESS4 National legislation Best practice	ditto	Preparation pre-construction; commissioning (pre-operation) Implementation throughout the Project	Water management plan is part of ESMP. Implementation is reflected in AESRs submitted to EBRD and EIB.	
PR4. Health, Safety and Security							
4.1.	Include and enforce requirements for contractors and SWM service providers to:	Benefits: OHS	EBRD PR4 KPI 4.1 Occupational	Responsibility: NOIEP and contractors during	Preparation pre-construction	Functioning OHS management	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
	- develop and implement an occupational health and safety management system based on regular Occupational Health and Safety Assessments. - appoint competent H&S Managers for the construction, operation, closure and aftercare phases. - perform procedures for staff training and health checks. - implement measures addressing the risks posed by COVID-19	management system addressing the risks related to construction works and SWM operations	Health and Safety EIB ESS9 Best practice Recommendations of WHO, national and regional authorities in Moldova	construction works. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1 (tender and supervision), TAC2 (when contracted); national budget, as appropriate	Implementation throughout the Project	system in place. Reports on accidents and incidents prepared according to national procedures and reflected in AESRs.	
4.2.	CESMP, OESMP and EPRP should include provisions for community health, safety and security. Key issues are land use, noise, traffic disturbance (heavy lorries) and dust emissions, windblown litter, leachate spreading, odour nuisance and visual impacts of SWM operations as well as risks related to unauthorized access to construction sites and to SWM facilities	Benefits: Avoidance / minimise action of incidents and associated liability. Better relationship with local residents.	EBRD PR 4 KPI 4.2 Community Health and Safety EIB ESS2, ESS9	Responsibility: NOIEP and contractors during construction works. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources:	Preparation pre-construction, commissioning (for operation) Implementation throughout the Project	Requirement included in tender documents and contracts. Implementation is reflected in AESRs submitted to EBRD and EIB.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
				NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1 (tender and supervision), TAC2 when contracted; national budget, as appropriate			
4.3	Establish procedures to ensure detailed engineering design includes: - measures to reduce risks caused by natural hazards. - measures to avoid exposure and spread of diseases. - high health & safety standards for infrastructure, buildings, structures, and equipment. Involve experienced consultants (from engineering design stage and on), experienced contractors (during construction works) and capable providers of services (during operation of SWM system) to ensure meeting H&S standards.	Benefits: Facilities and operations meeting H&S standards	EBRD PR 4 KPI 4.3 Infrastructure, Building, and Equipment Design and Safety KPI 4.7 Natural Hazards KPI 4.8 Exposure to Disease EIB ESS9 National legislation Best practices	ditto	Preparation pre-construction Implementation throughout the Project	Tender and contractual requirements for design and construction Detailed design approved by EBRD Measures are embedded in the ESMS and ESMP (when developed) and reported in AESRs submitted to the EBRD.	
4.4.	Include and enforce (via audits and corrective actions) requirement for contractors, equipment suppliers and SWM service providers to ensure safety of compost, recyclables and waste collection through good design of facilities and operation practices:	Benefits: Lowering risks for workers and customers	EBRD PR 4 KPI 4.5 (Product and Services Safety) EIB ESS9 National legislation	Responsibility: NOIEP, contractors, equipment suppliers during construction. Regional SWM Operator staff , equipment	Preparation pre-construction Implementation throughout the Project	Audits and corrective measures reported in AESRs submitted to EBRD	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
			Best practices	suppliers, SWM service providers during operation phase Resources: NOIEP, Regional SWM Operator staff , contractors, equipment suppliers, SWM service providers Investment needs: TAC1; national budget, as appropriate			
4.5.	Develop/update and maintain procedures integrated in an Emergency Preparedness and Response Plan (EPRP) as part of ESMS for the Project. Require contractors and SWM service providers to adopt EPRPs and to ensure capacity to follow them. Ensure staff training (PIU, contractors, SWM service providers):	Benefits: Minimizing E&S impacts from emergency situations.	EBRD PR4 KPI 4.9 (Emergency Preparedness and Response) EIB ESS1, ESS9 National legislation Best practice	Responsibility: NOIEP and contractors during pre-construction and construction. Regional SWM Operator staff , SWM service providers during operation. Contractors during remediation of dumpsites. Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1	Preparation pre-construction Implementation throughout the Project	EPRP adopted. Resources allocated, trainings conducted and reported in AESRs submitted to the EBRD.	
4.6.	Ensure preparation and implementation of Traffic Management Plans for all phases of the Project (as part of CESMP and OESMP)	Benefits: Reducing traffic nuisance,	EBRD PR 4 KPI 4.8 Traffic and Road Safety	Responsibility: NOIEP and contractors during pre-construction and	Preparation pre-construction, pre-operation	Traffic Management Plans adopted,	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
		accidents, emissions caused by Project vehicles	EIB ESS9 National legislation Best practice	construction. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1; national budget, as appropriate	Implementation throughout the Project	implementation reported in AESRs submitted to EBRD	
PR5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement							
5.1.	If any land acquisition and resettlement impacts are identified, the client will address the impacts by preparing and implementing a Resettlement Plan (RP). RP should be developed as per requirements of LARF and PR5, approved by EBRD, and implemented prior to the occurrence of impacts (before acquisition takes place). The implementation of RP should be verified through a completion report prepared by external resettlement consultant.	Avoid or minimize land acquisition and resettlement impacts	EBRD PR 5 EIB ESS6, ESS7, ESS10 National legislation Best practice	Responsibility: NOIEP during pre-construction and construction. Resources: NOIEP, SWM service providers Investment needs: Consultant for RP preparation and implementation (if relevant); national budget, as appropriate	Preparation (if relevant) pre-construction Implementation per RP, if relevant	RP prepared and approved by EBRD Progress is reflected in RP monitoring reports and/or AESRs. Completion report submitted to EBRD	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
R6 Biodiversity and Living Natural Resources							
6.1	Update EIA sections related to biodiversity per the current status of habitats and protected areas in accordance with adjusted Project concept. Include in CESMP, OESMP, LCAM and implement measures to lower Project impacts on biodiversity.	Benefits: Avoiding/ lowering Project impacts on biodiversity	EBRD PR6 EIB ESS3 National legislation Obligations per international conventions Best practice	Responsibility: NOIEP and contractors during pre-construction and construction. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1; national budget, as appropriate	Preparation (if relevant) pre-construction, pre-operation, pre-aftercare Implementation thought the Project, if relevant	Biodiversity conservation plan, if relevant, prepared, implemented and reported in AESR.	
PR7 Indigenous People – not applicable as there are no Indigenous People in Moldova							
PR8 Cultural Heritage							
8.1	Update EIA sections on the assessment of cultural heritage, chance find likelihood and visual impacts on landscape per the adjusted Project concept in consultation with the specialists and the local communities. Plan and implement measures, if relevant, to lower impacts on cultural heritage, visual impacts on	Benefits: Avoiding/ lowering Project impacts on cultural heritage	EBRD PR 8 KPI 8.1 Assessment and Management of Impacts on Cultural Heritage	Responsibility: NOIEP and contractors during pre-construction and construction. Regional SWM Operator staff , SWM service providers and contractors during	Preparation pre-construction and pre-operation (if relevant) Implementation thought the Project	Cultural heritage protection plan, if relevant, prepared, implemented and reported in AESR.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
	landscape.		EIB ESS5 National legislation Best practices	operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1; national budget, as appropriate			
PR9 Financial Intermediaries – not applicable for the Project							
PR10 Information Disclosure and Stakeholder Engagement							
10.1	Stakeholder Engagement Plan Ensure disclosure of updated EIA and SEP for the Project according to legal and regulatory requirements of Moldova and EBRD ESP. Develop, update as necessary and implement the SEP using adequate communication tools for consulting various stakeholder groups throughout the Project. Incorporate relevant comments/ concerns into the Project design and operations.	Benefits: Stakeholder consultation throughout the Project Effective grievance mechanism available	EBRD PR10 KPI 10.1 Stakeholder Engagement Plan EIB ESS10 National legislation Aarhus Convention Best practices	Responsibility: NOIEP during pre-construction and construction. Regional SWM Operator staff , SWM service providers and contractors during operation phase, closure and remediation of dumpsites, closure and aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs:	Preparation pre-construction, commissioning (pre-operation) Implementation throughout the Project	AESRs submitted to EBRD include information on implementation of SEP and grievance mechanism.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
				TAC1 (tender), TAC2 (when contracted); national budget, as appropriate			
10.2.	Community Liaison Group(s) Establish and maintain within SEP a system of regular (online and offline) meetings of Community Liaison Group(s). Ensure that local residents are fairly represented in the Group(s). Ensure that information about these meetings and their outcome is effectively communicated to the local community. Client to assign Community Liaison Officer (CLO)	Benefits: Communities support to the Project and benefit from the investments	EBRD PR10 KPI 10.1 Stakeholder Engagement Plan EIB ESS10 National legislation Best practices	Responsibility: NOIEP during pre-construction and construction. Regional SWM Operator staff , SWM service providers and contractors throughout further Project activities Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC2 (when contracted) ; national budget, as appropriate	Preparation pre-construction and pre-operation Implementation throughout the Project	List of Group members, records of meetings. Updated SEP. CLO assigned AESRs submitted to EBRD.	
10.3.	Grievance Mechanism for Public / Local Community Establish and maintain an effective grievance registration and redress procedure for communities neighbouring to Project sites and for and other stakeholders in the Project. Ensure that grievances are registered dealt with speedily, effectively, and fairly.	Benefits: timely receiving and redressing the Project related feedback	EBRD PR10 KPI 10.2 Operational Grievance Mechanism EIB ESS10 Best practices	Responsibility: NOIEP during pre-construction and construction. Regional SWM Operator staff , SWM service providers and contractors throughout operation phase, closure and remediation of dumpsites, closure and	Preparation pre-construction, pre-operation Implementation throughout the Project	Grievances registered and redressed within 10 working days. This is reflected in AESRs submitted to EBRD.	

No.	Action	Environmental & Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs and Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status
				aftercare of landfill Resources: NOIEP, Regional SWM Operator staff , contractors, SWM service providers Investment needs: TAC1 (tender), TAC2 when contracted; national budget, as appropriate			

Appendix 3D Stakeholder Engagement Plan

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

STAKEHOLDER ENGAGEMENT PLAN



FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

STAKEHOLDER ENGAGEMENT PLAN

PROJECT NO.

A226634

DOCUMENT NO.

WMZ-1 ESA4

VERSION

01

DATE OF ISSUE

24.02.2023

DESCRIPTION

SEP WMZ-1

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

Abbreviations

AESR	Annual Environmental and Social Report
CLO	Community Liaison Officer
CS	Composting Station
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPIU	Environmental Projects Implementation Unit in the Ministry of Environment of the Republic of Moldova (until 2023)
ESMS	Environmental and Social Management System
ESP	Environmental and Social Policy
LF	Landfill
LPA	Local Public Authority
LARF	Land Acquisition and Resettlement Framework
MARDE	Ministry of Agriculture, Regional Development and Environment (reorganised in August 2021)
MoEnv	Ministry of Environment of the Republic of Moldova
MSW	Municipal Solid Waste
NOIEP	National Office for Implementation of Environmental Projects (before 2023, EPIU)
PR	Performance Requirement
Rayon	District (in Moldova)
RO	Regional Operator
SEP	Stakeholder Engagement Plan
SS	Sorting Station
TS	Transfer Station

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APPENDICES

Appendix A	Stakeholder Engagement and Communication Programme for the Project
Appendix B	Record of public consultations regarding the EIA in 2015-2016

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1 Introduction

1.1 The proposed Project

The proposed Project shall contribute to establishing an integrated solid waste management (SWM) system in the Waste Management Zone 1 (WMZ-1) including Cahul Rayon¹, Cantermir Rayon, Taraclia Rayon (the three Rayons are part of South Development Region) as well as Comrat Rayon, Ceadir-Lunga Rayon, and Vulcanesti Rayon comprising the Autonomous Territorial Unit of Gagausia (ATUG). The proposed new system will include:

(1) an improved waste collection system in all Rayons included in WMZ-1 with new containers (including containers for dry fraction of waste excluding glass, containers for wet fraction of waste and special containers for separate collection of glass and other recyclables) and trucks for regular waste collection in all residential areas of WMZ-1;

(2) waste transfer stations and transfer trucks for the waste collected in Cantemir Rayon, Taraclia rayon and in Comrat Rayon located far from Cahul could be in the most efficient way transported to waste management facilities located in Cahul Rayon;

(3) new set of facilities in Cahul Rayon for management of waste from all Rayons of WMZ-1: a sorting station (for recyclables), a composting station (for treatment of park and garden waste) and a regional sanitary landfill (for disposal of residual waste) – recovery of recyclables and composting of park and garden waste will allow to reduce the amount of waste going to landfill;

(4) closure and capping of all dumpsites in WMZ-1 as soon as the new regional landfill is operational.

Figure 1.1 presents the map of the proposed elements of regional infrastructure of new waste management system within WMZ-1 assuming that LPAs will continue being responsible for the SWM services within the administrative territories of their respective municipalities.

According to the map, the territories of municipalities in WMZ-1 were grouped as four Waste Collection Catchments taking into consideration the proximity of each municipality to a Transfer Station or the regional sanitary landfill. The name of the waste collection catchments includes the name of the Rayon in which the Transfer Station or Reginal Landfill is located:

- > Cantemir Waste Collection Catchment includes the municipalities within Cantemir Rayon (excluding Visiniovca, Sadic, Samalia, and Cietu municipalities).

¹ According to the official sources, the term "Rayon" refers to a territorial administrative unit made up of villages (communes) and cities united by the territory, economic and social cultural relations", ref. <https://moldova.md/en/content/administrative-territorial-organization-moldova>

- > Cahul Waste Collection Catchment includes the municipalities within Cahul Rayon (excluding Chioselia Mare and Borceag municipalities), all municipalities within Vulcanesti Rayon of ATUG, and Budai Municipality within Taraclia Rayon.
- > Taraclia Waste Collection Catchment includes the municipalities of Taraclia Rayon (excluding Budai Municipality), municipalities within Ceadir-Lunga Rayon of ATUG (excluding Tomai Municipality), Chioselia Mare and Borceag municipalities within Cahul Rayon, and Chioselia Rusa and Svetlii municipalities within Comrat Rayon of ATUG.
- > Comrat Waste Collection Catchment includes the municipalities within Comrat Rayon of ATUG (excluding Chioselia Rusa and Svetlii municipalities), Visiniovca, Sadic, Samalia, and Cietu municipalities within Cantemir Rayon, and Tomai Municipality within Ceadir-Lunga Rayon of ATUG.

As it can be seen in the map, some municipalities located close to Rayon borders were, despite of the administrative borders, included in the waste collection catchments in which a Transfer Station or the Regional Landfill is located closer to the municipalities than a TS in their own Rayon. For example, four municipalities located in Cantemir Rayon (i.e., Visiniovca, Sadic, Samalia, and Cietu) are included into Comrat Waste Collection Catchment as they are located closer to the Transfer Station site in Comrat than to the TS in Cantemir.

The combination of regional landfill, waste sorting station and composting station located close to each other at Cahul site will be further referred to as the Waste Management Centre (WMC).

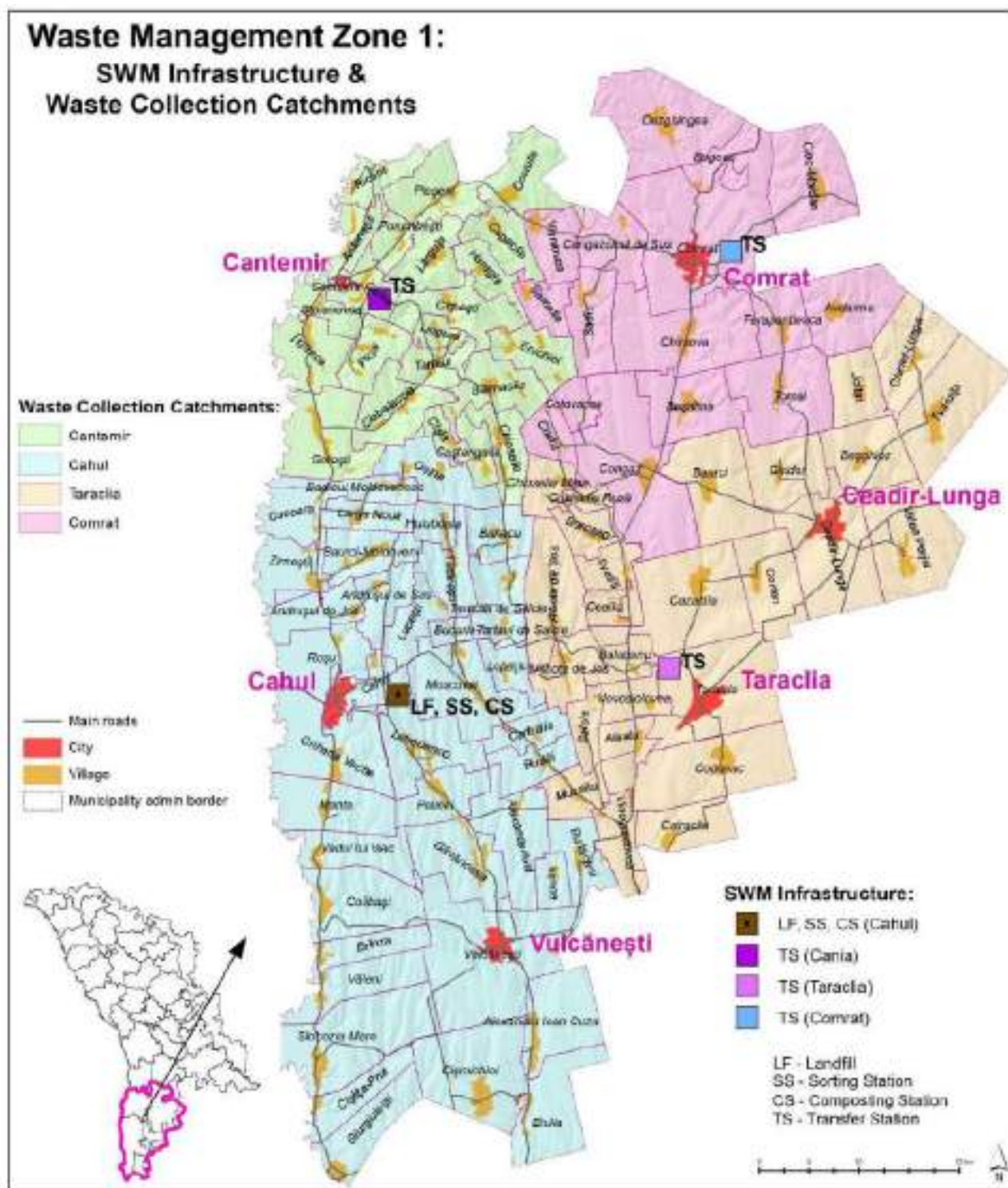


Figure 1.1 SWM infrastructure planned for the Project in WMZ-1

The site proposed for Cania TS establishment has an area of 1.78 ha (cadastral number 21142070182) and is owned by the Cania LPA. The distance from the site border to the nearest residential area is 1.3 km, the distance to the Tigheci River is 1.85 km. The site is currently used as pasture (see Figure 1.2) and is surrounded by agriculture lands.



Figure 1.2 Overview map of the proposed Cania TS site location in WMZ-1

The site proposed for Taraclia TS has an area of 1.74 ha (land cadastral nr. 8701104.862) and is owned by the municipality of Taraclia town. The site territory has a grass cover and includes remains of a former livestock farm. The site overview map is included in Figure 1.3



Source: COWI on the basis of moldova-map.md

Figure 1.3 Situational map of the proposed Taraclia TS site location in WMZ-1

The site proposed for the TS for Comrat Rayon is located next to the existing municipal dumpsite and close to the main road R35 (Comrat-Basarabeasca). The land is owned by Comrat Town Municipality and has an area of 0.369 ha. The site has a grass cover. The site is about 1,200 m away from residential area (Comrat Town). The site is bordered by Comrat Dumpsite (East) and cultivated lands (South-West). A quarry and some abandoned farm buildings can be observed within a distance of about 200 m from the site.



Source: COWI on the basis of Moldova-map.md, 2022

Figure 1.4 Location of site proposed for establishment of Comrat TS

The proposed Project assumes establishment of regional landfill compliant with the EU standards. Site selected for establishment of the regional waste management center (WMC) including a regional landfill, a sorting station and a composting station is located east of Cahul city within the land including the currently operated and guarded waste disposal site of Cahul municipality. The planned footprint of the waste body is estimated 20 ha. The currently designated area of 10.7 ha (includes a land plot of 9.1 ha owned by Cahul LPA and two privately owned land plots that are to be expropriated) could be extended. The site is surrounded by grassland and shrubland and is accessible from the main road via a gravel paved road.

The adjacent terrain is hilly and includes a ravine (depth 20-25 m) to the east and northeast. The existing waste disposal site is located at an elevated plateau having an altitude of about 140 m.a.s.l. and the surrounding slopes of 10-15°.



Source: COWI, February 2022

Figure 1.5 View from west to east over the site selected for regional WMC in WMZ-1

As stated in the EIA prepared in 2015, the site has a possibility for expansion to 18 ha. The area of existing waste disposal site (10.7 ha of degraded land) and of required expansion (6.05 ha of pastures and arable land) is in public ownership of Cahul LPA. Additional part of the required expansion area (1.246 ha of gardens) is the private property of 5 owners.

Geographical coordinates of the site are as follows:

- > Latitude: 47°54'30.11" N
- > Longitude: 28°16'17.5" E

View from the central part of the site towards South, where the area is planned for establishment of sorting station and composting station, is included in Figure 1.5.



Source: COWI, 2022

Figure 1.6 View of the area planned for sorting station and composting station within the regional WMC in WMZ-1

Distances from the site borders to the nearest residential area (Cotihana village) is 2.6 km, to the residential area of Cahul city is 3.5 km. Schematic maps indicating the distances from the site borders is included in Figure 1.7. and Figure 1.8.



Source: COWI on the basis of moldova-map.md

Figure 1.7 Overview map of the Cahul site location in WMZ-1



Source: COWI on the basis of moldova-map.md

Figure 1.8 A detail of the Cahul site location map



Source: COWI on the basis of moldova-map.md and FS (2015)

Figure 1.9 A detail of the Cahul site with the indicated layout of proposed regional sanitary landfill for WMZ-1

The site for construction of the new landfill was selected and investigated as presented in the EIA prepared in 2015. The proposed landfill will be an engineered facility designed, constructed and operated in accordance with the EU landfill directive. The landfill operation plan/manual will be developed, the staff will be trained and follow it in line with good international practices.

The landfill area for placing of waste will be established with the following key elements:

- > a base/bottom structure including a layer of natural clay and a layer of synthetic (HDPE) material to prevent soil and groundwater below the landfill against contamination from waste;
- > a system of pipes for collection of leachate (a liquid coming from waste due to its decomposition and contact with rainwater) and a leachate accumulation basin to ensure controlled handling of leachate within the landfill site;
- > a system for safe management of landfill gas generated in waste during its decomposition and containing methane;
- > environmental monitoring system, occupational health, safety and security system.

As soon as the regional landfill and other SWM infrastructure established within the Project are operational, all dumpsites in WMZ-1 could be closed (i.e., they will not be used for disposal of more waste) and covered with soil, while all waste collected in the Rayons of WMZ-1 will be, directly or via Transfer Station, taken to the proposed regional waste management centre (WMC) including the new regional landfill.

The EIA prepared for the earlier proposed project in 2015 includes assessment of impacts and proposed mitigation measures related to construction works and to operation of SWM facilities as they were planned in 2015. The EIA was after the public consultations submitted by the Ministry of Regional Development and Construction (the project initiator) to the Ministry of Environment that performed the expert examination procedure with the Environmental Decision approved by the Minister on 15 June 2017.

The Environmental Decision valid for 4 years was issued for the Ministry of Regional Development and Construction as the Project's initiator and implementing organisation, which was supposed to obtain all necessary

permits (construction permit and related other permits) for the Project implementation no later than 14 June 2021. Hence, the EIA shall be updated to obtain a new Environmental Decision according to the provisions of the Law No. 86/2014 on the environmental impact assessment in Moldova. If a new round of public consultation is arranged, due measures will be taken to address the risks posed by the COVID-19.

1.2 Providers of improved services

SWM services within the proposed new system in WMZ-1 will be provided by a Regional Operator (RO, regional provider of SWM services), which will be established as an inter-municipal joint-stock company established by the largest LPAs in WMZ-1 - Cahul Town, Cantemir Town, Comrat Town and Taraclia Town. Other LPAs, depending on the decisions of municipal councils, will enter the inter-municipal cooperation agreement (IMCA) or public service contracts with the RO or at least enter into service agreements with other SWM service providers in WMZ-1. The Regional Operator will be responsible for SWM services including collection of waste, operation of the transfer stations, recyclables sorting station, composting station, and the new regional sanitary landfill. The regional operator within the Project will get new waste collection trucks and via its units in the Rayons is supposed to collect waste in larger areas than before the Project.

1.3 Financing organisations

To ensure investments for establishment of the integrated SWM system with construction of the proposed new facilities MoEnv as the Project promoter is seeking loans from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). In total, the two loans will be used to finance 70% (35% each) of the planned priority investments. The remaining 30% are to be financed with an investment grant, which the EBRD intends to attract from an international donor, as well from the national budget, as appropriate. Additional grants for financing of technical assistance and supervision consultants are also envisaged to be mobilised by the EBRD.

1.4 Purpose of Stakeholder Engagement Plan

The stakeholders are individuals, groups, communities and organisations, who are responsible for, interested in, affected or likely to be affected by the proposed Project. The stakeholder identification and consultation will be carried out throughout preparation, as well as during the implementation of the Project.

Stakeholder engagement and consultation should improve the information flow and the process of decision-making for tailoring the Project activities based on better understanding and better addressing the interests of various organisations, communities, groups, individuals related to the Project.

Key objectives of Stakeholder Engagement Plan (SEP) are to:

- Identify key stakeholders of the Project, in particular the groups/communities directly affected by environmental and social impacts caused by the Project;
- Establish communication channels to ensure good understanding of the Project (activities, risks and mitigation measures) by all potentially affected groups and individuals;
- Establish grievance mechanism for continuous stakeholder consultation throughout the Project.

The current version of SEP (see Appendix A) is prepared in 2023 within the Project feasibility assessment basing on the review of the earlier Feasibility Study and EIA documentation prepared in 2015. The SEP is a living document and during the pre-construction and construction phases of the Project will be further developed and implemented by NOIEP of the MoEnv that will act as the Contracting Authority for the works, goods and services

during establishment of the regional SWM infrastructure. The NOIEP will be in charge of the management of projects implemented in all WMZs in Moldova and will be supported by the assigned staff of the Regional Operator in WMZ-1 that will take over from the State and LPAs the right to use the regional assets and will operate the regional SWM infrastructure.

The key contact in the NOIEP:

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National Office for Implementation of Environmental Projects (NOIEP)
Ministry of Environment of the Republic of Moldova
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2 Framework of legal and regulatory requirements

The Project shall adhere the requirements related to disclosure of environmental information and to public consultation procedure defined by the national legislation of Moldova, the EBRD Environmental and Social Policy and the Environmental and Social Standards of the EIB.

2.1 National requirements

2.1.1 Consultation during EIA

The Moldovan EIA legislation requires that public consultation is undertaken as a part of the process and the EIA report is disclosed to affected parties / stakeholders. Details of the consultation must be submitted alongside other EIA documents for the State Ecological Expertise.

Under the Moldovan legislation (Law 239/2008 on transparency in decisional making process), regional, Rayon, city, settlement or village executive committees, or the local government, organize public discussions in advance of project development. At least 15 days in advance of the discussion, its time and place shall be advertised on the official website and notice boards of the local executive and administrative authorities, in the media and on billboards at the entrances of residential buildings. Project documents shall be accessible at a public place, so that interested citizens can acquaint themselves with the project free of charge. Contact information shall be provided together with the documents, so that citizens can address their comments and questions to the developers.

The consultation meeting shall be held in a public space, where a representative of the project developer shall be present to answer questions and comments. Results of the public discussion shall be made publicly available as well as information that the project has been approved. Changes and/ or additions to project based on results of the public discussion are made at the customer's or developer's expense.

The period during which the public can submit comments is 30 calendar days. This period includes 15 days during which the project documents are made publicly available. After the incoming comments and suggestions have been considered, a protocol is elaborated.

2.1.2 Grievance procedure

In accordance with the Law 190/1994 on grievance, any citizen or employee may appeal to any individuals and/ or legal entities. Both must receive a response within 30 working days period. As stated in the law, the registered appeals are transferred to the affected party or its deputy for consideration and subsequently to the relevant departments of the appropriate ministries where they are processed.

Based on the examination and consideration of all issues contained in the appeals, appropriate measures are taken to protect and ensure the implementation, restoration of the rights, freedoms and (or) the legitimate interests of the applicants. Answers are delivered in hard copy, in verbal message or electronic form to the complainant.

2.1.3 Vulnerable groups

According to the legislation in force, the following categories of vulnerable persons as beneficiaries of social assistance beneficiaries in the Republic of Moldova (Law No. 547 of 25-12-2003):

- > children and young people whose health, development and physical, mental or moral integrity are prejudiced in the environment in which they live;
- > families that do not properly fulfil their obligations regarding the care, maintenance and education of children;

- > no-income or low-income families;
- > families affected by domestic violence;
- > persons without families, who cannot manage alone, who need care and supervision or are unable to cope with socio-medical needs;
- > families with three or more children;
- > single-parent families with children;
- > the elderly;
- > persons with disabilities;
- > other persons and families in difficulty.

According to Law no. 499 of 14-07-1999 regarding the state social allowances for some categories of citizens, the following categories of persons are established who can receive allowances:

- > persons with severe, accentuated and moderate disabilities;
- > persons with severe, accentuated and moderate disabilities from childhood;
- > children with severe, accentuated and average disabilities up to 18 years of age;
- > children who have lost their breadwinner;
- > persons who have reached retirement age;
- > persons caring for, accompanying and supervising a child with severe disabilities up to the age of 18;
- > persons with severe childhood disabilities - for care, accompaniment and supervision;
- > people with severe blind disabilities - for care, support and supervision.

2.2 Requirements of EBRD

The EBRD's Environmental and Social Policy (2019) sets out a number of Performance Requirements (PRs) which the Projects must comply with². Several of the PRs contain requirements for stakeholder engagement and grievance mechanism:

- > PR 10 "*Information disclosure and stakeholder engagement*" relates to meaningful engagement between the Bank's client and affected parties, e.g., local communities, workers and other stakeholders. Stakeholder engagement involves stakeholder identification and analysis, stakeholder engagement planning, disclosure of information, consultation and participation, grievance mechanism, and ongoing reporting to relevant stakeholders.
- > The PR 2 "*Labour and working conditions*" relates to grievances for employees and non-employee workers of the Client under the project and providing them with a mechanism to raise workplace concerns.
- > PR 5 "*Land Acquisition, Restrictions on Land Use and Involuntary Resettlement*" specifies the right of public affected by resettlement or economic displacement to be consulted from an early stage and to raise their concerns through planning and implementation of land acquisition and livelihood restoration activities in accordance with the Land Acquisition and Resettlement Framework (LARF) adopted for the Project and following PR 5, as well as using a grievance mechanism established according to the requirements in PR 10.

An effective grievance mechanism shall be established in order to respond to stakeholders' various concerns relating to the project. The process shall not prevent the use of judicial or administrative procedures. There should be an option to express concerns anonymously.

² PR 7 (Indigenous People) and PR 9 (Financial Intermediaries) are not applicable for the Project as there are no indigenous people in the country, and no financial intermediaries are involved in the Project.

The grievance procedure shall be established and maintained at a scale appropriate for the project so that any issues can be resolved in a timely manner throughout all phases of the project.

The EBRD ESP (2019) defines vulnerable groups as *people or groups of people who may be more adversely affected by project impacts than others by virtue of characteristics such as their gender, gender identity, sexual orientation, religion, ethnicity, indigenous status, age (including children, youths and the elderly), physical or mental disability, literacy, political views, or social status. Vulnerable individuals and/or groups may also include, but are not limited to, people in vulnerable situations, such as people living below the poverty line, the landless, single-headed households, natural resource dependent communities, migrant workers, refugees, internally displaced people, or other displaced persons who may not be protected through national legislation and/or public international law.*

As stated in the ESP commitment 2.6, the EBRD will require its clients to identify vulnerable people or groups who may be disproportionately impacted by projects and develop and implement mitigation measures so that vulnerable people are not disproportionately impacted. This will include assessing to what extent tariff changes caused by projects may create problems of affordability of basic levels of services for disadvantaged and/or vulnerable groups of the population and satisfy itself that effective schemes to mitigate the affordability challenges are developed and put in place.

2.3 Requirements of EIB

As a public institution, the EIB actively promotes the right to access to information, as well as public consultation and participation consultations are crucial and should be integrated at each stage of project preparation and implementation. EIB Environmental and Social Standard 10 (Stakeholder Engagement) requires promoters to uphold an open, transparent and accountable dialogue with all project-affected communities and relevant stakeholders in an effective and appropriate manner.

As set out in EIB Environmental and Social Standard 7 (Rights and Interests of Vulnerable Groups), in affirming the human rights-based principles of participation, non-discrimination and transparency in engagement and consultation, the promoter will provide discriminated and affected vulnerable groups as early as possible with all the relevant information about the project (including an assessment of potential adverse effects and projected benefits of the project). This is to be done in a culturally appropriate manner. Under-represented groups on account of gender, poverty or other elements of social vulnerability should be given equal opportunity to voice their opinions and concerns, and these should be accounted for in the project decision-making.

Information shall be disclosed in the local language(s) and in a manner that is timely, accessible and culturally appropriate, taking into consideration any vulnerable or minority groups and their right to equitable representation and consideration for their rights, views and interests. Promoters may provide targeted capacity building or other assistance so as to allow vulnerable individuals or groups impacted by the project to participate in engagement and consultation processes fully and effectively.

The value of public participation in the decision-making process is stressed throughout the preparation, implementation and monitoring phases of a project. The right to access to remedy, including through grievance resolution, is actively required.

3 Summary of stakeholder engagement to date

Stakeholder engagement activities for the Project preparation included the public consultation during EIA process in 2017 and the Project concept adjustment in 2021-2022. The following sections provide the details.

3.1 Consultations during EIA in 2015-2016

A public consultation process in compliance with the national legislation of Moldova was conducted and documented in 2015-2016 (see Appendix B). This is stated in the Environmental Decision issued in June 2017.

The public was informed about each stage of the EIA procedure by announcements:

- > in the mass media;
- > on the websites of the Ministry of Agriculture, Regional Development and Environment and Rayon councils in WMZ-1;
- > in the offices of local public administrations.

As stated in the Environmental Decision, no suggestions/objections from concerned public which could be considered relevant for making changes in the proposed project were received during the entire period of the procedure phases on the EIA.

3.2 Consultations on the Project concept adjustment in 2021-2023

Basing on the Project feasibility assessment, it was proposed instead of the sorting stations next to transfer station (for recovery of separately collected recyclables) planned during FS to locate the central sorting station next to the regional landfill in Cahul. MoEnv plans at some stage to implement RDF production for energy recovery from recyclable materials that cannot be recycled otherwise. According to MoEnv, the sorting station could be modified for production of RDF when necessary. EIA for regional sanitary landfill in Cahul could be updated taking into consideration the sorting station and composting station next to the landfill working as the waste management centre for WMZ-1. No EIA for TS is required per the legislation of Moldova. An example of the mass media publication about the Project preparation in 2021 is included in Appendix F.

3.2.1 Establishment of working groups in Rayons in 2021

Working groups for the Project implementation were established in Rayons included in WMZ-1 to support communication and coordination of decisions related to the Project preparation. The working groups are chaired by a Mayor or a Deputy Mayor. The working groups supported the collection of information from SWM service providers in 2020 based on the questionnaires developed by COWI during the Feasibility Study update.

3.2.2 Stakeholder consultations in 2022

Stakeholder workshops and teleconferences were held in September 2022 with participation of representatives of MoEnv, EPIU, EBRD and the mayors or deputy mayors of the largest towns of WMZ-1 (Cahul, Cantemir, Ceadir-Lunga Comrat, Taraclia on 09.09.2022 and on 16.09.2022). Discussions during the stakeholder meetings facilitated by the Consultant were focused on selecting the best organisational setup for intermunicipal cooperation essential for successful establishment and operation of the future waste management system in WMZ-1. A teleconference was also held (on 16.09.2022) with the mayor of Cania. Even though Cania is not a large LPA and not a residence municipality for the Rayon administration, consultation with the LPA is important, as it is proposed to establish a TS on the territory of Cania municipality. The municipality's agreement is required for the transfer to the state of the ownership of the land plot selected for the TS in Cania. Minutes of the stakeholder meetings held in 2022 are included in Appendices C, D and E.

4 Identification of Project stakeholders

The identification purpose is to prioritise stakeholders of the Project for consultation. To ensure successful preparation and implementation of the Project, due attention should be given to stakeholder identification at its all stages to ensure engagement with stakeholders (i) having impact/influence on the Project and (ii) impacted/affected by the Project.

4.1 Stakeholder groups

The stakeholders and their roles/interests identified so far are presented in the following table:

No.	Stakeholder group	Summary of interests / roles
Project shareholders		
1	MoEnv, NOIEP, EBRD, EIB, other funding institutions	Have direct impact on the Project: Key decisions regarding the Project
Permitting agencies, government bodies		
2	Environmental Agency, Inspectorate for Environmental Protection, Ministry of Health, Labour and Social Protection, and other regulatory/permitting bodies and local	Have direct impact on the Project: Development and enforcement of legislation, regulations. Issuing permits/approvals required for the Project.
Directly Affected Stakeholders		
3	Staff of the existing providers of SWM services	Potential loss of business/jobs when existing small communal companies providing SWM services have to cease their operations or merge with the existing Rayon operators or, when established, the regional operator, although employees are expected to be transferred to the regional operator. Changes in work positions, working procedures.
4	Communities near the new landfill and other Project sites	Potential environmental and social impacts from the Project (change of land use, increased traffic, windblown litter, odour nuisance, visual impact). Expected benefits from closure and remediation of dumpsites.
5	Customers of SWM services – households and organisations (including new customers in expanded service area)	Changes in waste management practices (e.g., closure of all dumpsites) and user charges for the services.
6	Vulnerable groups (persons with disabilities, female-headed households, families with 3 and more children, other low-income households included in national program of subsidies and allowances)	Could be directly and indirectly affected by construction activities and changes in operations and charges related to SWM
Indirectly Affected Stakeholders		
7	Potential contractors, suppliers and consultants	Business opportunities for the Project implementation

No.	Stakeholder group	Summary of interests / roles
8	Potential buyers of recovered and sorted recyclable materials and compost	Business opportunities considering available types, quantity, quality and costs of materials recovered within the Project facilities.
9	Other organisations (mass media, universities, CSOs ³ , NGOs, etc.)	Potential interest in environmental, health, social or other aspects of the Project.
Decision Makers and Key Stakeholders –Rayon level		
10	Administrations of Rayons included in WMZ-1 (Cahul, Cantemir, Comrat, Taraclia, Cheadir-Lunga, Vulcanesti)	Planning and supervising a sound SWM system in the Rayons meeting the national requirements to ensure the protection of the environment and the health of the population and following the adopted urban development plans; Data management and reporting to the national level organisations.
Decision Makers and Key Stakeholders – Local level		
11	Municipal Councils	Approval of local user charges for waste management services. Approval of annual budget for LPA. Taking decision to select provider of SWM services
12	Municipal executive authorities	Organizing waste management services and payments for them Identification of dumpsites, planning and enforcement of their closure and remediation Preparing of annual budget for LPA
13	Cahul LPA	Providing land for the future regional facilities. Supervising activities on site
14	CaniaLPA	Providing land for the transfer station for Cantemir waste collection catchment (per Figure 1). Supervising activities on site.
15	Comrat LPA	Providing land for the transfer station for Comrat waste collection catchment (per Figure 1). Supervising activities on site.
16	Taraclia LPA	Providing land for the transfer station for Taraclia waste collection catchment (per Figure 1). Supervising activities on site.
17	SWM service providers established at LPA level	Current employers for part of the future staff of the Regional Operator.

4.2 Identification of vulnerable groups

This stakeholder identification process for updating of the SEP at further stages of the Project preparation shall identify any people who may be disproportionately impacted by the Project. The vulnerable groups

³ e.g., CSO National Environmental Center <https://www.environment.md>

should be consulted in an appropriate way for elaboration and implementation of mitigation measures so that vulnerable people are not disproportionately impacted.

Vulnerable groups shall be given special attention and support during the stakeholder consultation process to ensure that they are not disproportionally affected by the Project but could benefit from the improved SWM services.

5 Stakeholder engagement planned for the Project

NOIEP acting on behalf of MoEnv will be responsible for stakeholder engagement at further stages of the Project. An outline of the recommended programme for stakeholder engagement and communication for the Project is provided in Appendix A. The updated SEP should ensure that discussions with stakeholders are carried out in an effective and appropriate manner according to requirements of EBRD and EIB, as well as the national legislation and regulations of Moldova.

Public will be informed and consulted during EIA update and during all further stages of the Project. Staff of SWM service providers will be informed and consulted before any changes to employment and working conditions.

5.1 Meetings and other forms of consultations

During the EIA updating process, public meetings⁴ should enable participants to look at information and speak to the NOIEP about the Project and its impacts. Meetings should be held (e.g., outdoors) at accessible locations close to the settlements near the landfill, sorting station, composting station, transfer stations and settlements close to the main transport routes to be affected, at an appropriate time, to facilitate participation, enabling vulnerable groups to attend. Additional support should be provided to vulnerable groups in order to help them engage in the consultation, e.g., meetings held close to their homes at appropriate times, assistance for transportation to meetings, community liaison officer(s) able to explain the project in more detail in an appropriate manner and provide assistance with completing the comments/grievance forms. A form for comments and suggestions during the EIA updating process is included in Appendix G.

A website/webpage for the Project will be established⁵ as early as possible to inform about the Project status, about the EIA, the SEP and the grievance mechanism. The information will be available in Romanian, Russian and English.

For outreach of stakeholders not having access to internet, posters shall be displayed at frequently visited places conveying the same information as above and any updates. The posters will be made in Romanian and Russian.

Community Liaison Officer(s) of NOIEP or the Regional Operator staff assigned to NOIEP will be appointed to lead on consultation and engage with communities, in particular the vulnerable persons.

Prior to changes in the employment and working conditions of staff currently involved in SWM services, the staff information meetings will be conducted, and HR management and/or legal advisory services provided, as required. The procedure for informing and consulting the workers involved in construction and operation activities will be established and followed within the ESMS.

5.2 Grievance mechanism

Per the EBRD PR 10 and the Grievance Management Guidance Note, the responsibility for the management and resolution of grievances will rest with MoEnv as the Bank's client. This also applies to situations where third parties, notably contractors, are involved.

During the EIA update and further during construction works and operation of the new SWM system the public grievances could be submitted by filling in the form included in Appendix H.

⁴ arranged with due measures to address the risk of COVID-19

⁵ e.g. by updating the EPIU website www.uipm.gov.md

Acknowledgement of receipt of a public grievance will be provided to the complainant within 5 working days of receiving the grievance and a proposed resolution of the grievance shall be given within 30 days.

A form for grievances of the Project employees and non-employee workers is included in Appendix I. Acknowledgement of receipt of a worker grievance will be provided to the complainant within 2 working days of receiving the grievance and a proposed resolution of the grievance shall be given within 10 days.

The system for grievances must be appropriately managed to ensure an appropriate level of confidentiality. A grievance monitoring report should be created and include information of the number of grievances received, resolved and closed during the monitoring period, their category or topic, the complainant's identity (if available) and how the grievance were resolved. This information shall be used to conclude trends in grievances, such as which group of the public is affected the most, which period most grievances were received in and whether there were any recurrent topics. This information shall be used by the NOIEP and the Regional Operator to inform further actions in the Environmental and Social Management System (ESMS) and to update the SEP.

5.3 Further development of the SEP

The SEP is a "live" document that the NOIEP and the Regional Operator (staff assigned to NOIEP) leading the Project implementation will regularly review and update. The detailed SEP shall contain procedures, actions, timeframes, responsibilities, etc. that are targeted and specific enough to enable monitoring of its successful implementation. The updated SEP should ensure that discussions with stakeholders are carried out in an effective and appropriate manner, according to requirements of the EBRD, the EIB and the national legislation and regulations of Moldova. The implementation of the actions committed to in the SEP shall be monitored and the results reported to the EBRD and EIB.

The EBRD envisages to make available the Technical Assistance consultants for the Project implementation support. One of these consultants will be responsible for Corporate Development and Stakeholder Participation Programme including the implementation and further development of the SEP.

5.4 SEP Monitoring

The implementation of the actions committed to in the SEP shall be monitored and the results reported to the EBRD and the EIB.

The NOIEP of MoEnv will regularly review and further develop the SEP. The contractors and SWM service providers shall adopt the SEP and support its implementation throughout the Project. Actions committed to in the plan shall be monitored and the results reported to the EBRD and EIB. Specifically, the Stakeholder Engagement Programme shall be regularly reviewed, and its fulfilment noted.

On agreement with the EBRD and EIB, a monitoring report will be developed and submitted regularly to the EBRD and EIB, specifying the stakeholder engagement activities that have been held during the monitoring period, their results and follow-up actions including timelines, if any.

Information about implementation of SEP and the received and redressed grievances from the public, as well as from the Project employees and non-employee workers will be reported to the EBRD and EIB in the Annual Environmental and Social Reports (AESRs) prepared by the NOIEP.

Appendix A Stakeholder Engagement and Communication Programme for the Project

	Stakeholder group	Information communicated	Method of communication	Timeframe	Outputs/ documentation
1	EBRD, EIB	Annual Environmental and Social Reports, monitoring reports	Pre-construction phase E-mailing the updated EIA, the detailed design, specifications for tender documents All phases of the Project E-mailing of reports prepared according to the agreed template Responsibility: NOIEP	EIA, Design and specifications for tender documents prior to construction works AESRs annually within the Project duration	- Information on the Project website - Approved detailed design - Approved specifications for tender documents - AESRs submitted to the EBRD
2	Environmental Agency and other regulatory/ permitting organisations	- Schedule and documentation for EIA update with public consultation - Detailed engineering design for SWM facilities - Application for approval of design documentation - Application for issuing the construction permits - Applications for commissioning of facilities - Reports per requirement of regulatory organisations	Pre-construction phase Submission of documentation (in hard copies and/or electronic form) as per the national requirements Responsibility: NOIEP, EIA consultant, Cahul Rayon Administration, design consultant		- Information on the Project website - Documentation for updated EIA - Environmental Decision valid for commencement date of the Project construction works - Engineering design approved - Construction permit - Statements on acceptance and commissioning of SWM facilities constructed within the Project - Statements on inspections and audits, reports on corrective actions if required - Reports submitted to national/regional/local regulatory organisations

	Stakeholder group	Information communicated	Method of communication	Timeframe	Outputs/ documentation
3	Employees of the existing providers of SWM services	- Details of the new Regional Operator; changes to work positions and responsibilities; potential relocations (if required). - Grievance mechanism. - Details of the new project including: NTS outlining the environmental and social impacts; timeframes; alternatives considered. - Details of new responsibilities, procedures and rules. - Project progress updates on relevant topics as required. - Closure phase: The plans for closure and reclamation, how waste will be managed in the future; implications for employees.	Pre-construction phase (and subsequent phases if additional redundancies are required): - Information provided to employees in a timely manner through project/ Existing service providers webpages, letters, at meetings and in offices. - Overview of project, restructuring, updates etc. through meetings with all/ groups of employees (appropriate time and location), held in a manner that enables feedback and ideas for potential solutions, e.g., workshop style. - Individual meetings. Independent legal advice for employees. Additional support and assistance for vulnerable employees, tailored to their needs, for example: additional information/ explanations, including their rights and benefits under the law; additional meetings; legal advice; assistance completing grievances/ appeals). All stages: - Training in new procedures and rules as required. - Regular updates on the progress of the project through information and meetings (as described in the first two bullet points above). - Grievance mechanism – employees can use the grievance mechanism to submit complaints. Responsibility: NOIEP, existing service providers, the new REGIONAL OPERATOR	Potential redundancies and changes to work positions (Pre-construction, subsequent phases if required): 6 months prior to any changes³. The employee shall be notified no later than 2 months before the planned date of dismissal. Other topics: Ongoing process during all stages	- Information on the Project website - Minutes of meetings (with details of the number of participants, their identity, if given consent; topics discussed, and resolutions reached). - Details of any suggestions, alternatives or solutions proposed. - Summary of no. of grievances and the main issues and solutions. - Signed employment agreements. - Reports on engagement carried out.

	Stakeholder group	Information communicated	Method of communication	Timeframe	Outputs/ documentation
4	Communities near the new landfill and other Project facilities	- Details of the new project, including: NTS outlining the environmental and social impacts; timeframes; alternatives considered; construction works. - Stakeholder engagement plan - engagement process, details of meetings etc. - Grievance mechanism - Project progress updates on relevant topics as required. - Closure phase: Plans for subsequent dumpsite/landfill closure and reclamation and future waste management.	Pre-construction phase: - Disclosure of information (see section 8 for details) and public meetings: 1st stage: initial project meetings; 2nd stage: obligatory public discussions required by Moldovan legislation prior to state examination. Additional subsequent meetings may also be required. All stages: Regular updates on the progress of the project provided through project/ Existing service providers webpages, in the media, social media, and displayed in public locations. Telephone, email and address contact details made available for stakeholders if they have queries. Additional meetings may be required for the closure phase. - Grievance mechanism - grievances can be submitted on a webpage or sent to the Existing service providers. The Existing service providers will respond in line with the grievance mechanism as described in the report. - Identify vulnerable groups (e.g., elderly) in the local population near the landfill and the main transport route and provide additional assistance as appropriate to help them engage in the consultation process for the local population, e.g., assistance with transportation to meetings, CLOs able to explain the project in more detail and their rights under law, in an appropriate manner, and provide assistance with making grievances and appeals, additional meetings may be required. Closure stage: Additional meetings during closure phase may be required to discuss landfill reclamation plans Responsibility: New Regional Operator, external consultants are recommended to carry out engagement.	Pre- construction: Consultation during EIA update: 1st stage meetings: at an early stage, after project is confirmed, before/during detailed design. 2nd stage: Public discussion about the project is carried out prior to the State examination of project documentation. The period for public comments is 25 days, including the length of the publication of the project (15 calendar days). Information campaigns prior to construction works and changes in SWM services All stages: ongoing process	- Information on the Project website, posters - Summaries of meetings. - Details of any suggestions, alternatives or solutions proposed. - Details of any grievances and responses. - Number of participants at meetings, identifying gender, age and presence of any vulnerable persons. - Record of consultation required for Moldovan legislation in relation to the EIA process and also to architectural, urban planning and construction activity.

	Stakeholder group	Information communicated	Method of communication	Timeframe	Outputs/ documentation
5	Customers of SWM services – households and organisations (including new customers in expanded service area), inter alia vulnerable groups	- Details and justifications of changes to the waste collection system and the waste management system, including environmental and social impacts, and tariff changes (if applicable) and benefits brought by the project. - NTS - Grievance mechanism - Rules for waste disposal. - Regular updates on the waste collection system. - Closure phase: how waste will be managed after the closure of the new landfill.	Pre-construction phase: - Information about the changes sent to all customers, published on webpages, in the media, on waste collection containers (where appropriate), delivered to properties (where appropriate) and displayed in public locations. - Provide opportunity for customers to attend the public meetings as described for stakeholder 4. All stages - Updates on the progress of the project. Contact details for Existing service providers/ Regional Operator made available for stakeholders if they have queries. - Grievance mechanism - grievances can be submitted on a webpage or sent to the Existing service providers. The Existing service providers/ Regional Operator will respond in line with the grievance mechanism to be developed, as described in this report. - Identify vulnerable persons and provide additional assistance to help them engage in the consultation process, e.g., explain their rights under law and information about the project in an appropriate manner, explain clearly how to make grievances/ appeals. Responsibility: new Regional Operator , Existing service providers.	Pre- construction: before changes in SWM services commence. All stages: ongoing process	- Information on the Project website - Summaries of meetings - Details of any suggestions, comments, grievances and responses. - Number of participants at meetings, identifying gender, age and any vulnerable persons. - Summary of engagement. - Information materials produced - Number. of households or businesses information distributed to. - Number. of waste containers where information displayed.

	Stakeholder group	Information communicated	Method of communication	Timeframe	Outputs/ documentation
6	Potential buyers of recovered and sorted recyclable materials and compost	Details of the Project design and as-built documentation regarding the expected amounts and specifications of recovered materials and compost available for sale. NTS	• Information disclosed for potential customers and subsequent communication • Meetings, site visits held as required. • Responsibility: NOIEP, Regional Operator	Starting from pre-construction stage	• Information on the Project website • List of potential buyers identified and information on their quality requirements for various types of recyclables • Minutes of meetings. • Correspondence
7	Other organisations (mass media, universities, CSOs ⁶ , NGOs, etc.)	• Details of the new project, timeframes and alternatives considered, NTS outlining the environmental and social impacts. • Stakeholder Engagement Plan, details of engagement process. • Grievance mechanism • Project progress updates on relevant topics as required. • Plans for subsequent landfill closure and reclamation.	Pre-construction: • Information provided about the project and its impacts and benefits • Representatives invited to attend public meetings. • Meetings held with particular NGOs as required. • Upon request, provide copies of the relevant project documents (as appropriate). • All stages: regular updates on the progress of the project provided through the project/ Regional Operator webpage, in the media, social media, and displayed in public locations. Contact details for enquiries to the Regional Operator provided. • Closure phase: information provided. Meetings may be required. • Responsibility: NOIEP, Regional Operator.	Pre- construction: From an early stage, during detailed design stage if appropriate. Ongoing: (updates provided)	• Information on the Project website • Minutes of meetings. • Details of any comments, alternatives or solutions proposed. • Details of any grievances and responses.

⁶ e.g., CSO National Environmental Center <https://www.environment.md>

	Stakeholder group	Information communicated	Method of communication	Timeframe	Outputs/ documentation
8	Rayon Administrations in Cahul, Cantermir, Cheadir -Lunga Comrat, Taraclia, and Vulcanesti Rayons	• Details of the Project; progress updates on relevant topics as required; • SEP • NTS • Information about municipal waste collection, treatment and disposal requirements	• Participation in meetings • Reports, particularly Environmental and Social Assessment reports. • Additional communication and information about the project • Other project information. • Internal information means (bulletins, notice boards, leaflets etc.) • Responsibility: NOIEP, Regional Operator.	Ongoing, beginning early in the pre-construction phase	• Information on the Project website, posters • Information on websites of the Rayons in WMZ-1 • Minutes of meetings
9	LPA Local Councils, LPA executive authorities	• Updated EIA • Details of the Project; project progress updates on relevant topics as required; • Local user charges for services within new SWM system • Conditions for exemption of vulnerable groups from obligation to pay user charges for SWM services or for applying reduced rates (with compensations, subsidies, allowances, etc.)	• Participation in meetings • Additional communication and information about the Project, the land allocation issues and approvals of documentation for the Project preparation and implementation • Plans for closure and capping of all dumpsites as soon as the new regional landfill is operational • Guidelines for land use restrictions within former dumpsites and Cahul landfill upon capping. • Additional communication and information about municipal SWM charges • Responsibility: NOIEP, Regional Operator.	Ongoing, beginning early in the pre-construction phase	• Information on the Project website, posters • Minutes of meetings • Decisions of LPA councils • Site visit reports for monitoring of closure and capping of dumpsites when new regional landfill is operational • Follow-up reports on status of closed and capped dumpsites
10	SWM service providers (if any) established at LPA level and operating in parallel with the regional operator	• Details of the project; project progress updates on relevant topics as required; • Grievance mechanism • Decisions made regarding employment.	• Participation in meetings • Internal information means (notice boards, leaflets etc.) • Additional communication and information about the project	Ongoing, beginning early in the pre-construction phase	• Information on the Project website, posters • Minutes of meetings

Appendix B Record of public consultations regarding the EIA in 2015-2016

The EIA process during the preparation of the SWM project for area currently included in WMZ-1 (but not including Comrat Rayon), included a series of activities carried out by the MSPL/GIZ team in July-August 2016 for informing the public about the project and for consultation with the public regarding the EIA findings and recommendations. These activities were led by the Ministry of Regional Development and Construction (MRDC) as the project initiator/promoter. Information about the activities was presented in the report issued by the MSPL/GIZ team in 2016. The Environmental Decision based on the EIA was issued by the Ministry of Environment on 15 June 2017.

The following activities were carried out to ensure the transparency principle and environmental information accessibility in the decision process at the stage of the project planning:

- > Placing on the websites of MDRC (mdrc.gov.md), SDR (adrsud.md) and MSPL project (serviliilocale.md) of the following links to public information and consultation activities according to the planned environmental impact assessment process with the Environmental Impact Assessment Program for the planned activity:

<http://www.mdrc.gov.md/libview.php?l=ro&idc=25&id=3076&t=/Dezvoltare-regional/Reports-and-studies/System-of-Management-Integrated-of-Waste-in-The-Area-of-Management-a-Waste-no-3-from-region-of-Development-South;>

[http://www.adrsud.md/public/files/II_Evaluarea_impactului_asupra_mediului_in_Zona_3_de_Management_al_Deeurilor_din_Regiunea_de_Developare_Sud.pdf;](http://www.adrsud.md/public/files/II_Evaluarea_impactului_asupra_mediului_in_Zona_3_de_Management_al_Deeurilor_din_Regiunea_de_Developare_Sud.pdf)

- > <http://www.serviciilocale.md/pageview.php?l=ro&idc=35&id=1131&t=/Planificare-si-programare-regional/assessment-impact-on-the-environment/>
- > Publication of the public notice in the newspapers on consultation and draft program for carrying out the environmental impact assessment of the planned activity, including the deadlines for submitting comments:

Name of the newspaper	Locality	Newspaper No.	Date of issue
Cahul Expres	Cahul	39	08.10.2015
Time	Kishinev	38	02.10.2015
Свет	Taraclia	38-39	08.10.2015
South Express	Cantemir	no.20 (90)	09.10.2015
Знамя	Ceadâr-Lunga	No. 80-81 (8258-8259)	09.10.2015

The following stakeholder engagement activities were performed as the public consultation process regarding the EIA report:

- > Disclosure of EIA report on websites of MDRC (mdrc.gov.md), SDR (adrsud.md) and MSPL project (serviciilocale.md) with the following links:

<http://www.mdrc.gov.md/libview.php?l=ro&idc=25&id=3076&t=/Dezvoltare-regionala/Rapoarte-si-studii/System-de-Management-Integrat-al-Waste-in-Zona-de-Management-a-Waste-nr-3-din-Region-de-Development-South>,

http://www.adrsud.md/public/files/II_Evaluarea_impactului_asupra_mediului_in_Zona_3_de_Management_al_Deaurilor_din_Regiunea_de_Dezvoltare_Sud.pdf

<http://www.serviciilocale.md/pageview.php?l=ro&idc=35&id=1131&t=/Planificare-si-programare-regionala/Assessment-impact-on-the-environment/>

- > Providing by e-mail and in paper copies the non-technical summary of EIA report to LPAs of Cahul, Cania, Cantemir and Taraclia with an abstract translated in Russian for LPAs in Taraclia, Ceadir-Lunga and Vulcanesti.
- > Publications in the newspapers⁷:

Name of the newspaper	Locality	Newspaper No.	Date of issue
Cahul Expres	Cahul	28	21.07.2016
Time	Kishinev	23 (2162)	22.07.2016
Свет	Taraclia	41	21.07.2016
South Express	Cantemir	no.14 (108)	22.07.2016
Знамя	Ceadir-Lunga	29 (7796)	22.07.2016

- > Public meetings were held in Cahul (03.08.2016, with 37 attendees including 21 women and 16 men), in Cania (28.07.2016, with 67 attendees including 28 women and 38 men), in Taraclia (04.08.2016, with 33 attendees including 12 women and 21 men)

As stated in the public consultation report 2016, no suggestions/objections from concerned public which could be considered relevant for making changes in the proposed project were received during the public consultation procedure on the EIA. The participants expressed their support to the proposed improvements in

⁷ Copies of the publications are available following the link:

<https://cloud.mail.ru/public/JsqE/AuxwN3oHf>

SWM system within the proposed project. The Minutes of Meetings and lists of questions and answers are available.

Appendix C Minutes of stakeholder meeting in Cahul (09.02.2022) on future organisation of SWM services in WMZ-1

MINUTES OF MEETING			
TITLE:	SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1		ADRESA: COWI A/S Parallevej 2 2800 Kongens Lyngby Denmark TEL: +45 56 40 00 00 FAX: +45 56 40 99 99 WWW: cowi.com PAGINA: 1/3
DATE:	09 September 2022		
PLACE:	Cahul municipality, meeting room of the city hall		
PARTICIPANTS:	List of participants included		
PREPARED BY:	COWI, 09 September 2022		
DISTRIBUTION:	to the participants		
PROJECT NO:	A226634		
Participants			
No	Name	Position	
Ministry of Environment			
1.	Svetlana Bolocan	Head of the Waste and Chemicals Management Policy Directorate	
I.P. U.I.P.M.			
2.	Anatol Risina	Head of EPIU	
3.	Aurelia Bahnaru	National consultant in the field of waste, EPIU	
Key LPAs from WMZ-1			
4.	Serghei Anastasov	Mayor of Comrat municipality	
5.	Baldji Victor	Head of PIU, Comrat municipality	
6.	Nicolae Dandis	Mayor of Cahul municipality	
7.	Torlan Ivan	Head of territory planning and sanitation department, Ciadîr-Lunga municipality	
Consultants (COWI)			
8.	Vladislav Cantea	SWM Expert/Project Deputy Team Leader	
9.	Ion Beschieru	Local Institutional Expert	



Agenda

- > Presentation of the waste management system and the institutional model for RMD-1 according to the gap analysis
- > Comments, questions and answers
- > Decisions

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Summary of presentations, comments, questions and answers

1. Mr. Anatol Risina opened the meeting, giving a brief presentation of the project implementation stage, mentioning the activities carried out and the remaining activities to be implemented. He mentioned that the loan agreement between the EBRD and the Republic of Moldova is expected to be signed by the end of October so that the start of the implementation of the project/investments can proceed.
2. Mrs. Svetlana Bolocan also mentioned that the key LPAs have an important role in the project implementation process. She also emphasized that this loan will be guaranteed/repaid by the state. She mentioned that the current dumpsites will be closed after the new regional landfill is put into operation and that there must be a focus on reducing the amount of waste disposed of at the landfill.
3. Mr. Vladislav Cantea made a presentation of the waste management system proposed for WMZ-1, presenting details regarding the regional infrastructure, collection equipment, the necessary investments of various components of the regional municipal solid waste management system, etc.
4. Mr. Ion Beschieru made a presentation on the institutional model. He mentioned that in the process of developing and selecting the preferred institutional model, several options and variations of the institutional model were analyzed in WMZ-5, but in the end, the model with a single regional operator founded by larger LPAs was selected, which will be responsible for both regional infrastructure management and waste collection and transportation. The founders of the regional operator in the case of WMZ-1 will be the municipalities of Cahul, Comrat, Cantemir, and Taraclia. He also mentioned the fact that the lands on which the elements of the regional infrastructure are to be located (i.e., transfer stations, regional waste landfill, recyclables sorting station, composting station) are proposed to be transferred to the property of the state, the use/management of which shall be later transferred to the regional operator. The waste collection and transportation equipment will be transferred to the property of the key LPAs. He also mentioned that the current operators will continue to operate until the regional infrastructure is put into operation, when the provision of waste collection and transportation service and management of the regional infrastructure will be taken over by the regional operator. The LPAs refusing to sign a contract for delegating the waste collection and transport service to the regional operator will have to bring the waste to the landfill or transfer stations themselves and pay the gate fee. The current dumpsites are to be closed and the state authorities shall enforce the ban on their further use.
5. Ms. Bahnaru made a brief presentation on the evolution of the main statistical indicators regarding the generation and volume of solid waste collected, the number of waste dumpsites, the coverage with waste management services, and the need to focus on recycling and waste recovery to reduce the amount of waste disposed of at the dumpsites.



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6. During the questions and answers session, the mayor of Cahul had several questions, one related to the implementation schedule, the answer being that according to the plan the infrastructure would be put into operation towards the end of 2026. There were also questions regarding the access road at the landfill, and how tariffs are to be calculated and approved, to which COWI consultants and representatives of the ministry and EPIU gave answers.
7. After clarifying the questions asked, all LPA representatives present at the meeting expressed their agreement and support for the implementation of the project according to the model presented by the consultants.
8. Regarding the next steps, Mr. Ion Beschieru mentioned that after the completion of the final report of the gap analysis, certain important parts of the report will be translated into Romanian (because the report is drawn up in English due to the involvement of international experts). Following the support expressed by the mayors (executive authority), the feasibility study, together with the gap analysis report will also have to be approved by the local councils, to express a clear and firm commitment to participate in the implementation of the project.
9. The two key LPAs who were not present at the meeting for some urgent reasons, Taraclia and Cantemir, are to be contacted by phone by the COWI consultants, to also inform them about what was reported during the meeting (especially the institutional model) and to obtain their approval or lack of objections.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. Contact the LPA representatives of the cities of Taraclia and Cantemir to present the institutional model and other relevant information from the gap analysis and obtain their approval and confirm their interest to participate in the project (followed by the approval by the local councils at a later stage).

Appendix D Minutes of online meeting (16.02.2022) with Taraclia LPA representatives on future organisation of SWM services in WMZ-1

MINUTES OF MEETING			
TITLE:	SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1		ADRESA: COWI A/S Parallelsvej 2 2800 Kongens Lyngby Denmark TEL: +45 56 40 00 00 FAX: +45 56 40 99 99 WWW: cowi.com PAGINA: 1/2
DATE:	16 September 2022		
PLACE:	Online		
PARTICIPANTS:	List of participants included		
PREPARED BY:	COWI, 16 September 2022		
DISTRIBUTION:	to the participants		
PROJECT NO:	A226634		
Participants			
Key LPAs from WMZ-1			
1.	Boşneaga Alexei	Deputy Mayor of Taraclia municipality	
2.	Viorica Railean	Deputy Mayor of Taraclia municipality	
Consultants (COWI)			
2.	Ion Beschieru	Local Institutional Expert	
Agenda			
➤ Presentation of the institutional model for RMD-1 according to the gap analysis ➤ Comments, questions and answers ➤ Decisions			
Summary of presentations, comments, questions and answers			
1. At the meeting with the representatives of the LLPAs from the WMZ-1 it was decided to call/organize follow-up online meetings with the mayors of the key LPAs from the zone that did not attend the			

meeting (Cantermir, Taraclia and Cania¹). Separate online meetings with all 3 municipalities have been organized.



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2. In the online meeting with the Mayor of Cantermir municipality, Mr. Ion Beschieru made a presentation on the institutional model, similar to the one made during the meeting on Cahul the same day. He mentioned that in the process of developing and selecting the preferred institutional model, several options and variations of the institutional model were analyzed in WMZ-5, but in the end, the model with a single regional operator founded by larger LPAs was selected, which will be responsible for both regional infrastructure management and waste collection and transportation. The founders of the regional operator in the case of WMZ-1 will be the municipalities of Cahul, Comrat, Cantermir, and Taraclia. He also mentioned the fact that the lands on which the elements of the regional infrastructure are to be located (i.e., transfer stations, regional waste landfill, recyclables sorting station, composting station) are proposed to be transferred to the property of the state, the use/management of which shall be later transferred to the regional operator. The waste collection and transportation equipment will be transferred to the property of the key LPAs. He also mentioned that the current operators will continue to operate until the regional infrastructure is put into operation when the provision of waste collection and transportation service and management of the regional infrastructure will be taken over by the regional operator. The LPAs refusing to sign a contract for delegating the waste collection and transport service to the regional operator will have to bring the waste to the landfill or transfer stations themselves and pay the gate fee. The current dumpsites are to be closed and the state authorities shall enforce the ban on their further use.
3. The deputy mayors had no major questions and declared that the local administration of Taraclia municipality supports the project implementation according to the presented institutional model.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. The deputy mayors of Taraclia agreed with the proposed institutional model.

¹ Though not a large LPA (not a residence municipality for the rayonal administration), on the territory of Cania municipality a transfer station will be located and they have to agree with the transfer of the ownership of the land

Appendix E Minutes of online meeting (16.02.2022) with Cania LPA representative on future organisation of SWM services in WMZ-1

MINUTES OF MEETING



TITLE SWM Moldova – Meeting to present the institutional model and other results/findings of the gap analysis for WMZ-1

DATE 16 September 2022

PLACE Online

PARTICIPANTS List of participants included

PREPARED BY COWI, 16 September 2022

DISTRIBUTION to the participants

PROJECT NO A226634

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Participants

No	Name	Position
Key LPAs from WMZ-1		
1.	Anatolie Manole	Mayor of Cania municipality (commune)
Consultants (COWI)		
2.	Vladislav Cantea	SWM Expert/Project Deputy Team Leader

Agenda

- > Presentation of the institutional model for RMD-1 according to the gap analysis
- > Comments, questions and answers
- > Decisions

Summary of presentations, comments, questions and answers

1. At the meeting with the representatives of the LLPAs from the WMZ-1 it was decided to call/organize follow-up online meetings with the mayors of the key LPAs from the zone that did not attend the meeting (Cantermir, Taraclia and Cania¹). Separate online meetings with all 3 municipalities have been organized.

¹ Though not a large LPA (not a residence municipality for the rayonal administration), on the territory of Cania municipality a transfer station will be located and they have to agree with the transfer of the ownership of the land to the state.

2. Mr Cantea shortly presented the main elements of the institutional model and the model for solid waste management in the WMZ-1. Importantly, he mentioned the fact that the land from Cania municipality on which the transfer station will be located needs to be transferred to the state ownership. This was also applied in the other regions to ensure the sustainability of the investment.



PAGINA 2/2

3. The mayor of Cania municipality, Mr Manole had no major questions and agreed with the idea that the land should be transferred to the ownership of the state.

Decisions/Conclusions

1. Take note of the presented information.
2. Finalization of the gap analysis.
3. The mayor of Cania municipality, Mr Manole agreed with the proposed institutional model and with the transfer of the ownership of the land plot for the construction of the transfer station to state ownership.

Appendix F Example of media publication about the Project preparation



03.09.2021 15:45⁸

EBRD to support Ministry of Environment in implementing waste management policy

The Minister of Environment Iuliana Cantargiu had an official meeting with Angela Sax, Head of the European Bank for Reconstruction and Development (EBRD) office in Moldova. The meeting objective was to establish the Government's priorities in the field of environmental protection and to determine the spheres of further cooperation.

During the meeting, the Minister spoke about the Government Decision on the organisation and functioning of the Ministry and the importance of restructuring the central specialized public administration, noting that the Ministry of Environment is the central authority that has the priority mission of protection and sustainable management of natural resources, by working out efficient public policies in the fields of environmental protection and sustainable use of natural resources. Minister Iuliana Cantargiu explained that the implementation of infrastructure projects in the field of water supply and sanitation, according to the restructuring, is a priority of another ministry.

The dialogue of the officials was focused on the exchange of views on the priorities and objectives of the Ministry of Environment in the field of environmental protection, especially regarding the field of waste management and the perspectives of cooperation in this respect.

The head of the EBRD office in Moldova Angela Sax appreciated the decision to solve the waste management problem by following the waste management policy and by implementing the Loan Agreement in the Waste Management Zones (WMZs) 1, 5 and 8. In this context, Ms Sax underlined the EBRD's readiness to continue providing technical assistance in the process of updating the Feasibility Studies in WMZ- 1 and WMZ-8 after Feasibility Study for the pilot region WMZ-5 update in September 2021.

The parties agreed on the organization of territorial meetings with the local public authorities of the Republic of Moldova in WMZ-1 and WMZ-8 in order to inform them about the importance of cooperating with COWI experts in order to start the process of collecting information for updating the Feasibility Studies, as well as informing the local public authorities in WMZ-5 as the pilot region, about the experts' recommendations on the institutional aspects regarding the organisation of the regional operator of SWM system.

Minister Iuliana Cantargiu informed that, in order to boost the communication process with the local public authorities, working meetings will be held in the regions on September 13-24, the priority being WMZ-5 (Ungheni, Calarasi and

⁸ <http://m.tvrmoldova.md/actualitate/berd-va-sustine-ministerul-mediului-in-implementarea-politicii-in-domeniul-managementului-deseurilor/>

Nisporeni Rayons), a pilot region, where the update of the Feasibility Study is at the final stage and the planning and financing process will be initiated.

The parties reiterated the commitments assumed within the financing agreement, including the co-financing of projects from the national budget according to the budget lines provided by the programs through the State Ecological Fund, as well as the EBRD's commitment to identify the grant component of the loan for the first tranche of 25 thousand euros.

During the EBRD's activity in Moldova, agreements on financing of 125 projects with a cumulative value of EUR 1,326.0 million were signed for various sectors of the country's economy.

Appendix G Form for comments and suggestions during EIA update

To: Anatolie Risina, Director National Office for Implementation of Environmental Projects (NOIEP) Ministry of Environment of the Republic of Moldova str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54 anatolie.risina@uipm.gov.md		
COMMENTS and SUGGESTIONS regarding the Moldova Solid Waste Project		
<i>We would like you to provide your name, address and e-mail, if possible. If you wish to remain anonymous, this is not a problem. Please just write ANONYMOUS in the box below. Your comments will still be considered by NOIEP. You can write on the reverse side or on additional pages. You do not need to fill in the grey section of this form. It is for our registration of your comment and response to it. After you have filled in this form, it can be submitted in a paper form or by e-mail to NOIEP (see the contact details above).</i>		
Contact details of person submitting the comments and suggestions:		
Name		
Address		
Telephone	E-mail address	
Comments and suggestions concerning ☐ the Project ☐ EIA Scoping Report ☐ draft EIA ☐ Non-Technical Summary of EIA		
Would you like to receive information on the Project developments? ☐ Yes ☐ No If yes, how would you like to receive it? ☐ TV ☐ letter ☐ poster ☐ e-mail ☐ website Which contact language you prefer? ☐ Romanian ☐ Russian ☐ English ☐ (other)		
STATUS OF COMMENT		
How was the comment received? ☐ In person ☐ By phone ☐ At reading room ☐ By mail ☐ By email ☐ Other (please describe).....		
Comment registration date:	Comment number:	Registered by:
Response required Yes/No	Person responsible for preparing the response:	
Response sent (date):	Response registered (date):	

Appendix H Public grievance form for the Project

To: Anatolie Risina, Director National Office for Implementation of Environmental Projects (NOIEP) Ministry of Environment of the Republic of Moldova str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54 anatolie.risina@uipm.gov.md		
MOLDOVA SOLID WASTE PROJECT PUBLIC GRIEVANCE FORM		
<i>We would like you to provide your name, address and e-mail, if possible. If you wish to remain anonymous, this is not a problem. Please just write ANONYMOUS in the box below. Your comments will still be considered by NOIEP. You can write on the reverse side or on additional pages. You do not need to fill in the grey section of this form. It is for our registration of your comment and response to it. After you have filled in this form, it can be submitted in a paper form or by e-mail to NOIEP (see the contact details above).</i>		
Contact details of person submitting the comments and suggestions:		
Name		
Address		
Telephone	E-mail address	
Grievance concerning implementation of the Project		
What happened?		
How this became a problem for you? How this disturbs you?		
Where did it happen?		
When did it happen? Once (date) _____ Several times (how many?) _____ On-going problem _____		
What would you like to see happen to improve the situation?		
Which contact language you prefer: ☐ Romanian ☐ Russian ☐ English ☐ ?		
STATUS OF GRIEVANCE		
How was the grievance received? ☐ In person ☐ By phone ☐ By mail ☐ By email ☐ Other (please describe).....		
Grievance registration date:	Grievance number:	Registered by:
Response required Yes/No	Person responsible for preparing the response:	
Response sent (date):	Response registered (date):	

Appendix I Grievance form for Project employees and non-employee workers

FORMAL GRIEVANCE

A grievance is defined as an act, omission or occurrence which an employee feels constitutes an injustice and can be established on factual information. It may relate to any condition arising out of the relationship between an employer and an employee, including but not limited to, compensation, working hours, working conditions, and membership in an organisation of employees or the interpretation of any law, regulation or disagreement. It does not include position allocation, involuntary transfers, dismissals, demotions, or suspensions.				
Name of Grievant: Job Title: Date of Hire:			Work Phone: Home Phone: Mobile Phone: e-mail:	
Home Mailing Address:			Work Mailing Address:	
Date, time and place of event leading to grievance: _____			Date you became aware of the event _____	
Detailed description of grievance including names of other persons involved, if any: 				
Applicable sections of Labour Code, laws, regulations or the Collective Agreement: 				
Date of contacting the workers' organisation (if relevant) 				
Proposed solution to grievance: 				
Please file a copy of this form with your immediate supervisor and retain a copy for filing at possible next step or steps. If you do not receive a response within 10 working days or disagree with the action taken, you may file a copy of the form with the next level supervisor.				
Step	Name of supervisor receiving the grievance	Date	Signature of the Grievant	Signature of the supervisor receiving the grievance
1				
2				
3				
4				

Appendix 3E Non-Technical Summary

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

NON-TECHNICAL SUMMARY OF ENVIRONMENTAL AND SOCIAL ASSESSMENT



FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

NON-TECHNICAL SUMMARY OF ENVIRONMENTAL AND SOCIAL ASSESSMENT

PROJECT NO.

A226634

DOCUMENT NO.

WMZ-1 ESA5

VERSION

01

DATE OF ISSUE

23.03.2023

DESCRIPTION

NTS WMZ-1

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

Abbreviations

CESMP	Construction Environmental and Social Management Plan
C&D	Construction and Demolition
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPIU	I.P. Environmental Projects Implementation Unit (from 2023, NOIEP)
EPRP	Emergency Preparedness and Response Plan
ESAP	Environmental and Social Action Plan
ESHS	Environmental, Social, Health and Safety
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FS	Feasibility Study
LARF	Land Acquisition and Resettlement Framework
LPA	Local Public Authority
MSW	Municipal Solid Waste
NOIEP	National Office for Implementation Environmental of Projects (until 2023, EPIU)
OESMP	Operation Environmental and Social Management Plan
Rayon	District (in Moldova)
SEP	Stakeholder Engagement Plan
TA	Technical Assistance
WMZ	Waste Management Zone

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APPENDICES

Appendix A	Public grievance form for the Project

1 Purpose of the Non-Technical Summary

This Non-Technical Summary (NTS) provides in non-technical language a brief description of the Project and specifically of the potential environmental and social benefits and impacts associated with the construction and operation of SWM facilities proposed as components the Project. It also describes how potential impacts and risks will be mitigated and managed through all phases of the Project and provides a summary of the public consultation activities and the approach to future stakeholder engagement.

The NTS is an overview of the following documents:

- > Feasibility Study and EIA prepared in 2015;
- > Feasibility Assessment prepared in 2022-2023;
- > Environmental and Social Action Plan (ESAP) focused on achieving the Project compliance with the EBRD Performance Requirements, the EIB Environmental and Social Standards, other international requirements, the national regulations and best practice;
- > Stakeholder Engagement Plan (SEP) developed to ensure that stakeholders are informed in a timely manner of the potential impacts of the Project and consulted on mitigation measures. The SEP also describes a formal grievance mechanism for dealing with complaints, concerns, queries etc.

NOIEP on behalf of MoEnv is committed to the implementation of the ESAP and SEP throughout the Project. The Regional Operator of SWM system in WMZ-1 will assign staff to support the NOIEP.

The key contact for this Project:

Anatolie Risina, Director
National Office for Implementation of Environmental Projects (NOIEP)
Ministry of Environment of the Republic of Moldova
str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54
anatolie.risina@uipm.gov.md

2 The Project

The Project is proposed as an investment programme for improvement of current SWM practices.

2.1 Current SWM practices in WMZ-1

The current data on quantities of waste collected in WMZ-1 are general and approximate, as there are no weighbridges available at the waste disposal sites in WMZ-1. The reported quantities of collected MSW to the National Bureau of Statistics by the waste collection operators in the region are also approximate.

Total collected MSW (from households, institutions, and businesses) reported by the National Bureau of Statistics¹ for the year of 2020 in WMZ-1 is 380,100 m³ (Cahul Rayon - 54,100 m³, Cantemir Rayon - 8,600 m³, Taraclia Rayon - 84,100 m³, Ceadir-Lunga Rayon - 99,300 m³, Vulcanesti Rayon - 19,200 m³, Comrat Rayon - 114,800 m³). The reported information on the MSW collected is based on the volume of vehicles used to collect the waste but not on actual weight of the waste. There are no weighbridges at any of the dumpsites in WMZ-1. The waste collection vehicles are not always full. Additionally, the transported waste reported to National Bureau of Statistic may include other types of waste (e.g., manure or other agricultural wastes), which do not represent MSW. No information on the collection of demolition waste or any other waste streams is available.

The collected MSW is disposed at about 116 dumpsites, only a few of them are authorised waste disposal sites. In urban areas the MSW is transported to the waste disposal sites by the SWM companies. In most villages, the residents individually transport waste to the local dumpsites. Many residents dump the waste in the nature (open fields, rivers, woodlands, etc.). Also, backyard burning of waste is a common practice in the region.

Generally, the collected waste in WMZ-1 is delivered to dumpsites which do not comply with requirements on environmental and human health protection. The dumpsites are not fenced, not monitored and not equipped with weighbridges for registration of incoming waste.

2.2 Providers of SWM services

Local public authorities (LPAs) are responsible for municipal solid management services in Moldova. There are 22 publicly owned SWM operators in WMZ-1. The largest operators (working in the urban areas) are represented by 5 Municipal Enterprises working in Cahul Town (I.M. Gospodaria Comunal-Locativa Cahul), Cantemir Town (I.M. Apa Canal Cantemir), Comrat Town (I.M. Gospodaria Locativ-Comunala Comrat), Taraclia Town (I.M. Apa Canal Taraclia), and Vulcanesti Town (I.M. Gospodaria Locativ-Comunala Vulcanesti). There is no separate SWM operator working in Ceadir-Lunga Town; the SWM service is provided by the Department of Public Works and Sanitation of Ceadir-Lunga LPA. The other providers of SWM services established as municipal enterprises are rather small.

Most of waste collection trucks currently used by local SWM operators are old and need replacement. Although a small part of bins/containers have been recently procured and installed by some LPAs, there is a need for more containers for collecting more of the waste generated in households and organisations in WMZ-1.

¹ www.statistica.md

https://cowi.sharepoint.com/sites/A226634-project/Shared Documents/60-WorkInProgress/10-Reports/4_Final Report/WMZ-1/06_FR_May 2023/WMZ1_ESA documents_March 2023/A226634_Moldova WMZ-1_Appendix 3E_NTS_2023 02 24.docx

2.3 Ongoing collection and sales of recyclables

Waste picking is not a common practice in the region because of low market value of recyclables contained in the MSW. Only scrap metal (having a market value) is from time to time collected from waste disposal sites by a limited number of waste pickers.

Home composting is not a common practice in the region. Many residents transport the organic waste (agricultural waste) to local dumpsites or dump it directly in the nature.

There are no statistical data on the quantities of recyclable materials collected and sold/procured in Moldova. The main buyer of plastic material on Moldovan market is ABS that operates sorting and processing facilities in other WMZ's. Other dealers procure recyclables (mainly plastic materials and cardboard) to export them to neighbouring countries. Waste separation at source is currently not carried out in the WMZ-1. None of the largest SWM operators in WMZ-1 collects recyclables.

2.4 Paying for and funding of current SWM services

SWM services in WMZ-1 like elsewhere in Moldova are financed based on user charges (taxes or tariffs) approved by local authorities at the request of SWM operators.

In the cities of Cantemir, Cahul and Taraclia the payment system is based on tariff, while in Ceadir-Lunga, Comrat and Vulcanesti it is based on a local tax. The level of tariff/local tax varies from 9-12 MDL/person/month for citizens living in apartments and 9-15 MDL/person/month in households. In case of Cantemir and Taraclia cities, the tariff varies from 30-33 MDL/household/month/. The tariff for legal entities (companies and institutions) varies from 143.60 to 217.96 MDL/m³, including VAT.

The level of the user charges is insufficient for covering the costs of proper maintenance and development of SWM services. However, increasing the user charges to cost recovery levels can be subjected to political constraints.

2.5 Needed improvements in SWM system

An integrated waste management system in WMZ-1 is needed for the following improvements in line with the EU standards and principles of green economy:

- Establishing regional sanitary landfill that will be designed, constructed and operated for safe disposal of waste in line with the EU Landfill Directive;
- Expanding of regular waste collection services in rural and urban areas;
- Increased collection and sorting of recyclables;
- Increased composting of biodegradable green (park and garden) waste;
- Reducing the negative impacts of existing waste disposal sites.

3 Description of the proposed Project

Like many other regional investment projects in SWM sector in various counties, the Project in Moldova's WMZ-1 is planned for 20 years. The Project will include a programme of short-term investments planned for 2025-2028 followed up by a long-term investment programme planned for 2028-2047.

3.1 Short-term investments (2025-2028)

The investments planned for 2025-2028 will include the following components:

- **Purchase of equipment for waste collection and transportation:**

Purchase and deployment of containers (for separate collection of recyclables and of other/residual waste) and trucks to ensure that SWM collection services are provided to 100% of the population in WMZ-1 - via door-to-door collection system and bring-to-container system.

- **Construction of new SWM facilities:**

- o **Regional waste management centre in Cahul serving whole WMZ-1:** construction of WMC including sanitary landfill (construction of Cell 1 as part of the EU compliant landfill planned to include three Cells with total capacity for 20 years of operation), sorting station for separately collected recyclables and composting station for open windrow composting of separately collected park and garden waste.
- o **Waste transfer stations:** construction of transfer stations one in Cania (in Cantemir Rayon), one in Comrat and one in Taraclia.

- **Closure of all dumpsites in WMZ-1:**

Closure/capping of all dumpsites in WMZ-1 as soon as the regional landfill in Cahul is operational. The procedures for tender and selection of contractors for the closure of the dumpsites shall be organised in 2026, and the construction works for the closing of the dumpsites shall be carried out during 2027-2028.

The total cost of investments within the Priority Investment Programme (PIP) planned for 2025-2028 is estimated at EUR 25.4 million. Additional financing is planned as technical assistance and supervision that are not part of the PIP but are essential to its implementation.

3.2 Long-term investment programme (2028-2047)

The long-term investment programme (LTIP) planned for 2029-2046 will cover costs for rehabilitation and replacement of depreciated equipment at SWM facilities. It will also include the closure/capping of cells 1, 2, and 3 of the regional landfill in Cahul. The total cost of the LTIP for 2028-2047 is estimated at EUR 29.9 million.

3.3 Financing organisations

To ensure investments for establishment of the integrated SWM system with construction of the proposed new facilities the Ministry of Environment of the Republic of Moldova (MoEnv²) as the Project promoter is seeking loans from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). A co-financing grant is envisaged from the international donor which the EBRD intends to attract. Co-financing is also envisaged from the national budget, as appropriate.

3.4 Future providers of improved services

SWM services within the proposed new system in WMZ-1 will be provided by a Regional Operator (RO, regional provider of SWM services), which will be established as an inter-municipal joint-stock company established by the largest LPAs in WMZ-1 - Cahul Town, Cantemir Town, Comrat Town and Taraclia Town. Other LPAs, depending on the decisions of municipal councils, will enter the inter-municipal cooperation agreement (IMCA) or public service contracts with the RO or at least enter into service agreements with other SWM service providers in WMZ-1. The Regional Operator will be responsible for SWM services including collection of waste, operation of the transfer stations, recyclables sorting station, composting station, and the new regional sanitary landfill. The regional operator within the Project will get new waste collection trucks and via its units in the Rayons is supposed to collect waste in larger areas than before the Project.

Figure 3.1 presents the map of the proposed elements of regional infrastructure of new waste management system within WMZ-1 assuming that LPAs will continue being responsible for the SWM services within the administrative territories of their respective municipalities.

According to the map, the territories of municipalities in WMZ-1 were grouped as four Waste Collection Catchments taking into consideration the proximity of each municipality to a Transfer Station or the regional sanitary landfill. The name of the waste collection catchments includes the name of the Rayon in which the Transfer Station or Regional Landfill is located:

- > Cantemir Waste Collection Catchment includes the municipalities within Cantemir Rayon (excluding Visiniovca, Sadic, Samalia, and Cietu municipalities).
- > Cahul Waste Collection Catchment includes the municipalities within Cahul Rayon (excluding Chioselia Mare and Borceag municipalities), all municipalities within Vulcanesti Rayon of ATUG, and Budai Municipality within Taraclia Rayon.
- > Taraclia Waste Collection Catchment includes the municipalities of Taraclia Rayon (excluding Budai Municipality), municipalities within Ceadir-Lunga Rayon of ATUG (excluding Tomai Municipality), Chioselia Mare and Borceag municipalities within Cahul Rayon, and Chioselia Rusa and Svetlii municipalities within Comrat Rayon of ATUG.
- > Comrat Waste Collection Catchment includes the municipalities within Comrat Rayon of ATUG (excluding Chioselia Rusa and Svetlii municipalities), Visiniovca, Sadic, Samalia, and Cietu municipalities within Cantemir Rayon, and Tomai Municipality within Ceadir-Lunga Rayon of ATUG.

² MARDE before the Government reorganisation in August 2021

https://cowi.sharepoint.com/sites/A226634-project/Shared Documents/60-WorkInProgress/10-Reports/4_Final Report/WMZ-1/06_FR_May 2023/WMZ1_ESA documents_March 2023/A226634_Moldova WMZ-1_Appendix 3E_NTS_2023 02 24.docx

As it can be seen in the map, some municipalities located close to Rayon borders were, despite of the administrative borders, included in the waste collection catchments in which a Transfer Station or the Regional Landfill is located closer to the municipalities than a TS in their own Rayon. For example, four municipalities located in Cantemir Rayon (i.e., Visiniovca, Sadic, Samalia, and Cietu) are included into Comrat Waste Collection Catchment as they are located closer to the Transfer Station site in Comrat than to the TS in Cantemir.

The combination of regional landfill, waste sorting station and composting station located close to each other at Cahul site will be further referred to as the Waste Management Centre (WMC).

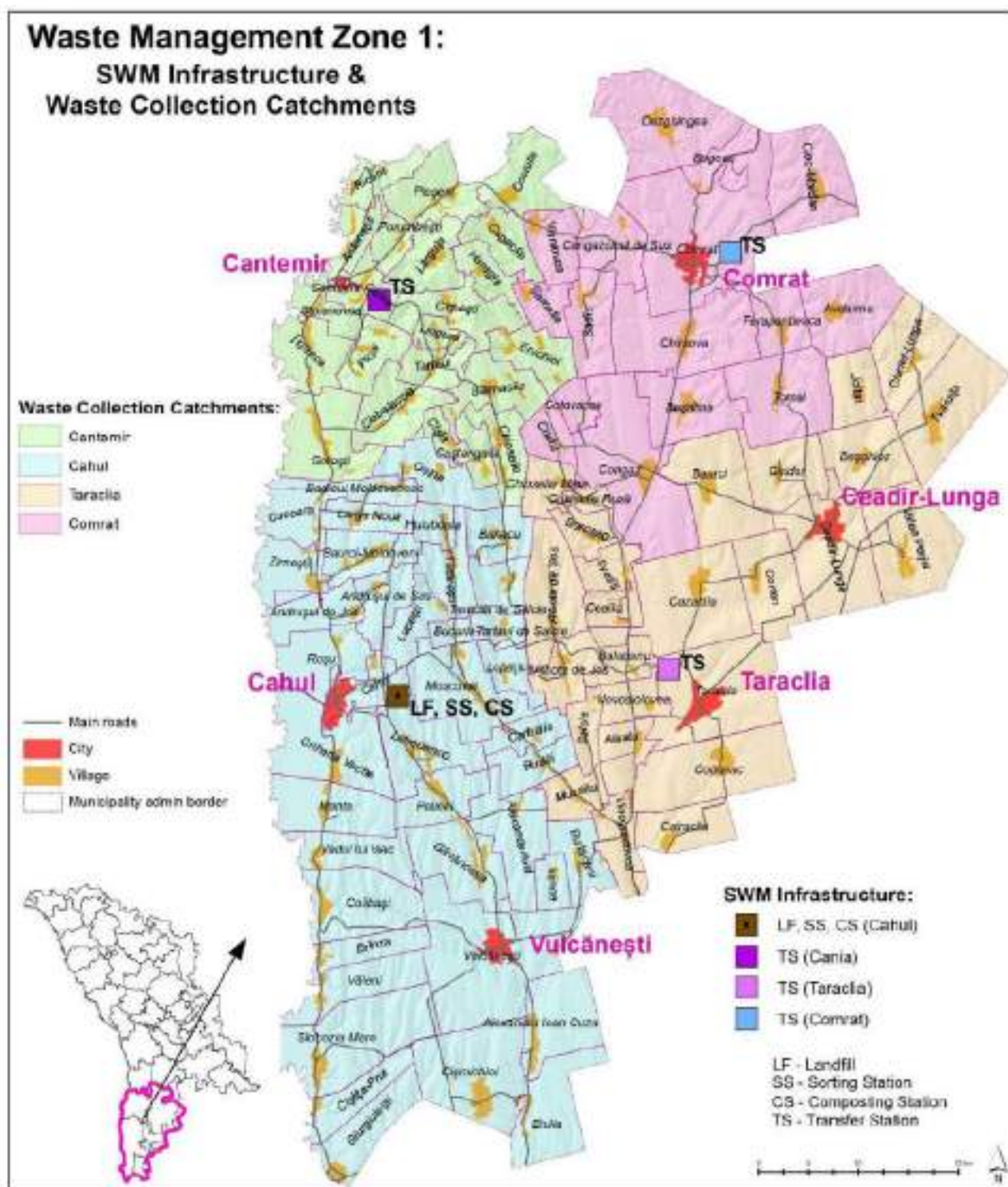
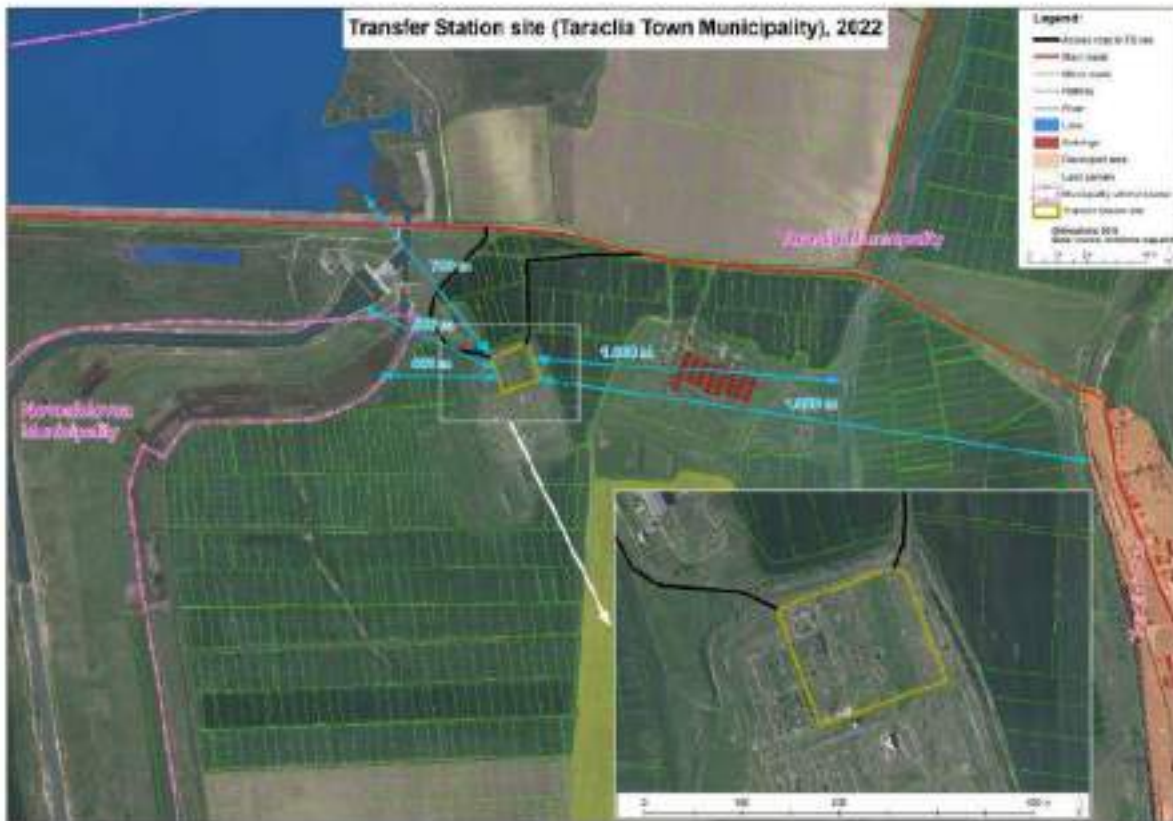


Figure 3.1 SWM infrastructure planned for the Project in WMZ-1

3.5 Location of proposed new facilities

The site proposed for Cania TS establishment has an area of 1.78 ha (cadastral number 21142070182) and is owned by the Cania LPA. The distance from the site border to the nearest residential area is 1.3 km, the distance to the Tigheci River is 1.85 km. The site is currently used as pasture (see Figure 3.2) and is surrounded by agriculture lands.



Source: COWI on the basis of moldova-map.md

Figure 3.3 Situational map of the proposed Taraclia TS site location in WMZ-1

The site proposed for the TS for Comrat Rayon is located next to the existing municipal dumpsite and close to the main road R35 (Comrat-Basarabeasca). The land is owned by Comrat Town Municipality and has an area of 0.369 ha. The site has a grass cover. The site is about 1,200 m away from residential area (Comrat Town). The site is bordered by Comrat Dumpsite (East) and cultivated lands (South-West). A quarry and some abandoned farm buildings can be observed within a distance of about 200 m from the site.



Source: COWI on the basis of Moldova-map.md, 2022

Figure 3.4 Location of site proposed for establishment of Comrat TS

The proposed Project assumes establishment of regional landfill compliant with the EU standards. Site selected for establishment of the regional waste management center (WMC) including a regional landfill, a sorting station and a composting station is located east of Cahul city within the land including the currently operated and guarded waste disposal site of Cahul municipality. The planned footprint of the waste body is estimated 20 ha. The currently designated area of 10.7 ha (includes a land plot of 9.1 ha owned by Cahul LPA and two privately owned land plots that are to be expropriated) could be extended. The site is surrounded by grassland and shrubland and is accessible from the main road via a gravel paved road.

The adjacent terrain is hilly and includes a ravine (depth 20-25 m) to the east and northeast. The existing waste disposal site is located at an elevated plateau having an altitude of about 140 m.a.s.l. and the surrounding slopes of 10-15°.



Source: COWI, February 2022

Figure 3.5 View from west to east over the site selected for regional WMC in WMZ-1

As stated in the EIA prepared in 2015, the site has a possibility for expansion to 18 ha. The area of existing waste disposal site (10.7 ha of degraded land) and of required expansion (6.05 ha of pastures and arable land) is in public ownership of Cahul LPA. Additional part of the required expansion area (1.246 ha of gardens) is the private property of 5 owners.

Geographical coordinates of the site are as follows:

- > Latitude: 47°54'30.11" N
- > Longitude: 28°16'17.5" E

View from the central part of the site towards South, where the area is planned for establishment of sorting station and composting station, is included in Figure 3.5.



Source: COWI, 2022

Figure 3.6 View of the area planned for sorting station and composting station within the regional WMC in WMZ-1

Distances from the site borders to the nearest residential area (Cotihana village) is 2.6 km, to the residential area of Cahul city is 3.5 km. Schematic maps indicating the distances from the site borders is included in Figure 3.7. and Figure 3.8.



Source: COWI on the basis of moldova-map.md

Figure 3.7 Overview map of the Cahul site location in WMZ-1



Source: COWI on the basis of moldova-map.md

Figure 3.8 A detail of the Cahul site location map



Source: COWI on the basis of moldova-map.md and FS (2015)

Figure 3.9 A detail of the Cahul site with the indicated layout of proposed regional sanitary landfill for WMZ-1

As soon as the regional landfill and other SWM infrastructure established within the Project are operational, all dumpsites in WMZ-1 could be closed (i.e., they will not be used for disposal of more waste) and covered with soil, while all waste collected in the Rayons of WMZ-1 will be, directly or via Transfer Station, taken to the proposed regional waste management centre (WMC) including the new regional landfill, as well as the proposed sorting station for separately collected recyclables and composting station for separately collected green waste. The sorting station and the composting station will be located next to the landfill.

3.6 Key elements of new regional landfill

The proposed landfill will be an engineered facility designed, constructed and operated in accordance with the EU Landfill Directive.

The landfill areas for placing of waste will be constructed with the following key elements:

- > a bottom structure including a layer of natural clay and a layer of synthetic (HDPE) material to prevent soil and groundwater below the landfill against contamination from waste;
- > a system of pipes for collection of leachate (a liquid coming from waste due to its decomposition and contact with rainwater) and a leachate accumulation basin to ensure controlled handling of leachate within the landfill site;
- > a system for safe management of landfill gas generated in waste during its decomposition and containing methane;
- > environmental monitoring system, occupational health, safety and security system.

The landfill capacity at the Cahul site is planned for about 20 years of operation. The operation plan/manual will be developed and implemented in line with the EU Landfill Directive and good international practice. The operating staff will be trained and perform accordingly.

3.7 Environmental Decision obtained in 2017

The EIA prepared for the Project in 2015 includes assessment of impacts and proposed mitigation measures related to construction works and to operation of SWM facilities as they were planned in 2015. The EIA was after the public consultations submitted by the Ministry of Regional Development and Construction (the project initiator) to the Ministry of Environment that performed the expert examination procedure with the Environmental Decision approved by the Minister on 15 June 2017

The EIA includes assessment of impacts and proposed mitigation measures related to construction works and to operation of SWM facilities proposed within the Project as planned in 2015 with detailed information about the selection of sites for the new SWM facilities.

The Environmental Decision valid for 4 years was issued for the Ministry of Regional Development and Construction as the Project's initiator and implementing organisation, which was supposed to obtain all necessary permits (construction permit and related other permits) for the Project implementation no later than 14 June 2021. Hence, the EIA shall be updated to obtain a new Environmental Decision according to the provisions of the Law No. 86/2014 on the environmental impact assessment in Moldova. If a new round of public consultation is arranged, due measures will be taken to address the risks posed by the COVID-19.

3.8 Project alternatives considered

3.8.1 Alternative without the Project implementation

If investments planned within the Project are not implemented, the waste management system in the Rayons of WMZ-1 will continue functioning with only partial collection of waste generated in urban rural areas. Waste disposal at dumpsite will continue posing risks for the environment and the human health, as there is no control over the amounts and types of waste at dumpsites, no systems for management of landfill gas, for management of leachate, for preventing access to the dumpsites for people and livestock, for preventing open burning of waste, etc.

MoEnv and other governmental bodies are making efforts to avoid this alternative and have initiated the Project to achieve major improvements in SWM system in WMZ-1 as soon as possible.

3.8.2 Technical alternatives

A comprehensive analysis of technical options for the Project was carried out within the framework of the Feasibility Study and EIA prepared in 2015, as well as during the feasibility assessment in 2022-2023. The following key technical alternatives were considered:

- Service area for WMZ-1:
 - Including Comrat Rayon in WMZ-1 to ensure that ATUG is included in the same SWM system;
 - Assuming that Comrat Rayon will be included into other WMZ, as planned in 2015;

- Waste collection:
 - Collection only at collection points in both urban and rural areas;
 - Collection from gate to gate for individual houses in urban areas and in collection points for the rest of the area;
 - Collection from gate to gate for individual houses in urban and rural areas and collection points for urban block area.
- Separate collection of recyclable waste:
 - Separate collection in urban areas and rural towns at collection points for three fractions: paper and cardboard waste, plastic and metal waste and glass waste;
 - Separate collection in the urban area and in rural towns at collection points for a fraction.
- Waste transfer:
 - Two transfer stations – one for Cantemir Rayon and one for Taraclia Rayon;
 - Alternative sites for transfer stations.
- Sorting:
 - Sorting of waste collected in the mixture;
 - Sorting of waste collected separately at a sorting station on the same site as the regional landfill;
 - Sorting of separately collected waste at two sorting stations in different Rayons.
- Biological treatment:
 - Stimulating individual composting through information and awareness campaigns;
 - Composting of green waste collected from the urban area in centralised composting plants (one facility per Rayon);
 - Composting of green waste collected from the urban area in a centralised composting plant located at the regional landfill;
 - Mechanical-biological treatment plant located at the regional landfill.
- Disposal:
 - No pre-disposal treatment;
 - With pre-disposal treatment (in the mechanical-biological treatment plant).
- Schedule for closure of dumpsites
 - Closure of small dumpsites and setting up large transitional dumpsites;
 - Closure of only the largest municipal dumpsite in each Rayon of WMZ-1 after opening of the regional landfill in Cahul and closure of all other dumpsites during a period of about 5-7 years (instead of 1-2 years as proposed in the updated Project concept).

3.8.3 Alternative sites for the new SWM facilities

Sites for regional landfill

Site selection criteria were established in accordance with the requirements of national legislation, as well as taking into consideration the provisions of the EU Landfill Directive (1999/31/EC).

The process of identification of the sites for the regional landfill in the area earlier defined as WMZ-3 (consisting of Cahul Rayon, Taraclia Rayon and Cantemir Rayon in South Development Region) currently included as part of WMZ-1, was carried out in phases starting from March 2014. In total, the local authorities with the support of the GIZ experts have shortened the list of potential sites to 3 most promising sites (2 in Cahul Rayon and one in Cantemir Rayon).

Cahul city, representing about 65% of the urban population of the area and about 17% of the total population of the area, was considered as the centre of gravity of municipal solid waste generation.

A detailed report on the site selection for regional landfill is presented in Annex 6 to the Feasibility Study report and in Annex 1.1 to the EIA report prepared by the GIZ team in 2015. The site adjacent to the existing dumpsite operated by Cahul town was selected as the preferred site, but the need and possibility for including additional land plots to ensure area large enough for the regional landfill have been acknowledged.

Sites for transfer stations

The location of the transfer station, as well as the landfill, must be selected take into consideration certain A number of options for locations of transfer stations in the concepts with more than one landfill were considered within the studies performed for separate parts of the area currently defined as WMZ-1. For example, Comrat Rayon was included in WMZ-2. However, according to the waste management concept for this zone (and including ATUG) developed by Ircon and SWECO in 2017, the waste from all waste from all municipalities of Comrat Rayon was to be transported to the planned regional landfill near Cimislia Town in WMZ-2 via a transfer station (TS) that was planned to be located near Comrat. For other part of current WMZ-1, which was during the FS (2015) considered as WMZ-3, the options included (i) three transfer stations - Cahul, Cantemir and Taraclia, where Taraclia TS serves also Ceadir-Lunga Rayon; and (ii) two transfer stations - one in Cantemir and one in Taraclia, assuming direct transport to the planned Cahul landfill from all residential areas of Cahul Rayon and Vulcanesti Rayon.

3.8.4 The updated Project concept

Upon consultations of MoEnv with the EBRD and EIB it is proposed to prepare the Project described in FS of 2015 and in EIA of 2015 with the following adjustments recommended in 2022-2023:

- > *Implementation of "door-to-door" collection* of waste in 25% of households (approx. 20,500 units) in rural areas with good road access. This implies: i) including additional 20,500 units of 120 l bins for residual waste collection from individual households in rural areas; ii) adjust the number of 1.1 m³ metal containers designated for residual waste collection at collection points. This will reduce the speed of the waste collection trucks, which implies including enough reserve capacity of compaction trucks in the system.
- > *Use of "bring system"* with 1.1 m³ containers. From the information provided in the FS (GIZ, 2015), no investment costs for waste collection points (concrete slabs for containers) are included. The containers for the "bring system" cannot be placed directly on the ground. Prefabricated concrete slabs shall be used to establish waste collection points where 1.1 m³ containers are placed on. These concrete slabs shall be prefabricated elements that are just brought and placed at the locations defined in advance by LPAs. Doing so, the collection points will represent removable structures for which construction permits are not necessary. The procurement of prefabricated slabs for the waste collection points shall be part of the supply tender. Some collection points exist in towns but none of them exist in villages. Concrete slabs for containers, mainly in rural areas, shall be included for the "bring system" in the updated SWM system. Almost all 1.1 m³ containers (for residual waste and recyclables) will need concrete slabs, with exception of about 20% of the containers as it is assumed that they are placed on an available collection points or paved areas.

Depending on the number of containers needed in one spot, several concrete slabs/pads can be placed next to each other to accommodate more containers at a waste collection point (see Figure 2.2). With

the support from the regional operator (and Implementation Support Consultant), the LPAs shall plan and prepare (including any necessary ground works) the location of the waste collection points before the delivery of prefabricated concrete slabs for containers. The supplier of the prefabricated concrete slabs shall just deliver the slabs to each LPA and place them at the designated locations. A special tender requirement for the supplier on the delivery of goods shall be included to accommodate this.

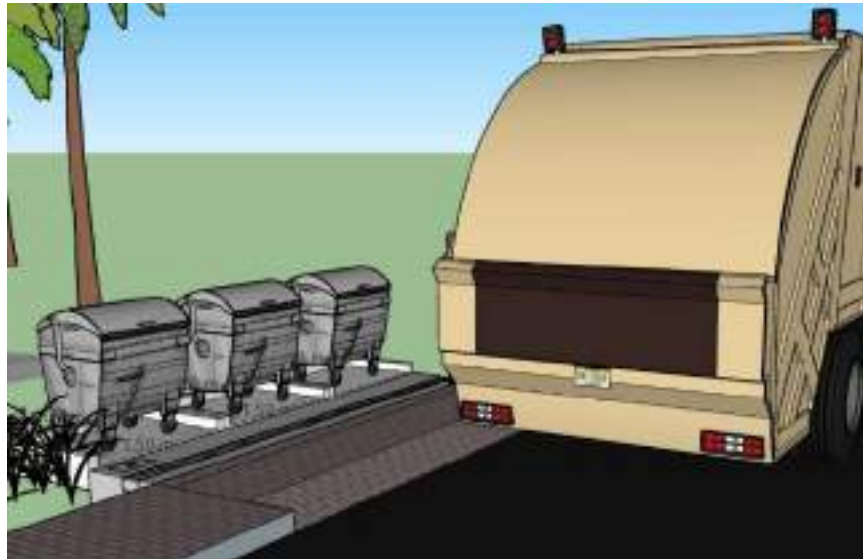


Figure 2.10 Example of a collection point with 3 concrete slabs

- > **Containers for separate collection of recyclables.** It is proposed to use see-through containers for recyclables. Examples of metal 1.1 m³ containers with mesh and plexiglass sides are presented in Figure 2.3 below. It is expected that the use of see-through containers will increase the efficiency of waste separation at source.



Figure 2.11 Example of a metal 1,100 l containers with mesh (left) and plexiglass (right) sides

- > **Digital monitoring of the waste collection process.** To ensure the monitoring of waste collection process, an automated waste collection tracking system shall be implemented. The monitoring information will increase the efficiency of the waste collection by allowing for appropriate monitoring/control and any necessary adjustments of the waste collection routes and other related processes. The implementation of such a system requires: (i) installation of radio-frequency identification (RFID) tags to all containers; (ii) installing global positioning system (GPS) units, fuel

sensors, and RFID readers on the trucks; (iii) optimisation of the software system; (iv) connection to the service for the monitoring of the collection trucks. Several companies in Moldova provide such services. The SWM operators will have access to the monitoring system through a simple web browser without the need of special software and hardware. The monitoring system (including database) will be hosted by the service provider; the service provider will maintain the system as part of the service provision fee paid by SWM operators on each vehicle monitored.

- > *Containers for Construction & Demolition (C&D) waste.* Containers (roll-on) for C&D waste were added to the system to allow for collection of C&D waste when needed. The containers will be also used for green waste transport when needed. The hook-lift truck at the transfer stations shall be used to transport these containers.
- > *Vehicles for supervisors and pick-up trucks at transfer stations.* Vehicles for supervisors responsible for waste collection were added to the system to allow for a better management of waste collection activities. Additionally, pick-up trucks were added at the transfer stations to improve the mobility of the supervisors and workers at the facilities when needed.
- > *Waste Transfer Stations in Cania, in Taraclia and in Comrat.* As the distances from other Rayons to the regional landfill in Cahul are too long for waste collection trucks, a Transfer Station (TS) will be established in each of the three mentioned Rayons to ensure efficient logistics for waste transportation (see Figure 3.1). It is proposed to use transfer stations with ordinary unloading bays with open 40 m³ containers, with a rolling compactor (mobile machinery) for compacting the waste in the container when necessary. Additionally, by using easier TSs, more unloading bays can be constructed to accommodate containers for all types of MSW (i.e., residual waste, deferent types of recyclables, green waste) that must be transported separately to the landfill or treatment facilities. The TS in Cania is planned with 4 unloading bays, while TS in Taraclia and TS in Comrat are planned with 5 unloading bays each. The TSs will have the same design concept and capacity of 12,000 tons/year each. The TSs will be able to handle the residual waste, recyclables and green waste and transfer them to landfill, sorting station and composting station, respectively, at Cahul site.
- > *Regional landfill, sorting station and composting station in Cahul.* The regional landfill (LF) for disposal of residual waste from all Rayons of WMZ-1 will be designed, constructed and operated in accordance with the EU Landfill Directive. Sorting station (SS) will be used for recovery of materials from source-separated recyclables collected in all Rayons of WMZ-1. Capacity of the soring plant will be approximately 14,000 t/year. Composting station (CS) will be used for windrow composting of source-separated green (park and garden) waste collected in WMZ-1. Capacity of the composting station will be approximately 1,000 t/year.
- > *Closure and remediation of existing dumpsites.* The priority investments within the Project will include the closure and remediation of all dumpsites in WMZ-1 as soon as the regional landfill in Cahul starts operating. The dumping of waste at all dumpsites within WMZ-1 shall not be allowed – the existing dumpsites will be closed for receiving more waste. Local council decisions shall be enforced on this issue in order not to jeopardize the operation new ISWM system. Many of the dumpsites have been developing over many years. The recently dumped waste is typically visible within a lesser area than the area polluted with waste throughout the dumpsite development history. The remediation of all existing dumpsites in WMZ-1, considering that there are about 120 of them with an average area of 1.3 ha by carrying out civil works within 1-2 years.

4 Environmental, social, health and safety aspects of the Project

4.1 Key benefits expected

The overall Project will allow diverting the flow of collected waste from disposal at dumpsites and non-compliant landfill towards recycling, composting and disposal of residual waste at compliant landfill. This shift in the waste flow will reduce GHG emissions and contribute to increased recycling.

Environmental and social benefits of the Project will include the following key improvements:

- > Expanded service area - increased number of households and other customers covered by regular waste collection services;
- > Improved equipment for waste collection and transportation, improved working conditions for waste collection and transportation crews;
- > Development of system for separate collection and recovery of recyclable materials to enhance their marketing for further treatment and use;
- > Regional sanitary landfill meeting the requirements of EU Landfill Directive and the national legislation of Moldova for environmentally sound disposal of residual waste from whole WMZ-1;
- > As the dumpsites pollute the environment, pose risks for human health, affect visual impression and living conditions in WMZ-1, the Project component for closure and capping of all dumpsites in WMZ-1 when the regional EU compliant landfill is operational will bring considerable improvement .

4.2 Assessment of risks and mitigation measures

The EIA prepared in 2017 with Environmental Decision issued in 2018 presented a detailed assessment of environmental risks and a brief assessment of social risks potentially caused during the Project implementation. The risks related to stages of pre-construction, construction, operation, closure and post-closure were considered, and measures for mitigation of adverse impacts were proposed.

4.3 Environmental and Social Action Plan (ESAP)

The ESAP was prepared for the Project could be implemented in line with the EBRD performance Requirements, the EIB Environmental and Social Standards, national legislation of Moldova and EU standards. The ESAP includes measures focused on improved ESHS management during all phases of the Project and on addressing the risks related to workers and the local communities.

An overview of key measures included in ESAP is summarised as follows:

Measures to develop capacity for ESHS management

- > Develop and implement ESHS Policy and an Environmental and Social Management System (ESMS) based on ISO 14001 to address ES impacts, including impacts on vulnerable groups that might be disproportionately affected by the Project, at all stages of the Project. Prepare ESMP for the Project,

include requirements for CESMP (for contractor) and OESMP (for SWM service providers) implementation.

- > Ensure employment and training of competent staff responsible for ESHS management in NOIEP, contractors and SWM service providers.

Measures to ensure environmental performance of the Project

- > Update of EIA and timely obtain all environmental permits for establishment and operation of the Project facilities.
- > Include requirement for contractors and SWM service providers to develop and follow ESHS management procedures including the monitoring and reporting procedures.
- > Ensure involvement of experience consultants in detailed design, procurement process and construction supervision with preparation of as-build documentation.
- > Develop, keep updating and follow Operation Manuals for Project SWM facilities in line with international standards, the principles of resource efficiency, pollution prevention and control. Landfill Operation Manual basing on the detailed design shall include systems for waste registration, compaction, covering, protection of soil and groundwater, management of leachate, surface runoff, landfill gas.

Measures for health and safety management

- > Include and enforce requirements for contractors and SWM service providers develop and implement an occupational health and safety management system based on regular Occupational Health and Safety Assessments, perform procedures for staff training and health checks, implement measures addressing the risks posed by COVID-19.
- > Involve experienced consultants (from design stage and on), experienced contractors (during construction works) and capable providers of services (during operation of SWM system) to ensure meeting H&S standards.
- > Develop/update and maintain procedures integrated in an Emergency Preparedness and Response Plan (EPRP) for the Project.
- > CESMP, OESMP and EPRP should include provisions for community health, safety and security - land use, noise, traffic disturbance (heavy lorries) and dust emissions, windblown litter, leachate spreading, odour nuisance and visual impacts of SWM operations as well as risks related to unauthorized access to construction sites and to SWM facilities.
- > Include and enforce (via audits and corrective actions) requirement for contractors and SWM service providers to ensure safety of compost, recyclables and waste collection through good design of facilities and operation practices.

Labour and employment management measures

- > Ensure development and implementation by the contractors and SWM services providers of HR policies and Labour Management Plans in compliance with the national legislation of Moldova and the requirements of EBRD and EIB.

- > Disclose and implement Stakeholder Engagement Plan (SEP) to ensure tailoring of the Project in consultation with local communities.
- > Disclose and maintain grievance mechanism for Project workers and for the public.

4.4 Land Acquisition and Resettlement Framework (LARF)

The LARF has been elaborated for the Project in line with the EBRD Environmental and Social Policy (ESP, 2019) defining a set of Performance Requirements to be met by the clients of the projects considered for financing with involvement of EBRD. The Performance Requirements are to be met by the EBRD clients during preparation and implementation of investment projects. The principles of EBRD ESP are acknowledged by the EIB and the EU.

The LARF adopted by the Client will be applicable for all sub-projects under this framework deal and any land/resettlement impacts should be addressed following the requirements of LARF and the EBRD *Performance Requirement 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement*.

According to the EBRD Performance Requirement 5 the compensation and livelihood restoration is required when the project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood. The term "livelihood" refers to the full range of means that individuals, families, and communities utilize to make a living, such as wage-based income, agriculture, fishing, foraging, other natural resource-based livelihoods, petty trade, and bartering. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement.

5 Stakeholder engagement activities

The stakeholders are individuals, groups, communities and organisations, who are responsible for, interested in, affected or likely to be affected by the proposed Project. Stakeholder engagement and consultation should improve the information flow and the process of decision-making for tailoring the Project activities based on better understanding and better addressing the interests of various organisations, communities, groups, individuals related to the Project.

For successful implementation of the Project, the stakeholder identification and consultation will be carried out throughout preparation, as well as during the implementation of the Project.

5.1 Activities conducted so far

Information about the Project preparation was provided, and concerns of the local communities were addressed during the public consultation meeting held during the EIA process performed in accordance with the national legislation of Moldova in 2015-2016. Various adjustments of the Project concept to ensure its acceptance for financing by the EBRD and the EIB were discussed in 2021-2023 with participation of MoEnv and EPIU during meetings and teleconferences with Mayors and/or other LPA officers of Cahul, Cania, Cantemir, Ceadir-Lunga, Comrat and Taraclia, as well as during the meetings of representatives from MoEnv, EPIU, EBRD, EIB and COWI in 2022-2023.

5.2 Requirements of EBRD and EIB

The Project proposed for financing by EBRD and EIB shall adhere the requirements related to disclosure of environmental information and to public consultation procedure defined by the national legislation of Moldova, the EBRD Environmental and Social Policy and the Environmental and Social Standards of the EIB.

A Stakeholder Engagement Plan (SEP) is required with the objectives to:

- Identify key stakeholders of the Project, in particular the groups/communities directly affected by environmental and social impacts caused by the Project;
- Establish communication channels to ensure good understanding of the Project (activities, risks and mitigation measures) by all potentially affected groups and individuals;
- Establish grievance mechanism for continuous stakeholder consultation throughout the Project.

The draft SEP was prepared in 2023 to reflect the proposed adjustments in the Project concept is available as a separate document made public together with this Non-Technical Summary.

The SEP is a living document and will be further developed and implemented by NOIEP in cooperation with contractors and providers of SWM services.

The NOIEP will regularly report to EBRD and EIB on implementation of SEP and grievance mechanism.

5.3 Planned information disclosure and consultation

During the EIA updating process, public meetings³ and/or disclosure via websites and posters should enable the residents of WMZ-1 and other stakeholders to receive the information and communicate questions/comments to the NOIEP about the Project and its impacts. Meetings, if relevant, should be held (e.g., outdoors) at accessible locations close to the settlements near the landfill, sorting station, composting station, transfer stations and settlements close to the main transport routes to be affected, at an appropriate time, to facilitate participation, enabling vulnerable groups to attend. Additional support should be provided to vulnerable groups in order to help them engage in the consultation, e.g., meetings held close to their homes at appropriate times, assistance for transportation to meetings, community liaison officer(s) able to explain the project in more detail in an appropriate manner and provide assistance with completing the comments/grievance forms.

A website/webpage for the Project will be established⁴ as early as possible to inform about the Project status, about the EIA, the SEP and the grievance mechanism. The information will be available in Romanian, Russian and English. A form for submitting comments and/or suggestions regarding the EIA will be made available and reviewed by the NOIEP.

For outreach of stakeholders not having access to internet, posters shall be displayed at frequently visited places conveying the same information as above and any updates. The posters will be made in Romanian and Russian.

Community Liaison Officer(s) of NOIEP will be appointed to lead on consultation and engage with communities, in particular vulnerable persons.

Prior to changes in the employment and working conditions of staff currently involved in SWM services, the staff information meetings will be conducted, and HR management and/or legal advisory services provided, as required. The procedure for informing and consulting the workers involved in construction and operation activities will be established and followed within the ESMS supervised by the NOIEP.

5.4 Procedure for grievances regarding the Project

During the EIA update and further during construction works and operation of the new SWM system the grievances could be submitted by filling in the form included in Appendix A.

The responsibility for management and resolution of grievances will rest with MoEnv as the client of EBRD and EIB. This also applies to situations where third parties, notably contractors, are involved.

Any questions, complaints, grievances regarding the Project could be submitted in hard copy or by e-mail to NOIEP. The key contact details for the Project are the following:

Anatolie Risina, Director
National Office for Implementation of Environmental Projects (NOIEP)
Ministry of Environment of the Republic of Moldova
str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54
anatolie.risina@uipm.gov.md , cancelaria@madrm.gov.md

³ arranged with due measures to address the risk of COVID-19

⁴ e.g. by updating the EPIU website www.uipm.gov.md

Acknowledgement of receipt of a public grievance will be provided to the complainant within 5 working days of receiving the grievance and a proposed resolution of the grievance shall be given (verbally or in writing) within 30 days.

A separate grievance procedure is established for the Project employees and non-employee workers.

The system for grievances will be managed to ensure an appropriate level of confidentiality.

The procedure for submitting the grievances to NOIEP regarding the Project shall not prevent anyone from using the formal procedures in accordance with the laws and regulations of Moldova.

Appendix A Public grievance form for the Project

To: Anatolie Risina, Director National Office for Implementation of Environmental Projects (NOIEP) Ministry of Environment of the Republic of Moldova str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54 anatolie.risina@uipm.gov.md; cancelaria@madrm.gov.md		
MOLDOVA SOLID WASTE PROJECT		
PUBLIC GRIEVANCE FORM		
<i>We would like you to provide your name, address and e-mail, if possible. If you wish to remain anonymous, this is not a problem. Please just write ANONYMOUS in the box below. Your comments will still be considered by NOIEP. You can write on the reverse side or on additional pages. You do not need to fill in the grey section of this form. It is for our registration of your comment and response to it. After you have filled in this form, it can be submitted in a paper form or by e-mail to NOIEP (see the contact details above).</i>		
Contact details of person submitting the comments and suggestions:		
Name		
Address		
Telephone	E-mail address	
Grievance concerning implementation of the Project		
What happened?		
How this became a problem for you? How this disturbs you?		
Where did it happen?		
When did it happen? Once (date) _____ Several times (how many?) _____ On-going problem _____		
What would you like to see happen to improve the situation?		
Which contact language you prefer: ☐ Romanian ☐ Russian ☐ English ☐ ?		
STATUS OF GRIEVANCE		
How was the grievance received? ☐ In person ☐ By phone ☐ By mail ☐ By email ☐ Other (please describe).....		
Grievance registration date:	Grievance number:	Registered by:
Response required Yes/No	Person responsible for preparing the response:	
Response sent (date):	Response registered (date):	

Appendix 3F Land Acquisition and Resettlement Framework

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

LAND ACQUISITION AND RESETTLEMENT FRAMEWORK



COWI

FEBRUARY 2023
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT FEASIBILITY ASSESSMENT

MOLDOVA SOLID WASTE PROJECT (WMZ-1)

FRAMEWORK AGREEMENT NO.: FC1088/11510/71218, PR000875

LAND ACQUISITION AND RESETTLEMENT FRAMEWORK

PROJECT NO.

A226634

DOCUMENT NO.

WMZ-1 ESA6

VERSION

01

DATE OF ISSUE

24.02.2023

DESCRIPTION

LARF WMZ-1

PREPARED

Project team

CHECKED

LLA

APPROVED

EKSC

Abbreviations

AESR	Annual Environmental and Social Report
CS	Composting Station
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPIU	Environmental Projects Implementation Unit in the Ministry of Environment of the Republic of Moldova (before 2023)
ESA	Environmental and Social Assessment
ESAP	Environmental and Social Action Plan
ESP	Environmental and Social Policy
LARF	Land Acquisition and Resettlement Framework
LF	Landfill
LPA	Local Public Authority
MoEnv	Ministry of Environment of the Republic of Moldova
NOIEP	National Office for Implementation of Environmental Projects (former EPIU)
NTS	Non-Technical Summary
PAP	Project Affected Person
PR	Performance Requirement
RP	Resettlement Plan
SEP	Stakeholder Engagement Plan
SS	Sorting Station
SWM	Solid Waste Management
TS	Transfer Station
WMZ	Waste Management Zone

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APPENDICES

Appendix A	Public grievance form for the Project

1 Purpose of this document

To establish an integrated system for management of municipal solid waste in Waste management Zone 1 (WMZ-1) located in the southern part of Moldova and including Cahul Rayon¹, Cantermir Rayon, Taraclia Rayon (the three Rayons are part of South Development Region) as well as Comrat Rayon, Ceadir-Lunga Rayon, and Vulcanesti Rayon comprising the Autonomous Territorial Unit of Gagausia (ATUG), the Ministry of Environment of the Republic of Moldova (MoEnv²) as the Project promoter is seeking loans from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). Co-financing grants are envisaged from the EU and from the National Environmental Fund of Moldova. Co-financing is also envisaged from the national budget, as appropriate.

This Land Acquisition and Resettlement Framework (LARF) is elaborated in line with the EBRD Environmental and Social Policy (ESP, 2019) defining a set of Performance Requirements to be met by the clients of the projects considered for financing with involvement of EBRD. The Performance Requirements are to be met by the EBRD clients during preparation and implementation of investment projects. The principles of EBRD ESP are acknowledged by the EIB and the EU.

This LARF will be applicable not only to the Project proposed for WMZ-1, but also for all other tranches of financing from the EBRD and the EIB for the improvement of solid waste management in Moldova.

So far, no activities of waste pickers have been identified on more than 100 dumpsites existing in WMZ-1, but the *EBRD Performance Requirement 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement* could be relevant for the proposed Project in WMZ-1 in case any waste pickers would be identified as potentially affected by the Project, when the currently existing dumpsites are closed, and all municipal solid waste generated in WMZ-1 is regularly collected and transported to the new regional Waste Management Centre (including a landfill, a waste sorting station and a composting plant) which is to be constructed near Cahul Town.

When the new system in WMZ-1 is established, any waste pickers and informal recyclers/traders will not have access to fresh waste as a source of their income.

¹ According to the official sources, the term "Rayon" refers to a territorial administrative unit made up of villages (communes) and cities united by the territory, economic and social cultural relations", ref.

<https://moldova.md/en/content/administrative-territorial-organization-moldova>

² MARDE before the Government reorganisation in August 2021

https://cowi.sharepoint.com/sites/A226634-project/Shared Documents/60-WorkInProgress/10-Reports/4_Final Report/WMZ-1/06_FR_May 2023/WMZ1_ESA documents_March 2023/A226634_Moldova WMZ-1_Appendix 3F_LARF_2023 02 24.docx

The LARF is based on the following documents describing the proposed Project:

- > Feasibility Study and EIA prepared by GIZ/MSLP team in 2015
- > Feasibility Assessment prepared by COWI in 2021-2023
- > Environmental and Social Assessment (ESA) and its Non-Technical Summary (NTS) prepared in 2023 - description of the Project and specifically of the potential environmental and social benefits and impacts associated with the construction and operation of SWM facilities proposed as components the Project also explaining how potential impacts and risks will be mitigated and managed through all phases of the Project.
- > Environmental and Social Action Plan (ESAP) prepared in 2023 and focused on achieving the Project compliance with the EBRD Performance Requirements, the EIB Environmental and Social Standards, other international requirements, the national regulations and best practice.
- > Stakeholder Engagement Plan (SEP) developed in 2023 to ensure that stakeholders are informed in a timely manner of the potential impacts of the Project and consulted on mitigation measures. The SEP also describes a formal grievance mechanism for dealing with complaints, concerns, queries, etc. from the public and from the Project workers.

As described in the documents listed above, the proposed Project is prepared in such a way that it will not require physical displacement (therefore this will not be further considered in the LARF), but could cause certain economic displacement, which could be mainly related to (i) potential additional land needed during construction/expansion of proposed SWM facilities and (ii) restricted access to waste as an income source for informal waste pickers and waste traders after closure of all dumpsites.

In line with EBRD PR5 (para 43), the LARF is prepared as a first step towards the development of a resettlement plan because, at the current stage of the Project development, no activities of waste pickers have been identified in WMZ-1, thus a detailed census of affected people and assets cannot be conducted in order to prepare a detailed resettlement plan. The present resettlement framework clarifies resettlement principles and organisational arrangements. Once the Project components at each specific site are defined in sufficient detail, a full census and socio-economic survey of waste pickers working at the specific dumpsite before its closure will be conducted and measures for livelihood restoration developed in consultation with the waste pickers (if any identified) will form a detailed resettlement plan. The planned measures will be proportionate to potential risks and impacts will be prepared in accordance with the requirements of PR5 reflected in the resettlement framework.

In case the issue of waste pickers becomes relevant for any of the Project sites, NOIEP on behalf of MoEnv is committed to development and implementation of the site-specific Resettlement Plans based on the present LARF as the planning documents integrated in the environmental and social management system of the Project. The Regional Operator of SWM system in WMZ-1 will assign staff to support the NOIEP in monitoring of RP implementation and in corrective actions, contacts with the stakeholders including the affected persons, management of the grievance mechanism.

The NOIEP acting on behalf of MoEnv as the client of the EBRD and the EIB will be responsible for providing to the Banks with monitoring reports on implementation of the Resettlement Plans. The extent of monitoring activities will be proportionate to the risks and impacts relate to site-specific Resettlement Plans developed on the basis of this LARF.

The present LARF provides a basis for consultation to be led by the NOIEP with persons potentially affected by economic displacement due to the Project activities, so that these persons could be in a timely and adequate manner involved (in accordance with the EBRD ESP PR10) in decision-making process related to envisaged economic displacement, compensation and other assistance.

2 Legal and regulatory context for LARF

2.1 Moldovan legislation

The following key documents, as amended, form the context of land acquisition and resettlement in Moldova:

- > Constitution of Moldova
- > Civil Code no. 1107 (06.06.2002)
- > Land Code no. 828 (25.12.1991)
- > Forest Code no. 887 (21.06.1996)
- > Law no. 1308 on the normative price for land and the buying/selling procedure (25.07.1997)
- > Law no. 488 on expropriations for public utility (08.07.1999)
- > Law no. 163 on the authorization of construction work (09.07.2010)
- > Law no. 29 on the delimitation of public property (05.04.2018)
- > Government Decision no. 1170 on the approval for the regulation regarding the mode of transmission, destination change and exchange for land (25.10.2016)
- > Government Decision no. 285 on the approval for the regulation for the reception of construction and adjacent utilities (23.05.1996)
- > Government Decision no. 958 on the approval for the regulation regarding land evaluation (04.08.2003)

2.2 EBRD PR5 requirements

According to the EBRD PR5 the compensation and livelihood restoration is required when the project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood. The term “livelihood” refers to the full range of means that individuals, families, and communities utilize to make a living, such as wage-based income, agriculture, fishing, foraging, other natural resource-based livelihoods, petty trade, and bartering. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement.

EBRD requirements pertaining to land acquisition and displacement, relevant for the Project can be summarized as follows:

- > Avoid or minimize displacement
 - > To avoid or, when unavoidable, minimize, involuntary resettlement by exploring alternative project designs; measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.
- > Consultation
 - > To involve the affected men and women, including host communities from the earliest stages and through all resettlement activities.
 - > To provide affected persons with the opportunity to participate in the eligibility requirements, negotiation of the compensation packages, resettlement assistance, suitability of proposed

resettlement sites and proposed timing consultation will continue during the implementation, monitoring and evaluation of compensation payment and resettlement.

- > To take necessary actions to ensure that vulnerable groups are not disadvantaged in the resettlement process, are fully informed and aware of their rights, and are able to benefit equally from the resettlement opportunities and benefits.
- > Socio economic assessment and census
 - > To carry out a socio-economic baseline assessment on people affected by the project, including impacts related to land acquisition and restrictions on land use. The assessment shall identify impacts within a project's social context and the needs and rights of the affected people and develop appropriate actions to minimize and mitigate resettlement impacts.
 - > To carry out a detailed census to: (i) identify persons who will be displaced by the project; (ii) determine who will be eligible for compensation and assistance; and (iii) take inventory of affected land and property. The census should consider the needs of seasonal resource users who may not be present in the project area during the time of the census.
- > Compensations for displaced persons
 - > To mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land by: (i) Providing compensation for loss of assets at replacement cost, prior to taking possession of acquired assets; and (ii) Ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
 - > To restore or, where possible, improve the livelihoods and standards of living of displaced persons, including those who have no legally recognizable rights or claims to the land (present in the project affected area at the time of the cut- off date), to pre-project levels and support them during the transitions period.
 - > To make special provisions for assisting disadvantaged or vulnerable individuals or groups (present in the project affected area at the time of the cut-off date) that may be more adversely affected by displacement than others and who may be limited in their ability to claim or take advantage of livelihood assistance and related development benefits.
- > Grievance mechanism
 - > To establish a grievance mechanism to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by displaced persons, including a resource mechanism designed to resolve disputes in an impartial manner.
- > Resettlement and/or Livelihood Restoration Framework
 - > To develop a Resettlement and/or Livelihood Restoration Framework to outline the general principles, procedures and entitlement framework.
- > Monitoring
 - > To carry out a monitoring of the resettlement and livelihood restoration process with the participation of key stakeholders such as affected communities.
 - > The completion report should be undertaken after all inputs in the process, including any developmental initiatives, have been completed. The report may identify further actions to be completed to close obligations for resettlement, compensation, livelihood restoration and development benefits.

- > Private sector responsibilities under government-managed resettlement
 - > There may be cases where land acquisition and resettlement are the responsibility of the host government. In such cases, the collaboration with the responsible government agency, to the extent permitted by the agency, is required. Where government capacity is limited, the client will play an active role during resettlement planning, implementation and monitoring. The client will prepare a plan (or a framework) that together with the documents prepared by the responsible government agency, will meet the EBRD requirements. The client may need to include in its plan: (i) a description of the entitlements of displaced persons provided under applicable laws and regulations; (ii) the measures proposed to bridge any gaps between such entitlements and the requirements of this PR; and (iii) the financial and implementation responsibilities of the government agency and/ or the client.

Unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment for the affected people, as well as environmental damage and adverse socio-economic impacts in areas to which they have been displaced. For these reasons, involuntary resettlement should be avoided. However, where involuntary resettlement is unavoidable, it should be minimized and appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented. The government often plays a central role in the land acquisition and resettlement process, including the determination of compensation, and is therefore an important third party in many situations. Experience of the international financial institutions demonstrates that the direct involvement of their clients in resettlement activities can result in more cost-effective, efficient, and timely implementation of those activities, as well as in the introduction of innovative approaches to improving the livelihoods of people affected by resettlement.

The LARF will provide a basis for site-specific Resettlement Plans proportionate to the risks and impacts associated with the Project at each specific site, where the livelihoods and/or income generation of waste pickers could be affected by the Project activities.

According to para 61 of the EBRD PR5, in the case of projects affecting livelihoods or income generation, the client shall plan measures to improve, or at least restore, affected persons' incomes or livelihoods. The plan shall establish the entitlements of affected persons and/or communities, will pay particular attention to gender aspects and the needs of vulnerable groups, and will ensure that these are provided in a transparent, consistent, and equitable manner. The plan shall incorporate arrangements to monitor the effectiveness of livelihood measures during implementation, as well as evaluation once implementation is completed. The mitigation of economic displacement shall be considered complete when the completion audit concludes that affected persons or communities have received all of the assistance for which they are eligible, and have been provided with adequate opportunity to restore their livelihoods.

According to the EBRD PR5 (para 42), a Resettlement Plan shall be based on up-to-date and reliable information about:

- i) the proposed project and its potential impacts on the displaced persons and other adversely affected groups;
- ii) entitlement matrix which defines compensation entitlements (whether in-cash or in-kind) for each category of loss and each group of affected persons;
- iii) appropriate and feasible mitigation measures for all impacts identified;

iv) the legal and institutional arrangements required for effective implementation of resettlement measures; and

v) a budget specifically allocated to resettlement that is commensurate with the mitigation measures.

Government agencies follow national legal requirements, while the EBRD clients are required to ensure that resettlement undertaken on their behalf meets national laws as well as the objectives of PR 5. This may require supplementing the Government's efforts in various ways.

2.3 Gap between Moldovan legislation and EBRD requirements

The key gaps between the Moldovan legislation and EBRD requirements are related to waste picking at dumpsites as informal income generating activities. The Moldovan legislation does not recognise these activities as legitimate source of livelihood, while the EBRD Environmental and Social Policy (ESP) requires that all persons whose livelihoods/incomes, including these with no formal rights, are affected by the project must be assisted to improve or at least restore their livelihoods to pre-project levels.

The Moldovan legislation defines no provision for income or livelihood restoration planning and its specific tools to define eligibility to various entitlements and compensation, while the EBRD ESP requires restoration of income and/or sources of livelihood based on entitlements for all groups of affected people.

Disclosure of information and meaningful public consultation with the affected people is integral parts of the EBRD requirements for the client's activities throughout all stages of the project preparation and implementation, while the national legislation requirements are focused on information dissemination in a form of public hearings only at the stage of the project initiation and preparation.

The legislation of Moldova provides for the presentation of applications, complaints, objections and suggestions to developer of a project, as well as appeal to the court. Following the EBRD requirements, the existing grievance mechanism is to be tailored for providing opportunities for affected people, the general public and the project workers throughout all stages of project to submit comments, complaints and grievances related to the Project implementation, as well as to get response from the client. This approach within the grievance mechanism allows to resolve potential conflicts and perform corrective actions as soon as possible and with the best knowledge of the specific details of the Project. At the same time, the grievance mechanism does not prevent any formal procedures (e.g., via court) following the national legislation.

The EBRD requires that throughout the project duration the client is regularly reporting to the EBRD on the progress in preparation and implementation of the resettlement plans, the status of grievances and their resolution. The respective requirements could be reflected in the format of Annual Environmental and Social Report (AESR) to be submitted by the client on agreement with the EBRD.

3 Project impacts and affected people

The proposed Project assumes that new facilities for management of waste in line with the EU standards will be established. The dumpsites will be closed - it will not be allowed to bring new waste to them.

Like many other regional investment projects in SWM sector in various counties, the Project in Moldova's WMZ-1 is planned for 20 years. The Project will include a programme of short-term investments planned for 2025-2028 followed up by a long-term investment programme planned for 2028-2047.

3.1 Short-term investments (2025-2028)

The investments planned for 2025-2028 will include the following components:

- **Purchase of equipment for waste collection and transportation:**

Purchase and deployment of containers (for separate collection of recyclables and of other/residual waste) and trucks to ensure that SWM collection services are provided to 100% of the population in WMZ-1 - via door-to-door collection system and bring-to-container system.

- **Construction of new SWM facilities:**

- o **Regional waste management centre in Cahul serving whole WMZ-1:** construction of WMC including sanitary landfill (construction of Cell 1 as part of the EU compliant landfill planned to include three Cells with total capacity for 20 years of operation), sorting station for separately collected recyclables and composting station for open windrow composting of separately collected park and garden waste.
- o **Waste transfer stations,** : construction of transfer stations one in Cania (in Cantemir Rayon), one in Comrat and one in Taraclia.

- **Closure of all dumpsites in WMZ-1:**

Closure/capping of all dumpsites in WMZ-1 as soon as the regional landfill in Cahul is operational. The procedures for tender and selection of contractors for the closure of the dumpsites shall be organised in 2026, and the construction works for the closing of the dumpsites shall be carried out during 2027-2028.

The total cost of investments within the Priority Investment Programme (PIP) planned for 2025-2028 is estimated at EUR 25.4 million. Additional financing is planned as technical assistance and supervision that are not part of the PIP but are essential to its implementation.

3.2 Long-term investment programme (2028-2047)

The long-term investment programme (LTIP) planned for 2029-2046 will cover costs for rehabilitation and replacement of depreciated equipment at SWM facilities. It will also include the closure/capping of cells 1, 2, and 3 of the regional landfill in Cahul. The total cost of the LTIP for 2028-2047 is estimated at EUR 29.9 million.

3.3 Future providers of improved services

SWM services within the proposed new system in WMZ-1 will be provided by a Regional Operator, which will be established as a new inter-municipal joint stock company founded by LPAs of the largest towns (Cahul Town, Cantemir Town, Comrat Town, and Taraclia Town) that are the administrative centres of the respective Rayons. The Regional Operator will be responsible for SWM services including collection of waste, operation of the two transfer stations, sorting station, composting station and the new regional sanitary landfill. The Regional Operator within the Project will get new waste collection trucks and via its units in the Rayons in WMZ-1 is supposed to collect waste in larger areas than before the Project.

As presented in Figure 1, the territories of municipalities in WMZ-1 were grouped as four Waste Collection Catchments taking into consideration the proximity of each municipality to a Transfer Station or the regional sanitary landfill. The name of the waste collection catchments includes the name of the Rayon in which the Transfer Station or Regional Landfill is located:

- > Cantemir Waste Collection Catchment includes the municipalities within Cantemir Rayon (excluding Visiniovca, Sadic, Samalia, and Cietu municipalities).
- > Cahul Waste Collection Catchment includes the municipalities within Cahul Rayon (excluding Chioselia Mare and Borceag municipalities), all municipalities within Vulcanesti Rayon of ATUG, and Budai Municipality within Taraclia Rayon.
- > Taraclia Waste Collection Catchment includes the municipalities of Taraclia Rayon (excluding Budai Municipality), municipalities within Ceadir-Lunga Rayon of ATUG (excluding Tomai Municipality), Chioselia Mare and Borceag municipalities within Cahul Rayon, and Chioselia Rusa and Svetlii municipalities within Comrat Rayon of ATUG.
- > Comrat Waste Collection Catchment includes the municipalities within Comrat Rayon of ATUG (excluding Chioselia Rusa and Svetlii municipalities), Visiniovca, Sadic, Samalia, and Cietu municipalities within Cantemir Rayon, and Tomai Municipality within Ceadir-Lunga Rayon of ATUG.
- > As it can be seen in the map, some municipalities located close to Rayon borders were, despite of the administrative borders, included in the waste collection catchments in which a Transfer Station or the Regional Landfill is located closer to the municipalities than a TS in their own Rayon. For example, four municipalities located in Cantemir Rayon (i.e., Visiniovca, Sadic, Samalia, and Cietu) are included into Comrat Waste Collection Catchment as they are located closer to the Transfer Station site in Comrat than to the TS in Cantemir.
- > The combination of regional landfill, waste sorting station and composting station located close to each other at Cahul site will be further referred to as the Waste Management Centre (WMC).

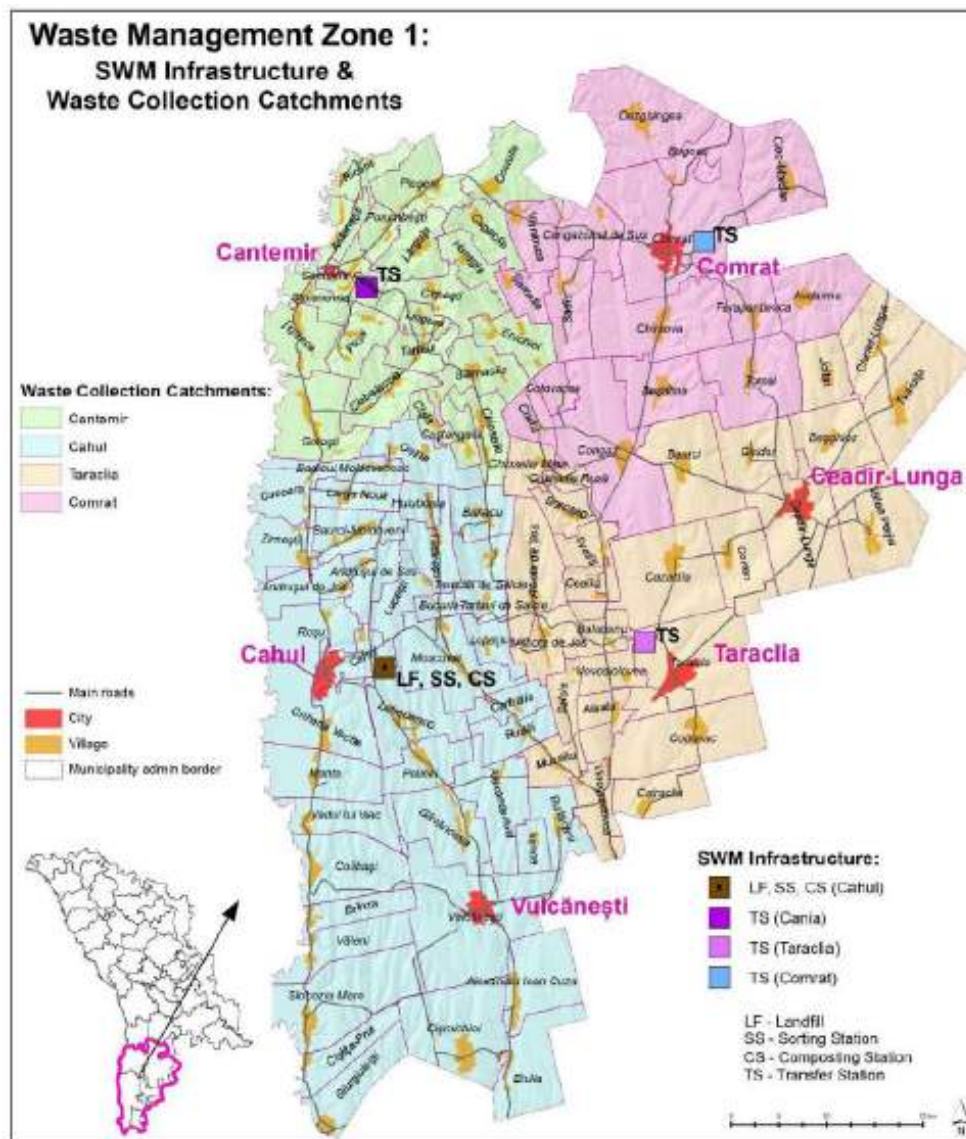


Figure 1 SWM infrastructure and waste collection catchments planned for the Project in WMZ-1

3.4 Establishment of new facilities

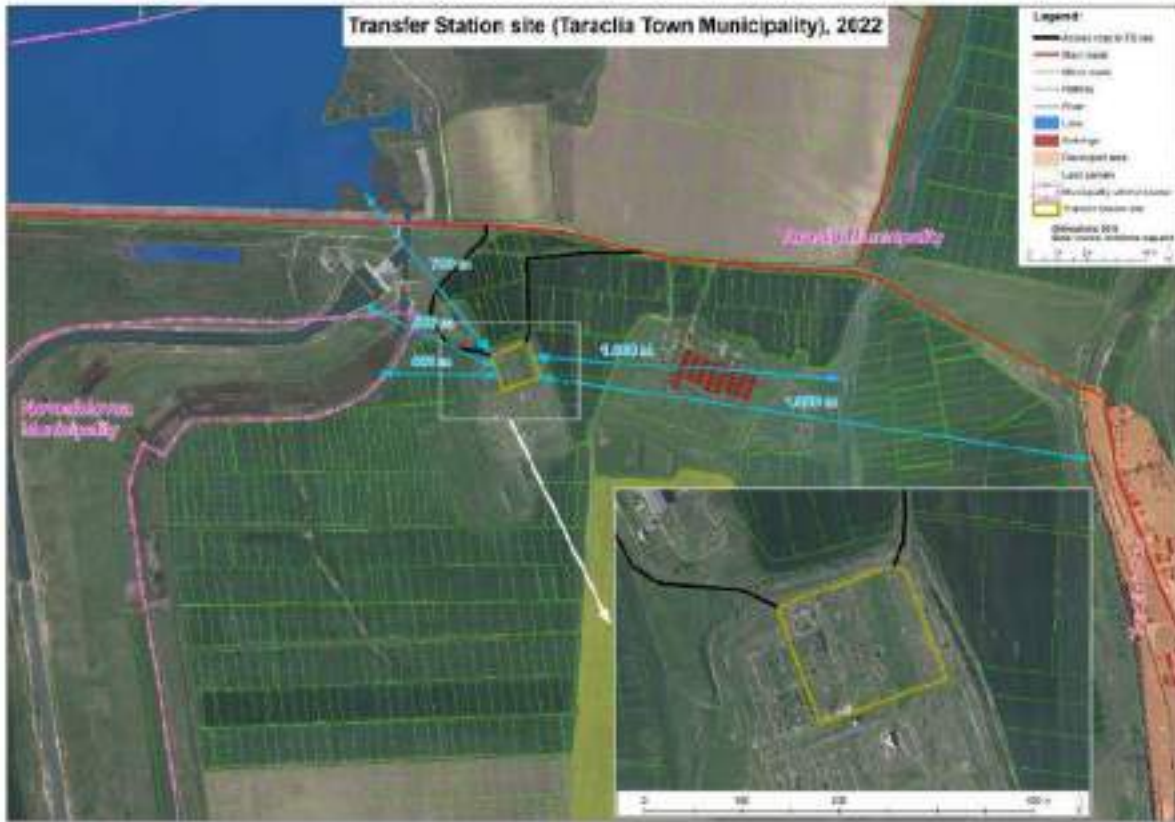
The site proposed for Cania TS establishment has an area of 1.78 ha (cadastral number 21142070182) and is owned by the Cania LPA. The distance from the site border to the nearest residential area is 1.3 km, the distance to the Tigheci River is 1.85 km. The site is currently used as pasture (see Figure 1.2) and is surrounded by agriculture lands.



Figure 3.2 Overview map of the proposed Cania TS site location in WMZ-1

The TS for Briceni Rayon will be established within the site located within the territory of wastewater settlement basins of the former sugar factory near the town of Briceni. The site is the public property of Briceni LPA and has the land cadastral nr. 96032080146. The site area is 2 ha, while the area sufficient for TS was during the FS of 2017 estimated as 0.49 ha. The distance from the site border to the nearest housing area (of Briceni town) is more than 1.2 km.

The site proposed for Taraclia TS has an area of 1.74 ha (land cadastral nr. 8701104.862) and is owned by the municipality of Taraclia town. The site territory has a grass cover and includes remains of a former livestock farm. The site overview map is included in Figure 5.14



Source: COWI on the basis of moldova-map.md

Figure 3.3 Situational map of the proposed Taraclia TS site location in WMZ-1

The site proposed for the TS for Comrat Rayon is located next to the existing municipal dumpsite and close to the main road R35 (Comrat-Basarabeasca). The land is owned by Comrat Town Municipality and has an area of 0.369 ha. The site has a grass cover. The site is about 1,200 m away from residential area (Comrat Town). The site is bordered by Comrat Dumpsite (East) and cultivated lands (South-West). A quarry and some abandoned farm buildings can be observed within a distance of about 200 m from the site.



Source: COWI on the basis of Moldova-map.md, 2022

Figure 3.4 Location of site proposed for establishment of Comrat TS

The proposed Project assumes establishment of regional landfill compliant with the EU standards. Site selected for establishment of the regional waste management center (WMC) including a regional landfill, a sorting station and a composting station is located east of Cahul city within the land including the currently operated and guarded waste disposal site of Cahul municipality. The planned footprint of the waste body is estimated 20 ha. The currently designated area of 10.7 ha (includes a land plot of 9.1 ha owned by Cahul LPA and two privately owned land plots that are to be expropriated) could be extended. The site is surrounded by grassland and shrubland and is accessible from the main road via a gravel paved road.

The adjacent terrain is hilly and includes a ravine (depth 20-25 m) to the east and northeast. The existing waste disposal site is located at an elevated plateau having an altitude of about 140 m.a.s.l. and the surrounding slopes of 10-15°.



Source: COWI, February 2022

Figure 5.5 View from west to east over the site selected for regional WMC in WMZ-1

As stated in the EIA prepared in 2015, the site has a possibility for expansion to 18 ha. The area of existing waste disposal site (10.7 ha of degraded land) and of required expansion (6.05 ha of pastures and arable land) is in public ownership of Cahul LPA. Additional part of the required expansion area (1.246 ha of gardens) is the private property of 5 owners.

Geographical coordinates of the site are as follows:

- > Latitude: 47°54'30.11" N
- > Longitude: 28°16'17.5" E

View from the central part of the site towards South, where the area is planned for establishment of sorting station and composting station, is included in Figure 5.3.



Source: COWI, 2022

Figure 5.6 View of the area planned for sorting station and composting station within the regional WMC in WMZ-1

Distances from the site borders to the nearest residential area (Cotihana village) is 2.6 km, to the residential area of Cahul city is 3.5 km. Schematic maps indicating the distances from the site borders is included in Figure 5.5. and Figure 5.6.



Source: COWI on the basis of moldova-map.md

Figure 5.7 Overview map of the Cahul site location in WMZ-1



Source: COWI on the basis of moldova-map.md

Figure 5.8 A detail of the Cahul site location map



Source: COWI on the basis of moldova-map.md and FS (2015)

Figure 5.9 A detail of the Cahul site with the indicated layout of proposed regional sanitary landfill for WMZ-1

The site for construction of the new landfill was selected and investigated as presented in the EIA prepared in 2015. The proposed landfill will be an engineered facility designed, constructed and operated in accordance with the EU landfill directive. The landfill operation plan/manual will be developed, the staff will be trained and follow it in line with good international practices.

As soon as the regional landfill and other SWM infrastructure established within the Project are operational, all dumpsites in WMZ-1 could be closed (i.e., they will not be used for disposal of more waste) and covered with soil, while all waste collected in the Rayons of WMZ-1 will be, directly or via Transfer Station, taken to the proposed regional waste management centre (WMC) including the new regional landfill, as well as the proposed sorting station for separately collected recyclables and composting station for separately collected green waste. The sorting station and the composting station will be located next to the landfill.

3.5 Closure of dumpsites

The Project includes measures for all dumpsites located in WMZ-1 will be closed, i.e., they will not receive more waste when the new SWM system becomes operational, and all waste regularly collected in WMZ-1 will be taken to the proposed Waste Management Centre (including new regional sanitary landfill, sorting station and composting station) which will be constructed near Cahul Town.

The existing dumpsites in WMZ-1 will be covered with soil, dumping of waste will not be allowed. Local council decisions regarding this will be issued, made known to the public and enforced.

Plans prepared for closure of dumpsites will be updated during construction of the new regional landfill in Cahul. The construction will take approximately 1 year. Any identified activities of waste pickers and informal recyclers/traders potentially affected by envisaged closure of dumpsites in WMZ-1 will be considered and addressed in the Resettlement Plan developed per entitlements defined in this LARF (Table

4.1). The civil works for closure of all dumpsites will be started as soon as the new SWM system in WMZ-1 is operational and the approval for start of civil works is received from the Banks. It is planned that all dumpsites in WMZ-1 shall be closed within approximately 1 year.

3.6 People potentially affected by the Project

Two groups of potentially affected people considered in this LARF are described below.

3.6.1 Group 1 – people potentially displaced during establishment of new SWM facilities

Establishment of Transfer Station within a site (see Figure 3.2) near Cania village in Cantemir Rayon will reduce the area of publicly owned pasture and thus will cause economic displacement of owners of livestock using this pasture. Owners of private land plots located within area preliminary planned for Cahul landfill will be affected by establishment of the landfill. Additional areas will be affected by expansion of the site to reach a footprint big enough for all elements of the regional WMC.

For establishment of the proposed Transfer Station and other SWM facilities within the selected sites allocated by the available decisions of the local authorities³ the economic displacement will be related to changing⁴ for the designated publicly owned land plot from the present land use category (e.g. agricultural/pasture in case of the site allocated for the transfer station in Cania) to a category defined as suitable for facilities for housing services (e.g. lands located within territories of settlements and designated for common use⁵) per the Land Code of Moldova.

It could be envisaged that after operation for about 20 years followed by establishing the final top cover and the aftercare programme of the proposed Cahul landfill during further at least 20-30 years, the territory of the landfill could be used by the Cahul community for recreational or other purposes. However, this would not be relevant in the near future and would be complicated due to various restrictions related to post-closure use of any landfill site.

It is expected that the public land allocated in 2015 by the Cahul community will be supplemented by adjacent private and public land to ensure area sufficient for placing the landfill, the sorting station and the composting station of the planned capacity for the Project implementation.

The sites proposed for TS in Comrat and for landfill in Cahul are located next to the existing waste disposal sites operated by the municipalities. As could be seen from the situational map in Figure 3.3, the Project assumes establishment of the proposed the TS in Taraclia within the site currently not used for disposal of waste, but earlier used for livestock farm and includes remains of the farm buildings. The land use categorisation of the site should be changed to fit the use for SWM facilities. Some economic displacement could be caused by establishment and operation of the SWM facilities in case the sites get new owners/users before the Project implementation start.

However, during the Project implementation activities, the need for additional land acquisition and resettlement may occur (e.g., for expansion of area for landfill and/or other SWM facilities, upgrading/relocation of access roads and utility connections, etc.). Temporary use of additional lands could

³ the site selection and allocation process is documented in the Feasibility Study and the EIA prepared in 2017

⁴ Land Code of Moldova, Chapter XI, Article 71

⁵ Land Code of Moldova, Chapter VI, Article 47

https://cowi.sharepoint.com/sites/A226634-project/Shared Documents/60-WorkInProgress/10-Reports/4_Final Report/WMZ-1/06_FR_May 2023/WMZ1_ESA documents_March 2023/A226634_Moldova WMZ-1_Appendix 3F_LARF_2023 02 24.docx

be required for short-term storage of construction materials, for parking and maintenance of construction equipment and vehicles, for contractor camps, etc.

Any need for additional land to be used permanently or temporarily will be clarified at the design stage. The land plan will be developed to define the impacts related to land acquisition and resettlement. Contractors will formally request MoEnv to acquire this additional land required for the Project implementation. Based on the impacts identified after finalization of the land plan, an appropriate Resettlement Plan will be prepared based on policy principles specified in this LARF. The Resettlement Plan will be verified, and its implementation monitored by the external consultant (Resettlement Monitor) reporting to the EBRD and EIB (the Banks). MoEnv acting on behalf of the Government of Moldova will be responsible for implementation of the Resettlement Plan prior to commencement of civil works with pending land acquisition and resettlement issues. Approval of the Resettlement Plan Completion Report prepared by the Resettlement Monitor will be a precondition the Banks' approval to start the civil works.

3.6.2 Group 2 – people potentially displaced because of closure of dumpsites

This LARF prepared in accordance with the EBRD PR5 (para 41 iii) also covers the issues of potential economic displacement with significant impacts on livelihoods or income generation of waste pickers, if any informal waste pickers are identified in WMZ-1 by the time of dumpsite closure activities.

During the engineering design and the obtainment of permits for works of contractors on the Project sites, the NOIEP will arrange for collection of updated information as a background for planning of compensation for changing the land use category of the sites allocated for the Project implementation.

The schedule of works for closure of dumpsites will depend on the actual construction schedule for landfill and other regional facilities. Waste pickers, if any, working at the dumpsites in WMZ-1 will be identified.

3.6.3 Census of affected people

Effective planning of economic displacement will require a detailed socio-economic census/survey of persons potentially subject to displacement and an inventory of affected land and assets. The date of completion of the census and assets inventory represents a cut-off date. In line with the normal practice of international projects, it is assumed that individuals coming to the dumpsite area after the cut-off date are not eligible for compensation or livelihood restoration assistance, provided that notification of the cut-off date has been well communicated, documented, and disseminated.

A detailed socio-economic baseline survey for identification of persons potentially affected by the Project activities and their specific needs in terms of livelihood restoration will be carried out during or after the national procedure of the Environmental and Social Impact Assessment. The survey will be also an important tool to discourage ineligible persons. A set of site-specific resettlement plans will be prepared in line with the present LARF and considering the survey findings. The plans will describe the procedure of census with setting the cut-off dates for specific components of the Project.

The census for Group 1 and for Group 2 of affected people would be carried out immediately after obtaining of the official approval for design documentation for construction of landfill and other SWM facilities, as

well as for closure of dumpsites (the official approvals are to be obtained from the national regulatory authority⁶).

No waste pickers have been identified in WMZ-1 during the Project preparation studies performed in 2015-2017 and 2021-2022.

For acting in accordance with circumstances relevant for closure of each dumpsite in WMZ-1, a formal census of the waste pickers should be carried out when the starting date of the dumpsite closure works could be clearly foreseen. Closure of a dumpsite could be also started with establishment of final cover at the dumpsite areas with waste accumulated long ago. The crucial stage of limiting for informal waste pickers the access to fresh waste will come with the stop of waste delivery to the dumpsite and the establishment of soil cover over the recently placed waste and the heaps of extracted recyclables located within the dumpsite area if the aggregated recyclables have not been removed (collected by customers of the waste pickers).

It is good practice that the identification of vulnerable households and individuals is undertaken in cooperation with the local authorities dealing with a specific dumpsite, so that the dumpsite closure plans are verified in cooperation with community leaders, community-based organizations (committee of pasture users, women council, community leader of nearest residential area) and/or NGOs dealing with the local socio-economic realities.

In the absence of the government procedures, the NOIEP will establish a cut-off date for eligibility. Information regarding the cut-off date will be well documented and disseminated throughout the Project area.

3.7 Displacement is unavoidable and has been minimised

The Feasibility Study findings show that the necessary and the only affordable solution for improvement of waste management system in WMZ-1 in the nearest future would not be possible without establishment of new regional landfill with other SWM facilities and closure of all dumpsites.

The MoEnv as the Project proponent in cooperation with the EBRD and the EIB considered feasible alternative Project designs and selected the optimal design leading to minimal economic displacement and balancing environmental, social, and financial costs and benefits. Particular attention was given to impacts on poor and vulnerable. The Project formulated during the Feasibility Study in consultation with leaders of the participating municipalities and other stakeholders assumes no physical displacement required for the Project implementation.

Due to currently challenged market for recyclables and the principle of economy of scale, the Project include investments in separate collection of recyclables in WMZ-1 and their sorting at one regional station. The Project is planned in a way leaving room for employment of waste pickers at the sorting line for recyclables after closure of the dumpsites.

⁶ per the Law no. 163 on the authorization of construction work (09.07.2010)

4 Proposed compensation and assistance

The MoEnv is ready to implement prompt measures for compensation and for livelihood restoration, so that the measures result in improvement of living conditions of people potentially affected by economic displacement caused by the Project activities.

4.1 Legal setup for compensation

Legal acts of Moldova⁷ and the EBRD ESP form the setup for compensation measures relevant for the proposed Project.

4.1.1 Compensation for transfer of land for Project facilities

This LARF applies to the private landowners, whose lands will be permanently or temporarily affected by compulsory actions by the Government of Moldova due to any future additional/new land acquisition required for the Project implementation. It also applies to people who lease private or state-owned lands or those who have no registered or legal rights over the land they use, and who will be adversely affected as a result of the Project. However, the LARF does not apply to state land that is transferred from one governmental authority to another or used temporarily by the contractors during construction works for the Project implementation, unless third parties are adversely affected by the transfer or use.

The sites selected for establishment of SWM facilities planned within the Project are to be transferred to the state ownership. This would require changing the land use category. The procedure of land use category change is regulated by the Decision of the Government of Moldova. Compensation for this kind of economic displacement is to be provided in accordance with Articles 97 and 99 of the Land Code of Moldova and Chapter IV of the Law No. 1308-XIII On normative price for land and the buying-selling procedure⁸. The MoEnv acting on behalf of the Government of Moldova will collaborate with the responsible government agency⁹ to help accelerate the assessment of loss and the full compensation.

4.1.2 Compensation for no access to waste at dumpsites

No legal and regulatory acts of Moldova provide background for any compensation arrangements and/or payments for economic displacement to the informal waste pickers and the owners of livestock scavenging at the dumpsites. Nevertheless, in accordance with the EBRD ESP the MoEnv will provide: (1) targeted assistance to informal waste pickers to improve or at least restore their income-earning capacity and standards of living, (2) transitional support to them based on estimated time to restore their income-earning capacity and standards of living.

4.1.3 Project affected persons eligible for entitlements under this LARF

This LARF is a general framework document applicable only for future additional/new land acquisition requirements that might occur for establishment and/or extension of the Project SWM facilities where no previous land acquisition was carried out.

⁷ please refer to Chapter 2 of this LARF

⁸ as adopted on 25.07.1997 with amendments per 16.12.2021

⁹ Agency for Land Relations and Cadastre of the Republic of Moldova

https://cowi.sharepoint.com/sites/A226634-project/Shared Documents/60-WorkInProgress/10-Reports/4_Final Report/WMZ-1/06_FR_May 2023/WMZ1_ESA documents_March 2023/A226634_Moldova WMZ-1_Appendix 3F_LARF_2023 02 24.docx

In case of any land acquisition for the Project implementation needs, the potentially displaced persons eligible for entitlements under this LARF will include the following groups:

- > All Project affected persons (PAPs) losing land either covered by legal title, with legalizable ownership or without registered ownership status,
- > Tenants, whether registered or not;
- > Owners of buildings, crops, plants, or other objects attached to the land;
- > PAPs losing business, income, and employment/salaries.

In case unregistered land users are affected, the MoEnv, through the relevant organisation, will assist the affected land users to register or update the registration of their lands in order to enable the MoEnv to compensate them under the legislation of Moldova. The non-land assets/structures on the affected plots of land users without titles will be evaluated and compensated by exactly the same criteria as those with titles.

The entitlements will be further specified (for relevant sections of this LARF) within the Resettlement Plan to be prepared and implemented by the MoEnv.

4.1.4 Entitlements to compensation and assistance

Entitlement is a range of measures comprising compensation in cash or in kind, income restoration, transfer assistance, income substitution, and relocation which are due to PAPs, depending on the nature of their losses, to restore their economic and social base.

Compensation and assistance must ensure that any potential PAPs maintain or improve their livelihood and standard of living during the Project. For purposes of defining the eligible PAPs, the cut-off date for the Project will be determined by the MoEnv or other local authority issuing the decree(s) on land acquisition for state needs. Table 4.1 below provides an overview of entitlements for various categories of PAPs addressing the degrees of impacts potentially caused by the Project.

Table 4.1 Entitlement and Compensation Matrix

Asset	Specifications	Affected Persons	Compensation Entitlements
Permanent Loss			
Agricultural land	Cropped / cultivated land or pastureland	Owners	- Land for land compensation with plots of equal productivity and size to the plots lost; or - Cash compensation for affected land plot at full replacement value without deduction for taxes, transaction, registration or transfer costs and other applicable payments; - Security of tenure provided (in case of replacement land)
		Renters (long-term/ short term)	- Land for land compensation (replacement lease) with plots of equal productivity and size to the plots lost. - If the land is not available, consider providing compensation reflecting terms of lease and impact; - Security of tenure provided (in case of replacement lease)

Asset	Specifications	Affected Persons	Compensation Entitlements
		Informal land users (if any)	- Leased plot on state land; or - If leased plot cannot be provided, consider one-off self-relocation allowance equal to 12 months of minimum wage.
Residential and commercial land		Owners	- Land for land compensation with plots of equal value and size to the plots lost; or - Cash compensation for affected land plot at full replacement value without deduction for taxes, transaction, registration or transfer costs and other applicable payments; - Security of tenure provided (in case of replacement land)
		Renters long- term/ short-term	- Land for land compensation (replacement lease) with a plot comparable in value to the lost plot. - If the land is not available, consider providing compensation reflecting terms of lease and impact; - Security of tenure provided (in case of replacement land)
		Informal land users (if any)	- A land plot to be provided from the state for lease (with no charge for taxes, transaction, registration, and land legalization) - If leased plot cannot be provided, consider one-off self-relocation allowance equal to 12 months of minimum wage
Structures	Residential houses and commercial buildings	Owners of permanent structures, including informal land users	- Replacement housing: if replacement is of lower value, cash compensation for the difference; or - Cash compensation at the full replacement value for affected structures and other real assets at existing prices at the moment of acquisition with no deduction for depreciation or transaction costs. Compensation will include the value of affected connections to water supply and/or other public utilities. - If immediate accommodation/storage is unavailable, housing/storage rental allowance covering rent for at least 3 months or more if rental requirement period is longer.
	Temporary structures	Owners of temporary/ movable structures	- Approved site to relocate structure with the relevant permissions and access to the road, if required. - Other relocation support as deemed necessary.
Crops	Crops affected	All PAPs including informal users	Crop compensation in cash at full market rate for 1 year gross harvest.
Trees	Trees affected	All PAPs including informal users	Cash compensation reflecting income replacement. Fruit trees value is based on age category and calculated as gross market value of one-year income times the number of years to grow a tree to similar productivity, plus purchase cost of seedlings and starting materials. For wood/timber trees, compensation will be based on the cost of dry wood volume.

Asset	Specifications	Affected Persons	Compensation Entitlements
Business and employment	Temporary or permanent business/employment loss	Business owners (including those with no formal rights on the land) and their affected workers	• If permanent business loss, cash compensation equal to one-year net income (lost profit). • If temporary business loss, cash compensation for the period of income loss (not exceeding one year). • If permanent employment loss, 3 months average registered wages (if not registered, based on the official minimum wage in Moldova). • If temporary employment loss, average registered wage during disruption (if not registered, based on the official minimum wage in Moldova). • Note: Affected workers will be paid through their employers
Relocation	Transport and transitional livelihood costs	All persons affected by relocation	• Transportation allowance sufficient to cover transport expenses; and • Relocation allowance equivalent to monthly rental cost for similar land plots/structure multiplied by the number of months needed to rebuild and relocate to a new site. • Transition allowance to cover their households needs during transition period
Structure renters		Renters with valid rental contract	• Rental allowance in accordance with the conditions of the rent agreement but not less than cost of rent for 3 months. • Refund of the unused portion of the rent or lease fees paid in advance.
Community assets			• Rehabilitation or replacement of affected structures to pre-Project function.
Imposition of servitudes		Owners/users of land plots	• Cash compensation for affected land plot and property without deduction for taxes, transaction, registration or transfer costs and other applicable payments.
Vulnerable and disproportionately affected population groups		Households below the poverty line; female headed household; large families having 4 or more children below 18 years; households with disabled members; and elderly with no family support	• Assistance equivalent to minimum living wage for 3 months; • Enrollment in government social assistance program if not yet enrolled; • Priority in local employment for able members of vulnerable household; • Other support measures based on results of vulnerability analysis
Livelihoods impacts		All PAPs regardless of their legal status	• Livelihood restoration measures necessary to ensure that PAPs' livelihoods level is improved or at least not worse off compared to pre-Project level

Asset	Specifications	Affected Persons	Compensation Entitlements
Severe impact	Severely impacted households (losing 10% or more of their productive/ income generating assets, such as agriculture/ aquaculture landholding), and/or physically displaced from housing, and/or business owners losing their business	All severely affected households	• Assistance equivalent to net income for one year generated on impacted land plot/property (if no data on income is available, then calculation will be based on minimum wage for 12 months) or land swap (if available). • Enrollment in government social assistance program if not yet enrolled and applicable. • Priority in local employment for severely impacted PAPs.
		All severely affected households of waste pickers and waste traders	• Support for registration process for persons with no ID • Support for medical treatment in case of serious illness and contagious disease acquired due to waste picking activity • Access to psychologist and/or social workers to help becoming more capable of getting jobs and supporting own livelihoods • Transition payment during 2 months of looking for job (the amount equivalent to household income from waste picking per month during the last year is to be determined during baseline survey). • Support for seeking employment opportunities within the formal SWM system, e.g., at SWM facilities established within the Project • A single lumpsum payment for purchase of school stationery items and clothes (the amount equivalent to 100% of household income from waste picking per month within school holidays on average during the last year is to be determined during baseline survey) • Support for applying for any additional government welfare scheme the household may be eligible for • Food and utility fee support for 6 months • Support tuition fees for children to finish school and/or technical college (the amount is to be determined during the baseline survey).
Temporary Loss			
Land for civil works or borrow pits	Negotiated between owner and Contractor / MoEnv	Owners	• Contractor pays cash compensation at existing local rental rates for duration of temporary use plus income/crop/structure loss due to temporary land use, if any as provided for in the entitlements for crops, business and structure losses. • Land restored to original status at the end of rental. • Contractor pays for making land management and legal documents.
	Negotiated between leaseholder and Contractor / MoEnv	Leaseholders (long-term and short-term land lease)	• Contractor / MoEnv pays cash compensation at local state rental rates for duration of temporary use plus income/crop/structure loss due to temporary land use, if any as provided for in the entitlements for crops, business and structure losses. • Land restored to original status at the end of rental. • Contractor / MoEnv pays for making land management and legal documents.

Asset	Specifications	Affected Persons	Compensation Entitlements
		State lands (permanent land users)	- Land restored to original status at the end of rental. - Environmental safeguard measures. - Contractor / MoEnv pays for making land management and legal documents.
Imposition of servitudes or other restrictions (might be required for underground pipelines, cables and overhead lines, other utilities, etc.)		Owners and users of land plots	- Signing of servitude agreement, specifying conditions of access to part of the land plot. - Provision of compensation as per servitude agreement. - If imposition of servitude significantly restricts the designated use of land plot or makes the land plot unviable, then at the request of the owner/user the affected land plot will be acquired in full or replaced with another plot comparable in value to the initial plot.

Source: COWI

The entitlements outlined in the matrix are further elaborated below:

Agricultural land impacts. The household with legal title to agricultural lands will be compensated at full replacement value either through (i) cash compensation at current market rates of the land (inclusive of fair market value, transaction costs, interest accrued, transitional and restoration costs and other applicable payments), or (ii) granting of replacement land equal in value/productivity to the plot lost as preferred by the owner. Actual transaction taxes/fees will be paid by the MoEnv or waived by the concerned agency. Compensation will also include costs incurred by the owner related to land plot development, maintenance, protective measures and soil fertility improvement, considering the inflation, as well as losses that the owner incurred related to early termination of obligations to third parties.

Leaseholders (whether long-term or short-term) that lease plots from the State will be provided with alternative land plots, as they may require for maintaining their activity. Resettlement Plan must cover details of modifications, including review of baseline legal documents.

Residual agricultural land impacts. Residual portions of the acquired lands which are rendered unusable will be included in the affected land and compensated as indicated above subject to the preference of the PAP.

The main criterion to determine whether the residual part (plough land or pasture) is or is not suitable for its earlier purpose is its economic impracticability based on the following: a) small area of the remaining (cut) part; b) difficult access to it (driving of agricultural machinery or cattle/animals via highway); c) high cost for plot development and insignificant profits that can be obtained from its further use. This will be determined by the independent valuator in consultation with the owner or long-term leaseholder.

Alternatively, the PAP has the option of seeking an alternative plot or of changing the intended use of the remaining plot i.e. from agricultural to commercial. Moreover, PAPs may explore the reorganization and swapping of plots with adjacent owners to improve the economic viability of the remaining agricultural lands. MoEnv in coordination with the relevant LPA and responsible governmental agency will assist PAPs

who opt to change the use of portions of their remaining plot or in swapping with adjacent plot owners/leaseholders.

Transaction taxes/fees and/or registration costs will be paid by the MoEnv or waived by the concerned agency.

Residential/commercial land. Households and legal entities which own residential/commercial lands that will be affected by the Project will be compensated at full replacement rate either: (i) in form of land for land with equal characteristics and agreed with the owner; or (ii) cash at current market rates free of transaction costs and depreciation (inclusive of fair market value, transaction costs, interest accrued, transitional and restoration costs and other applicable payments).

Buildings, and structures will be compensated in cash at full replacement cost free of deductions for depreciation, salvaged materials, and transaction costs irrespective of the registration status of the affected item. The cost of lost connections to water supply and other public utilities will be included in the compensation.

Partial or complete damage to irrigation, drainage and erosion-preventive structures (systems) will be determined based on the cost of constructing new facilities or rehabilitating existing structures (systems), including the cost of design and survey works.

Crops. Standing crops on the acquired lands will be compensated at market rates for their gross value of 1 year's harvest losses. Crop compensation will be paid both to landowners and tenants based on their agreed sharing scheme.

Trees. Trees planted by private land users will be paid cash compensation reflecting replacement of income derived from the trees. The economic value of fruit trees will be based on the age category and valued equivalent to one-year income times the number of years to grow a tree to similar productivity. The cash compensation will also include the price of seedlings and starting materials. For wood/timber trees, cash compensation will be based on the price of dry wood volume.

Businesses. If business is lost permanently, it will be compensated in amount equal to one-year net income (loss of profit). If disruption is temporary, the PAP will be paid cash compensation for the period of business interruption period (not exceeding one year) based on tax declaration or, if unavailable, official monthly minimum salary, taking into account compensation for employed workers based on the Labour Code and the specific labour agreement/contract between the employer and employee. Losses that the owner incurred related to early termination of obligations to third parties, and expenses related to business development will also be considered.

Employees. Workers whose employment will be disrupted, will be provided with indemnity for lost wages for the period of business interruption up to a maximum of 3 months, based on their registered monthly wages/salaries, or, if unavailable, official monthly minimum salary.

Relocation assistance and transitional allowance. PAP households/owners of structures who need to relocate will be provided with (i) transportation allowance or transport to help them transport their structures, goods and personal items to a new site; (ii) relocation allowance equivalent to monthly rental cost for similar land plots/structure multiplied by the number of months needed to rebuild and relocate to a new site; (iii) transition allowance to cover their household expenses during the transition period. The

transition allowance will be computed based on the official minimum wage multiplied by the number of months needed for them to rebuild and relocate to a new site.

Community structures and public utilities will be fully replaced or rehabilitated to maintain their pre-Project functions.

Vulnerable people. Displaced households below the poverty line, female headed households, large families having 4 or more children below 18 years, households with disabled members, and elderly with no family support will be provided cash assistance equivalent to 3 months minimum wage and will be enlisted in existing special programs and other initiatives for socially vulnerable people (i.e., targeted social assistance programme, state social benefits) if not yet enrolled. Able-bodied (and qualified, after training if necessary) members of vulnerable households will be given priority in Project-related jobs.

Severe impact losses. Households losing 10% or more of their productive, income generating assets, such as agriculture/aquaculture landholding, and/or physically displaced from housing and/or business owners losing their business will receive an additional allowance for severe impacts equal to net income for one year generated on impacted land plot/property (if no data on income is available, then calculation will be based on minimum wage for 12 months) or land swap (if available). Assistance will also be provided for enrolment in government social assistance program (if not yet enrolled) and enrolment in vocational training programs, in discussion with NGOs and development partners. Priority in local employment will be provided to members of severely impacted households.

Livelihood restoration for any informal waste pickers and waste traders identified in the circumstances of the proposed Project does not mean their re-location to the new regional landfill. Livelihood restoration for informal waste pickers (including job opportunities for them) should ensure no loss of their income, improve affected persons' housing and access to social services such as education and healthcare, and would allow them to benefit from the Project. Particular attention will be given to consulting the women and improvement of livelihood for the women, so that they can express their own opinion regarding the preferred options of compensation and livelihood restoration and are not just dependent on opinions and incomes of the males.

Arrangements for certain integration of informal waste pickers in the waste management system improved during the Project could include employment opportunities at the sorting lines for recyclables, at composting plant, engaging them in clean-up of wind-blown litter in areas adjacent to the SWM facilities established and operated within the Project.

If waste pickers are provided job opportunities at waste collection points or as members of waste collection crews, they need certain training, so that the formal providers of SWM services could benefit from their skills.

In general, the Project could benefit from proper livelihood restoration measures for the informal waste pickers. The measures would allow exploring the market for recyclables, which in the long-term prospect could reduce the amount of waste subject for landfilling and would be very important for discouraging the waste pickers from excavation of waste at the closed dumpsites, from moving to unmanaged dumpsites or scavenging in containers at waste collection points in residential areas instead of better ways of extracting the recyclables. In the best-case scenario, the waste pickers engaged in cooperation with formal providers of SWM services could become the driving force facilitating for separate collection of recyclables at source (at waste collection points) and raising the public awareness of recycling opportunities and efficient separation at source for extracting recyclables of good quality from municipal solid waste.

The numbers of any potentially affected waste pickers and waste traders mentioned in the entitlement matrix (Table 4.1) are to be determined during baseline social survey performed when the regional landfill is operational, so the dumpsite closure activities could be started. The survey shall be completed with an established cut-off date, and the entitled measures are to be implemented prior to physical contractor works preventing for waste pickers their normal access to waste at a specific dumpsite subject to closure within the Project.

Temporary impacts. In case of temporary land acquisition, compensation will be based at local commercial rental rates for the duration of use, plus income/crop/structure loss due to temporary land use, if any as provided for in the entitlements for crops, business and structure losses. The Project will ensure that the land is restored to its original status at the end of the rental period.

Unexpected adverse effects. For unexpected adverse effects during the Project implementation, the MoEnv in coordination with relevant local public authority will undertake measures in accordance with the objectives of the LARF of restoring the socio-economic and living conditions of the affected persons.

The MoEnv will conduct census / socio-economic survey of PAPs and prepare the Resettlement Plan covering all applicable requirements consistent with the approved LARF. The amounts of compensations preliminary indicated in the entitlement matrix (Table 4.1) will be determined during the survey.

In the case of cash compensation, payments will be delivered by MoEnv through the banks based on the preference of the PAPs free from fees or processing charges. Expenses related to transfer of funds, and documentation requirements will be covered by the MoEnv.

4.1.5 Socio-economic survey for valuation of potential losses

Assessment of impacts potentially posed by the Project (its separate components, as relevant) will be done based on the design documentation. Information on the affected plots will be derived by superimposing the proposed alignment of the sites and any required additional land on the land cadastral map to be provided by the relevant governmental agency and used to identify the names of the registered landowners / leaseholders with permanent land use rights, land use, size of the affected plots and the proportion of affected land against the total area of the plot. Impacts of land acquisition will be fully assessed once the land plan is available and boundaries of required additional land plots have been marked on the ground. Affected users of adjacent areas (i.e. businesses, and services) will be identified through field visits performed by NOIEP jointly with representative of contractor. Background information on the PAPs will be obtained using a structured census / socio-economic questionnaire. Secondary information on the social, demographic and livelihood conditions in the Project area will be collected from state agencies and public authorities of the municipal/Rayon/Region level. On the basis of the impact assessment and consultation with PAPs, a Resettlement Plan will be prepared.

The impact assessment during the detailed design stage will involve the following procedures:

- > Marking the boundaries of additional land (by the contractor in coordination with NOIEP and LPAs);
- > Inventory and valuation of affected assets (land, structures, crops, trees, other improvements) by valuers commissioned by the MoEnv. A map that will indicate the location of affected structures will be prepared for each site, as means for determining which owners should be eligible for assistance during Resettlement Plan implementation;

- > Census of all PAPs (by a consultant hired by MoEnv) taking into account their socio-economic characteristics, age, gender, ethnicity, household demography;
- > In parallel with the inventory of assets, a replacement cost survey will be undertaken by independent valuers to serve as a basis for establishing compensation rates at pre-Project level replacement cost.

The inventory of affected assets will summarize the: (i) number of structures that will be demolished and information on their ownership disaggregated by gender; (ii) the types of construction materials used in the affected structures; (iii) other immovable assets like electricity connections and source of drinking water, etc.; and (iv) amounts of recyclables recovered from waste by any waste pickers and handled by waste traders, their scope of activities.

The census / socio-economic surveys of PAPs will cover, but not limited to: (a) profiles of household heads by age, sex and education; (b) household members, labour force and employment, disaggregated by sex; (c) family incomes and its sources as compared with poverty thresholds in the country/Region; (d) asset ownership such as land, crops and trees; (e) access to social services like schools, clinics, public markets, etc.; (f) access to electricity connections and roads; (g) access to common resources in the area; and (e) access to waste picking areas and networks of waste traders.

The census will identify the: (a) loss of potential incomes from business units operating in area adjacent to the Project sites; (b) potential displacement of workers employed by affected business units; and (c) loss of potential incomes from informal waste picking and trading.

Likewise, the census will identify the impacts and associated risks arising from losses to PAPs particularly on reduced household incomes, and displacement from employment in affected business units. It will also identify vulnerable and non-vulnerable households. These impacts will be the basis for compensation and livelihood restoration for the PAPs. The result of the survey will be complemented with available secondary socio-economic information for the Project area.

5 Disclosure of LARF and consultation with affected people

5.1 Disclosure of LARF

The NOIEP in coordination with LPAs will disclose this LARF to the public to ensure that the potentially affected people understand the compensation procedures and know what to expect at various stages of the Project.

At least one consultation with PAPs will be conducted after the land plan defining any additional land needed is determined.

Public information brochure that summarizes entitlements, compensation procedures, grievance redress and related information will be distributed during consultations. The brochure will also include information on temporary use of land for upgrading/construction of access roads, utility connections, for parking/maintenance of construction machinery and vehicles, for short-term storage of construction materials, for contractor camps, etc. The brochure will be available in the local languages.

The disclosure of measures relevant for waste pickers and traders will be carried out via a series of meetings held at the dumpsites with registration of the meeting participants and providing them with the information leaflets (in the understandable language) containing the contact details for possible questions and grievances.

For example, the disclosure materials (leaflets in Romanian and/or other acceptable language handed out to registered participants of meetings) will include answers to the following basic questions:

- > When will the dumpsite stop receiving waste and when it will be covered with soil?
- > When will the detail survey of informal waste pickers be started and when it will be completed (the cut-off date)
- > What will happen to recyclables accumulated within the dumpsite area?
- > When will the informal waste pickers be invited to discuss options for their livelihood restoration, i.e., the compensation in cash or their cooperation opportunities with the local/regional provided of SWM services?
- > Will the identity documents or other documents be required for livelihood restoration?
- > How long time will they have for participation in the discussions?
- > When will they be invited to attend the training for matching the job opportunities?
- > What are the contact details for additional information and grievances?
- > Which documents for the Project have been disclosed and where could they be studied?

5.2 Consultation with affected people

The NOIEP will provide the affected people with information on the assessment of values subject for compensation and livelihood restoration, as well as with information on the methods applied during the assessment. The procedures for determining and awarding compensation under the LARF will be presented to the affected people in a form, which they can understand, so that they know what to expect, how long they will have to respond, know about the grievance mechanism and legal procedures to be followed, if negotiations about the values and compensation/restoration fail.

Detailed planning of compensation and livelihood restoration requires active consultation and engagement with a wide range of stakeholders including first of all the economically displaced persons, as well as any governmental or other parties responsible for approving and implementing the compensation and livelihood restoration measures.

As for the informal waste pickers, if the job opportunities for them are provided in the sphere of waste management, it would be important to consult the staff of formal providers of SWM services for identification and better planning of the effective measures.

Early communication and involvement of consultants knowing the local context help to manage public expectations concerning the impact of the Project and its expected benefits. Early engagement is very important to enable all affected people and other stakeholders to fully understand the implications of such impacts on their lives and to actively participate in the associated planning processes and in decision making related to the economic displacement. Women's and men's preferences in terms of compensation and livelihood restoration mechanisms, such as compensation in kind rather than in cash, should be explored.

Informal waste pickers working at large dumpsites typically have certain ability to claim or take advantage of assistance and benefits related to economic displacement. After closure of large dumpsites, the informal waste pickers are typically left with a limited number of alternatives, e.g. to resettle or become economically displaced. Informal waste pickers should be considered as a vulnerable group in the context of economic displacement because they cannot be protected through national land or asset compensation legislation. Special measures in terms of consultation and development assistance would be needed to allow the informal waste pickers to participate in displacement planning meaningfully and to benefit from development opportunities. Persons identified as vulnerable should be assisted to fully understand their options for livelihood restoration and compensation and should be encouraged to choose the option with the lowest risk.

Information about the envisaged dumpsite closure and remediation will be disclosed to the public after completion of the Feasibility Study and the ESA, as well as during the Environmental and Social Impact Assessment in accordance with the national legislation before the Project could be approved by the authorities.

The focused rounds of consultations with affected people will be carried out prior to start of construction of the regional landfill and other SWM facilities included in the Project, and then a few months later, when the landfill construction is almost completed - prior to closure of the dumpsites.

During the consultations, all the affected people will be informed about the grievance mechanism established within the Project.

5.3 Procedures for grievance redress

Timely redress of grievances through an effective and transparent grievance mechanism is vital to the satisfactory implementation of compensation and livelihood restoration measures and to completion of the Project on schedule.

The grievance mechanism will help the NOIEP to identify any issues and claims at early stage and make the efforts to resolve grievances at the community level (e.g., via the community liaison officer) without impeding access to any judicial or administrative remedies that may be available.

The grievances will be received and redressed using customary and traditional methods of dispute resolution convenient for the affected people. Further guidance on establishing grievance procedures can be found in *IFC's Good Practice Note—Addressing Grievances from Project-Affected Communities* (2009).

5.4 Contacts for grievances

Grievances regarding compensation and livelihood restoration measures could be submitted by filling in the form included in Appendix A.

The responsibility for management and resolution of grievances will rest with MoEnv as the client of EBRD and EIB. This also applies to situations where third parties, notably contractors, are involved.

Any questions, complaints, grievances regarding the Project could be submitted in hard copy or by e-mail to NOIEP. The key contact details for the Project are the following:

Anatolie Risina, Director
National Office for Implementation of Environmental Projects (NOIEP)
Ministry of Environment of the Republic of Moldova
str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54
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Acknowledgement of receipt of a public grievance will be provided to the complainant within 5 working days of receiving the grievance and a proposed resolution of the grievance shall be given (verbally or in writing) within 30 days.

The system for grievances will be managed to ensure an appropriate level of confidentiality.

The procedure for submitting the grievances to NOIEP regarding the Project shall not prevent anyone from using the formal procedures in accordance with the laws and regulations of Moldova.

Appendix A Public grievance form for the Project

Anatolie Risina, Director National Office for Implementation of Environmental Projects (NOIEP) Ministry of Environment of the Republic of Moldova str. Alexandru cel Bun 51A, et.2, Chişinău, Tel (+373 22) 22 62 54 anatolie.risina@uipm.gov.md , cancelaria@madrm.gov.md		
MOLDOVA SOLID WASTE PROJECT PUBLIC GRIEVANCE FORM		
<i>We would like you to provide your name, address and e-mail, if possible. If you wish to remain anonymous, this is not a problem. Please just write ANONYMOUS in the box below. Your comments will still be considered by NOIEP. You can write on the reverse side or on additional pages. You do not need to fill in the grey section of this form. It is for our registration of your comment and response to it. After you have filled in this form, it can be submitted in a paper form or by e-mail to NOIEP (see the contact details above).</i> Contact details of person submitting the comments and suggestions:		
Name		
Address		
Telephone	E-mail address	
Grievance concerning implementation of the Project		
What happened?		
How this became a problem for you? How this disturbs you?		
Where did it happen?		
When did it happen? Once (date) _____ Several times (how many?) _____ On-going problem _____		
What would you like to see happen to improve the situation?		
Which contact language you prefer: ☐ Romanian ☐ Russian ☐ English ☐ ?		
STATUS OF GRIEVANCE		
How was the grievance received? ☐ In person ☐ By phone ☐ By mail ☐ By email ☐ Other (please describe).....		
Grievance registration date:	Grievance number:	Registered by:
Response required Yes/No	Person responsible for preparing the response:	
Response sent (date):	Response registered (date):	

Appendix 4 Overview GET analysis

ASSUMPTIONS REGARDING WASTE MANAGEMENT SYSTEM IN WMZ-1

Baseline (without the Project)

Share of all generated waste managed at dumpsites	100%
Share of all generated waste managed by open burning	0%
Share of all generated waste transported for recovery	0.00%
Share of all generated waste recovered/sold	0.00%

With the Project:

Share of all generated waste collected	96.6%
Share of all collected waste transported to WMC via TS	57%
Share of all collected waste transported to WMC directly	43%
Share of separately collected green waste treated at Composting Station	100%
Share of separately collected recyclables recovered at Sorting Station	84%
Share of residual waste treated at EU compliant landfill	100%

Notes:

1. With the new SWM system (2027-2046), it is assumed that about 3.4% of the generated waste remains in the household, being composted in the households as a result of home composting promotion.
2. With the old SWM system (2024-2026), about 60% of the MSW is collected by SWM operators; the rest of the waste is disposed of at local dumpsites individual by population, dumped in the nature or burned in the backyard.
3. It is assumed that no recyclables are collected within the old SWM system in WMZ-1.

EMISSION FACTORS FOR TREATMENT OF WASTE

Treatment of waste	Average share of generated waste	EF value, tCO ₂ eq/t	Activity as per Ecoinvent 3.8	Note
Baseline (without the Project)				
Recovery of recyclables (PET), diversion from open dump	0.00%	-0.0959	treatment of waste polyethylene terephthalate, open dump	Avoidance of emissions from PET at open dumpsites
Treatment MSW at dumpsites (share of all generated waste)	100%	0.825	treatment of municipal solid waste, open dump	100% of residual waste at dumpsites
Open burning of MSW (share of all generated waste)	0%	0.761	treatment of municipal solid waste, open burning	0% of residual waste in open burnings
With the Project				
Treatment of separately collected green waste at Composting Station	100%	0.0599	Treatment of biowaste, industrial composting	Separately collected park and garden waste
Recovery of separately collected recyclables at Sorting Station	84%	-0.0999	Treatment of waste plastic, mixture, sanitary landfill	Avoidance of emissions from them at sanitary landfill
Management of residual waste at sanitary landfill	100%	0.64	Treatment of municipal solid waste, sanitary landfill	

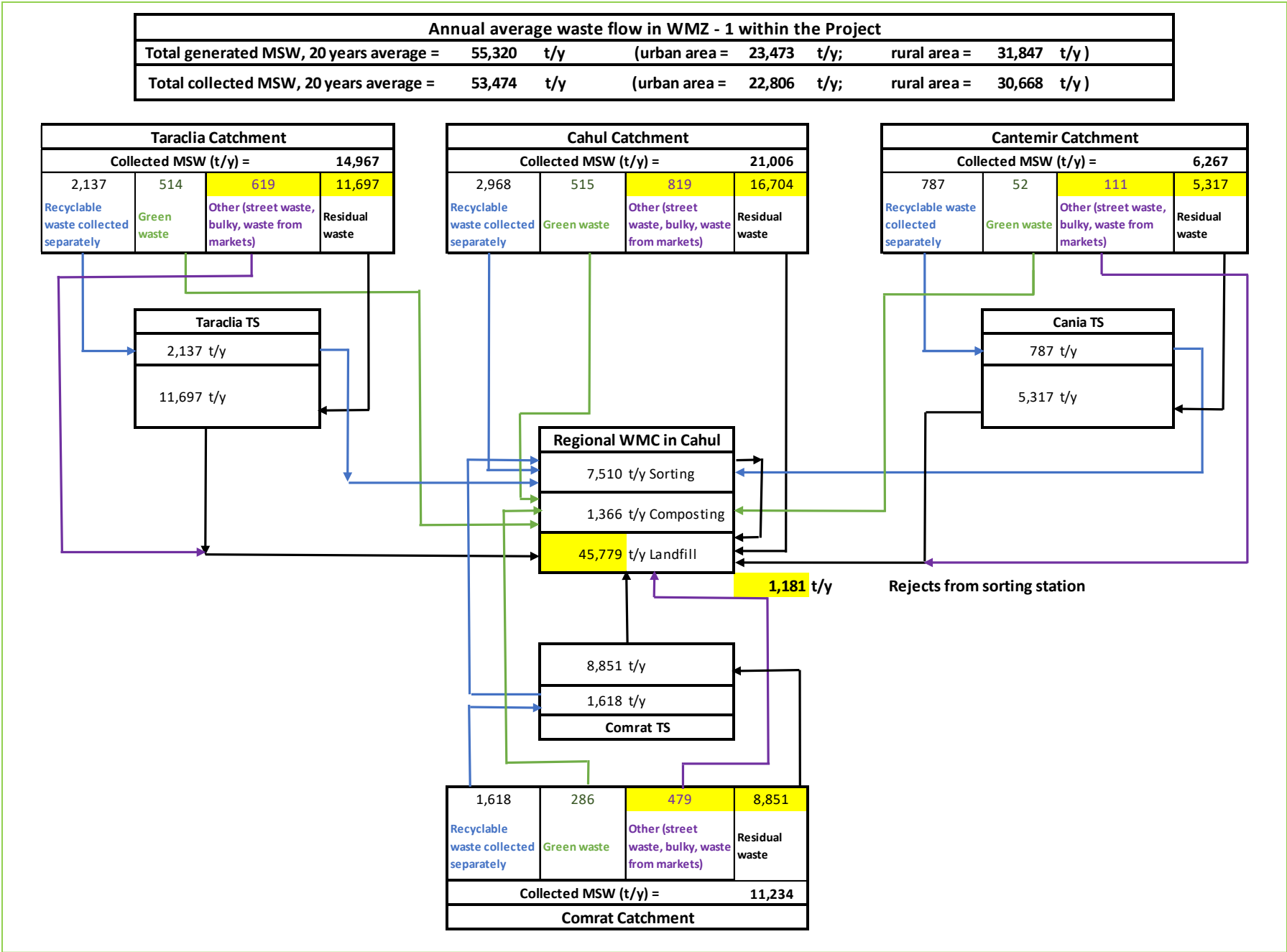
Baseline (without the Project)				
Recyclables to remote facilities outside WMZ-1	0.00%	0.000509	100	transport, freight, lorry 3.5-7.5 metric ton, EURO4
Waste transported to dumpsites (share of all generated waste)	60%	0.000509	10	transport, freight, lorry 3.5-7.5 metric ton, EURO4
With the Project				
Collected waste transported to regional Waste Management Centre via TS	57%	0.000087	50	transport, freight, lorry >32 metric ton, EURO6
Collected waste transported directly to WMC	43%	0.000163	20	transport, freight, lorry 16-32 metric ton, EURO6

EMISSION FACTORS FOR COLLECTION OF WASTE

Collection of waste	Average share of all generated waste	EF value, tCO ₂ eq/tkm	Average distance during collection, km	Vehicle type (assumed)	Activity as per Ecoinvent 3.8	Note
Baseline (without the Project)						
Collecting a share of all generated waste	60%	0.00392	10	EURO4 lorry, capacity 4.1 t, load factor 50% (average load 2.05 t)	not available	EF for collection is calculated as 7.7 times higher than for transport - based on the ratio for 21 t (EURO5) truck available in Ecoinvent 3.8
With the Project						
Collecting practically all generated waste	96.6%	0.00128	20	EURO5 16-32 t lorry, capacity 8.2 t, load factor 50% (average load 4.1 t) like 21 metric ton lorry	municipal waste collection service by 21 metric ton lorry (for settlement structure in Swiss and German municipalities)	EURO5 16-32 t lorry, capacity 8.2 t, load factor 50% (average load 4.1 t) like 21 metric ton lorry

OVERVIEW OF CALCULATIONS

Year of new SWM system operation:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	ANNUAL AVERAGE (2027-2046):	Scope1
Financial year ending		2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046		
Population	persons	278,807	275,431	272,117	268,869	265,690	262,567	259,506	256,501	253,555	250,668	247,846	245,075	242,360	239,697	237,088	234,532	232,022	229,565	227,152	224,790	250,192	
Waste generated	t/year	60,038	59,486	58,943	58,411	57,888	57,374	56,870	56,374	55,887	55,409	54,941	54,481	54,030	53,587	53,153	52,727	52,308	51,898	51,494	51,100	55,320	
Waste collected	t/year	58,762	58,163	57,572	56,988	56,413	55,845	55,283	54,728	54,180	53,638	53,104	52,575	52,052	51,534	51,022	50,515	50,012	49,514	49,020	48,557	53,474	
Waste collection coverage	%	98%	98%	98%	98%	97%	97%	97%	97%	97%	97%	97%	97%	96%	96%	96%	96%	96%	95%	95%	95%	96.6%	
Waste collected separately - recyclables	t/year	6,379	7,027	7,168	7,312	7,459	7,611	7,614	7,619	7,624	7,630	7,636	7,643	7,651	7,659	7,668	7,678	7,688	7,698	7,710	7,722	7,735	
Waste collected separately - green waste	t/year	1,535	1,515	1,496	1,478	1,459	1,441	1,423	1,405	1,388	1,371	1,354	1,337	1,320	1,304	1,288	1,272	1,257	1,242	1,226	1,211	1,366	
Total recovered (% of collected waste)	%	10%	11%	12%	12%	12%	13%	13%	13%	13%	13%	13%	13%	14%	14%	14%	14%	14%	14%	14%	15%	13%	
Recyclables recovered (to be sold)	t/year	5,414	5,922	6,041	6,162	6,286	6,413	6,416	6,420	6,424	6,428	6,433	6,439	6,445	6,451	6,459	6,466	6,474	6,483	6,492	6,502	6,329	
Waste to EU compliant sanitary landfill	t/year	51,813	50,725	50,035	49,349	48,668	47,991	47,444	46,903	46,369	45,839	45,317	44,799	44,287	43,779	43,275	42,776	42,281	41,790	41,301	40,844	45,779	
Baseline (without the Project)																							
Recyclables/PET recovered per year	t/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Subtotal, emissions from management of recyclables	tCO2e/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Amount of collected and transported waste (60% of waste generated)	t/year	36,023	35,692	35,366	35,046	34,733	34,425	34,122	33,824	33,532	33,245	32,964	32,689	32,418	32,152	31,892	31,636	31,385	31,139	30,897	30,660	33,192	
Emissions from collection (60% of all generated waste), EURO4 trucks, average load 2.05 t	tCO2e/year	1,412	1,399	1,386	1,374	1,362	1,349	1,338	1,326	1,314	1,303	1,292	1,281	1,271	1,260	1,250	1,240	1,230	1,221	1,211	1,202	1,301	
Emissions from transport (60% of generated waste) in EURO4 trucks to dumpsites, driving back and from/to garage	tCO2e/year	367	363	360	357	354	350	347	344	341	338	336	333	330	327	325	322	319	317	315	312	338	
Subtotal, emissions from collection and transport of MSW to dumpsites	tCO2e/year	1,779	1,762	1,746	1,731	1,715	1,700	1,685	1,670	1,656	1,642	1,628	1,614	1,601	1,588	1,575	1,562	1,550	1,538	1,526	1,514	1,639	1,639
Cumulative amount of waste at dumpsites	t	60,038	119,524	178,467	236,877	294,766	352,140	409,010	465,383	521,270	576,678	631,619	686,100	740,130	793,717	846,870	899,596	951,905	1,003,802	1,055,297	1,106,397	596,479	
Subtotal, emissions from waste accumulating at dumpsites	tCO2e/year	49,531	98,607	147,235	195,424	243,182	290,516	337,433	383,941	430,048	475,760	521,086	566,032	610,607	654,817	698,667	742,167	785,321	828,137	870,620	912,777	492,095	
Waste managed by open burning	t/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Subtotal, emissions from management of residual waste at dumpsites and open burnings	tCO2e/year	49,531	98,607	147,235	195,424	243,182	290,516	337,433	383,941	430,048	475,760	521,086	566,032	610,607	654,817	698,667	742,167	785,321	828,137	870,620	912,777	492,095	492,095
TOTAL, Baseline	tCO2e/year	51,310	100,369	148,982	197,154	244,897	292,215	339,118	385,611	431,703	477,401	522,714	567,647	612,208	656,404	700,242	743,729	786,871	829,675	872,146	914,291	493,734	493,734
With the Project																							
Emissions avoided from recyclables (plastic mixture) at landfill	tCO2e/year	- 541	- 592	- 603	- 616	- 628	- 641	- 641	- 641	- 642	- 642	- 643	- 643	- 644	- 644	- 645	- 646	- 647	- 648	- 649	- 650	- 632	
Emissions from management of green waste (at Composting Station)	tCO2e/year	92	91	90	89	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	73	82	
Subtotal, emissions from management of recyclables	tCO2e/year	- 449	- 501	- 514	- 527	- 541	- 554	- 556	- 557	- 559	- 560	- 562	- 563	- 565	- 566	- 568	- 570	- 572	- 573	- 575	- 577	- 550	
Total (cumulative) waste amount received at EU compliant sanitary landfill	t	51,813	102,538	152,573	201,922	250,590	298,581	346,025	392,929	439,297	485,137	530,454	575,253	619,539	663,318	706,593	749,369	791,650	833,440	874,741	915,585	499,067	
Subtotal, emissions from management of waste at EU compliant landfill	tCO2e/year	33,160	65,624	97,647	129,230	160,378	191,092	221,456	251,474	281,150	310,487	339,490	368,162	396,505	424,523	452,220	479,596	506,656	533,402	559,834	585,974	319,403	319,403
Emissions from collection of waste, EURO6 trucks, average load 4.1 t	tCO2e/year	1,504	1,489	1,474	1,459	1,444	1,430	1,415	1,401	1,387	1,373	1,359	1,346	1,333	1,319	1,306	1,293	1,280	1,268	1,255	1,243	1,369	
Emissions from transfer trucks	tCO2e/year	165	288	285	282	279	277	274	271	268	266	263	260	258	255	253	250	248	245	243	241	259	
Emissions from direct transport trucks	tCO2e/year	291	288	285	282	279	277	274	271	268	266	263	260	258	255	253	250	248	245	243	241	265	
Subtotal, emissions from collection and transport of waste	tCO2e/year	1,960	2,065	2,044	2,023	2,003	1,983	1,963	1,943	1,924	1,905	1,886	1,867	1,848	1,830	1,812	1,794	1,776	1,758	1,741	1,724	1,892	1,892
TOTAL, with Project	tCO2e/year	34,671	67,189	99,177	130,726	161,840	192,520	222,863	252,860	282,515	311,832	340,814	369,465	397,789	425,787	453,463	480,820	507,861	534,586	561,000	587,121	320,745	321,295
Average annual emission reduction	tCO2e/year																					172,989	172,439



Notes:

1. Rejects from sorting station - 1,181 t are sent to Landfill.
2. About 3.34% (1,846 t/y) of the generated MSW are treated in the households as a result of home composting activity.
3. About 43% (23,067 t/y) of collected waste are transported to WMC directly, about 57% (30,407 t/y) are transported via TSs.

Waste Collection Catchments:

- 1. Cantemir Catchment** - includes the municipalities within Cantemir Rayon (excluding Visiniovca, Sadic, Samalia, and Cietu municipalities).
- 2. Cahul Catchment** - includes the municipalities within Cahul Rayon (excluding Chioselia Mare and Borceag municipalities), all municipalities within Vulcanesti District of ATUG, and Budai Municipality within Taraclia Rayon.
- 3. Taraclia Catchment** - includes the municipalities of Taraclia Rayon (excluding Budai Municipality), municipalities within Ceadir-Lunga District of ATUG (excluding Tomai Municipality), Chioselia Mare and Borceag municipalities within Cahul Rayon, and Chioselia Rusa and Svetlii municipalities within Comrat District of ATUG.
- 4. Comrat Catchment** - includes the municipalities within Comrat District of ATUG (excluding Chioselia Rusa and Svetlii municipalities), Visiniovca, Sadic, Samalia, and Cietu municipalities within Cantemir Rayon, and Tomai Municipality within Ceadir-Lunga District of ATUG.

Appendix 5

Overview of regional SWM infrastructure in WMZ-1

Regional Sanitary Landfill, Cahul Town, Cahul Rayon

The land site designated for the regional sanitary landfill and other infrastructure for waste treatment (Sorting station for source-separated collected recyclables and Composting station for green waste) has an area of 23 ha and being located East of Cahul Town Municipality, Cahul Rayon. The site is located near the dumpsite used currently by Cahul Municipality. The road distance for the delivery of waste to the landfill is about 10 km from the centre of Cahul Town.

The site consists of a series of land plots, majority of which belong to Cahul Municipality. The plot which includes the current dumpsite has an area of 9.1 ha. Just north of this plot of land is the area (8.8 ha land covered by grass) designated for the construction of the regional landfill cells. Almost all the land designated for the construction of the regional landfill belongs to Cahul Municipality except for 2 small plots (0.22 ha and 0.28 ha) which are private; the owners of these 2 plots of land refused to exchange them for other parcels of land proposed by Cahul Municipality. Cahul Municipality must initiate the official process of expropriation for these 2 plots of land.

The site is suitable for the construction of the planned regional sanitary landfill. The size of the landfill area is sufficient for the generated waste in WMZ-1, including Comrat District of ATUG. Potential area (of 8 ha) for new landfill cells is available near the site.

The planned sanitary landfill includes 3 cells with a total of 6.3 ha. Since the land is situated in a valley flanked by two hills, it allows for storage of large quantities of waste; the waste body of the landfill is 20 m in height on average. The landfill site is connected to the main road by a gravel road of 1.5 km which needs improvement to facilitate the traffic of the waste collection trucks and long-distance trucks delivering the MSW. There are no utilities on the site. Electric network is available at about 2 km from the site. No water supply or sewage network are available near the site.

The design criteria and the conceptual design of the regional sanitary landfill are described in the FS document (GIZ, 2015), pp. 138-166. Annexes of the FS includes the site map and conceptual drawings for the landfill and related infrastructure. The annexes referring to the conceptual drawings for the landfill are the followings: Cahul landfill –General layout; Cahul landfill –Excavation plan; Cahul landfill –Basis; Cahul landfill –Final situation; Cahul landfill –Degassing plan; Cahul Landfill – Reception; Cahul Landfill – Weighing office; Cahul Landfill – Office / Social room; Cahul Landfill – Office Views; Cahul Landfill – Garage; Cahul Landfill – Garage Views. The conceptual drawings shall be used for the development of the detailed designs for the construction of the regional sanitary landfill.

The capacity of the regional sanitary landfill (including 5% capacity for intermediate covers) according to the FS (GIZ, 2017) is 1,084,000 m³ (cell 1 - 289,000 m³; cell 2 - 362,500 m³; cell 3 - 432,500 m³) with a total lined landfill area of 62.8 ha. The landfill cells occupy 62,800 m² (cell 1 - 19,800 m²; cell 2 - 17,000 m²; cell 3 - 26,000 m²). The capacity of the regional sanitary landfill allows for waste disposal for more than 21 years. Extra space is available near the site to increase the life of the landfill beyond 25-30 years.

The conceptual design of the landfill cells described by the FS (GIZ, 2015) follows the requirements of EU directive (Council Directive 1999/31/EC of 26 April 1999 on landfill of waste). The base sealing system of the landfill cells include the following liners: natural geological barrier (1.0 m, compacted clay layer); HDPE geomembrane (2.0 mm); geotextile layer (1200 g/m²); drainage layer (50 cm filter layer of crushed stones or gravel of size group 0/32 mm or 2/32 mm with a co-efficient of permeability $k > 10^{-3}$ m/s; the lime content is limited to 10%) with leachate collection pipes. The landfill cells include a leachate collection system, leachate treatment system, landfill gas collection and treatment system.

The other landfill infrastructure includes the following: storm water collection and discharge system, fire protection system, public supplies (electricity, water, wastewater), access roads to infrastructure

elements, administration and social building, workshop/garage, gate and fence, wheel washing and cleaning, weighbridge.

The equipment at the landfill includes: a landfill compactor (approx. 30 tons), a wheel loader, a bulldozer (20 tonnes, 200 hp), dump truck, water tanker, and a pick-up truck for supervisor. Other auxiliary tools at the landfill include the following: movable traffic signs, emergency power generator, remote radio, a set of tools for machine repair, high pressure cleaner.

According to the gap analysis document, the construction of the regional sanitary landfill is planned for the period of 2025-2026. The Contractor for the design & build of the landfill infrastructure shall be selected in the spring-summer of 2024. From summer 2024 until beginning of spring 2025 the Contractor shall finish the detailed designs (for all infrastructure, including all 3 cells of the regional sanitary landfill) and receive all necessary approvals for the start of building activities. The construction activities (for cell 1 of the regional landfill and all other infrastructure on the site) shall start in the beginning of spring 2025 and finished by the end of 2026. The operation of the regional sanitary landfill and related facilities shall start in the beginning of 2027.

The preparation for the construction of cell 2 of the regional landfill shall start in 2032 and finished by 2033. The preparation for the construction of cell 3 of the regional landfill shall start in 2039 and finished by 2040. The timing for the construction of next two cells of the regional sanitary landfill shall be adjusted as needed depending on the filling level of the landfill cell in operation.

The regional landfill shall receive about 46,000 tons (20-year average) of residual waste per year. Assuming a compacted waste density of 1 t/m³, all 3 landfill cells will have sufficient capacity for disposal of waste generated in WMZ-1 for more than 21-23 years. The landfill operational aspects are described in the FS (GIZ, 2015) pp. 161-166.

The landfill gas management system is described in section 9.4.8 pp. 152-155 of the FS (GIZ, 2015). According to the FS (GIZ, 2015), the carbon content in waste is estimated at 150 kg per 1 m³ of waste. The landfill gas generation will increase gradually. The highest generation of methane would be reached about 20 years after the landfill operation start. The maximum annual emission rate will be about 118.5 m³/h. Gas quantities are calculated in detail for a waste disposal time of 21 years. Calculations for gas quantities in the FS (GIZ, 2015) consider a time frame of 88 years. During this period a total landfill gas quantity of 24.3 Mio m³ is to be generated by the waste, assuming an adequate landfill operation with high compaction.

The FS (2015) assumes that the extracted landfill gas will be directed to a gas flare for combustion. Cost of landfill gas collection and flaring system (i.e., vertical gas collection wells, gas transmission pipes, blower, dehumidification unit, and high temperature gas flare) is included in CAPEX (part of PIP for the landfill construction investments). The degassing system will be constructed in a way that a gas engine for production of electricity can be included at a later stage, after getting reliable information about gas quality and flow in a long-term prospect. Landfill gas generation usually starts 6-12 months after the start of landfill, depending on the type and amount of waste. A network of gas collection wells could be established by gradually building up the vertical perforated metal or plastic (HDPE) pipes while placing of waste into a cell. To protect each gas collection well from being clogged by waste, a column of gravel will be filled up around the perforated pipe. The gas wells will be connected gradually to the gas flaring system during the operation of the LF as the waste is disposed of. The capping (closure) of Cell 1 is part of the LTIP and will include any extra activities needed to make sure that all gas collection wells are connected to the gas flaring system. With the construction and operation of Cell 2 and Cell 3 of the landfill (as part of the LTIP) the gas collection wells installed in them will be also connected to the gas flaring system. Any future needed improvements (including replacements) for the entire gas flaring system will be made gradually as part of the LTIP.

The closure of landfill cells shall be done according to EU directive (Council Directive 1999/31/EC of 26 April 1999 on landfill of waste), which includes a surface sealing system with the following components: gas drainage layer, impermeable mineral layer, drainage layer/mat, topsoil cover. The Contractor for the design & build of the landfill infrastructure shall produce the detailed designs for the closure of the landfill site.

The aspects related to closure and rehabilitation of the existing Cahul dumpsite located at the regional landfill site are described in the FS (GIZ, 2015) pp. 166-169. It is important to mention that the area

of Cahul dumpsite increased from 2 ha (in 2015) to 3 ha (in 2022). In the gap analysis document, the costs for the closure and rehabilitation works were adjusted to cover this increase in size of the dumpsite area.

Sorting station for recyclables, Regional Sanitary Landfill site, Cahul Town, Cahul Rayon

The conceptual design of the sorting station (for source-separated collected recyclables: plastic, paper/cardboard, and metal packaging materials) is described in the FS document (GIZ, 2015), pp. 135-137. Annexes (i.e., Cahul landfill – General layout, Cahul Sorting – Layout, Cahul Landfill – Reception) of the FS presents the layout and conceptual drawings for the sorting station, which shall be used for the development of the detailed designs for the construction of the Sorting station at the regional sanitary landfill site in Cahul.

The planned capacity of the sorting station is 6,000 tons/year of source-separated collected recyclables (plastic, paper/cardboard, and metal packaging materials), which is sufficient for the forecasted quantities of recyclables to be collected in WMZ-1. The capacity can be increased when needed by adjusting the working hours at the sorting station. The further increase of the capacity of the sorting station can be achieved by working in two shifts.

The layout of the sorting station shall include the following components: delivery area; flat bunker; inclined intake conveyer belt; feed hopper and drum screen (with 150 mm sieve size); magnetic separator for ferrous materials; discharge for small particles; sorting flat belt and working places; chutes and containers for segregated recyclable materials; container for residuals left on the belt; large scale capacity horizontal baler; electrical connection and central distribution board; roofed area for baled and sorted recyclable materials. The sorting station design should allow for flexibility in the system, so that it can be reorganized to increase the capacity when needed.

The Contractor (for the design & build of the sorting station) shall produce the related detailed designs and execute the works for the construction of the sorting at the required capacity.

The sorting station shall receive the recyclables (plastic, paper/cardboard, and metal packaging materials) from all WMZ-1. The quantity of recyclables going through the sorting station is expected to be between 5,100 and 6,200 tons/year. The glass will not go through the sorting station but collected and transported directly to recycling operators.

The recovered recycling materials to be sold (plastic, paper/cardboard, and metal packaging materials) will amount to between 4,100 and 5,000 tons per year. The quantities of mixed glass (as collected directly from 1.1 m³ containers) are expected to range between 1,300 and 1,500 tons per year.

Composting station for green waste, Regional Sanitary Landfill site, Cahul Town, Cahul Rayon

The design criteria and the conceptual design of the composting station (for green waste collected separately in urban areas of WMZ-1) at the regional sanitary landfill site are described in the FS document (GIZ, 2015), pp. 132-135. Annexes (i.e., Cahul landfill – General layout, Cahul Landfill – Reception) of the FS presents the layout and conceptual drawings for the composting station, which shall be used for the development of the detailed designs for the construction of the Composting station at the regional sanitary landfill site in Cahul.

The planned capacity of the composting station is 1,700 tons/year according to FS (GIZ, 2015), which is sufficient to receive and process all green waste generated in urban areas of WMZ 1. The composting station is a small and simple plant for open and passively aerated windrow composting with static piles and regular windrow turning.

The composting area consists of a concrete pad of about 3,700 m². The total length of the windrows amounts to 735 m, with a total volume of almost 1,700 m³ per batch. The windrows will be aerated by regularly turning (by tractor with sideways mounted windrow turner) of waste (once a week) and moistened.

The composting plant shall feature the following components: 1) waste receiving area; 2) windrow treatment area (concrete pad); 3) leachate/storm-water discharge, 4) sieving, shredding and storage area.

The equipment at the composting station includes the following: a tractor; mobile wood shredder; mobile compost screen; windrow turner for tractor; water tanker trailer. Small scale equipment like thermometer, pH-meter, CO₂-meter, is required to control the composting process and shall be present at the site.

The composting station shall reserve and process about 1,500 tons/year of green waste from urban areas in WMZ-1. About 550-700 tons of compost shall be produced and sold every year.

Transfer Station, Cania, Cantemir Rayon

The transfer station site has an area of 1.78 ha and is located North-East of Cania Village. The land is public and belongs to Cania Municipality (land cadastral nr. 21142070182). Currently (2022), the land is covered by grass, brush and small trees. If the main road is used, the distance from the centres of Cantemir Town and Cania Village to the transfer station site is respectively 5 and 3 km. The distance from Cania transfer station site to Cahul Landfill site is 58 km.

The site is just on the side of road R56 – Cania-Baimaclia-Taraclia de Salcie. Electricity (10 kV) is near the site. Water supply and sewerage networks are not available near the site.

The design criteria and the conceptual design of the transfer station are described in the FS document (GIZ, 2015), pp. 122-132. Annexes (i.e., Cania transfer station – current situation, Cania transfer station – layout plan, Cania transfer station – sections) of the FS presents the layout and conceptual drawings for the transfer station.

The conceptual design of the transfer station described in the FS (GIZ, 2015) and the proposed changes in the Gap analysis report should be used for the development of the detailed designs for the construction of the Transfer Station in Cania. The following changes shall be made to the original layout of the transfer station presented in the FS: 1) excluding the composting area; 2) changing the original transfer station type (i.e., hopper unit with 30 m³ metal containers) to a transfer station with ordinary 4 unloading bays with open 40 m³ containers, with a mobile rolling compactor for compacting the waste in the container; 3) the transfer station bays shall be located at the location originally planned for the composting area, reducing in this way the construction area of the transfer station. Similar conceptual design of the transfer stations to be built in WMZ-5 and WMZ-8 shall be used for the transfer station in Cania.

The new layout of the transfer station in Cania shall include the following: 2 level roofed transfer ramps with 4 slots/bays for 40 m³ roll-on/off metal containers; access area with office building and weighbridge; access roads for waste collection trucks and long-distance transport trucks; protection dam between working area and the road; parking area; temporary storage area for the special waste streams (hazardous household waste, bulky waste, and construction/demolition waste). The transfer station area will be completely asphalted.

The equipment for the transfer site includes the following: a hook-lift truck; 2nd hook-lift trailer; rolling compactor (for compaction the waste in the containers); pick-up truck for supervisor; 8 units of 40 m³ roll-on/off containers.

Even if the needed capacity of Cania transfer station is 7,000 tons per year, the constructed transfer station will have a minimum capacity of 12,000 tons per year. For the calculation of the capacity, it is considered that the hook-lift truck works 250 days per year, making two trips per day and transporting two containers of 40 m³ (or 12 tons) during one trip (250x1x2x2x12=12,000). When necessary, the capacity of the transfer station can be increased by increasing the number of trips made by the hook-lift truck and/or by increasing the number of working days.

The collected MSW (nearly 7,000 tons/year) from all localities within Cantemir Waste Collection Catchment will be delivered to this transfer station by the compaction trucks. From the transfer station the waste will be transported by the long-distance truck to the treatment and disposal facilities at regional sanitary landfill site in Cahul Town, Cahul Rayon.

Transfer Station, Taraclia Town, Taraclia Rayon

The transfer station site has an area of 1.74 ha and is located North-West of Taraclia Town. The land is public and belongs to Taraclia Town Municipality (land cadastral nr. 8701104.862). Currently (2022), the land is covered by grass and includes ruins of former livestock farm. If the main road is

used, the distance from the centre of Taraclia Town to the transfer station site is 6.5 km. The distance from Taraclia transfer station site to Cahul Landfill site is 40 km.

The site can be accessed from the main road R38 (Chisinau-Taraclia) by two gravel roads, each of about 0.7 km. The access road (0.7 km) to the site needs improved. Electricity is available at about 500 m from the site. Water supply and sewerage networks are not available near the site.

The design criteria and the conceptual design of the transfer station are described in the FS document (GIZ, 2015), pp. 122-132. Annexes (i.e., Taraclia transfer station – current situation, Taraclia transfer station – layout plan, Taraclia transfer station – sections) of the FS presents the layout and conceptual drawings for the transfer station.

The conceptual design of the transfer station described in the FS (GIZ, 2015) and the proposed changes in the Gap analysis report should be used for the development of the detailed designs for the construction of the Transfer Station in Taraclia. The following changes shall be made to the original layout of the transfer station presented in the FS: 1) excluding the composting area; 2) excluding the sorting station for recyclables; 3) changing the original transfer station type (i.e., hopper with compaction units with closed 30 m³ metal containers) to a transfer station with ordinary 4 unloading bays with open 40 m³ containers, with a mobile rolling compactor for compacting the waste in the container. Similar conceptual design of the transfer stations to be built in WMZ-5 and WMZ-8 shall be used for the transfer station in Taraclia.

The new layout of the transfer station in Taraclia shall include the following: 2 level roofed transfer ramps with 5 slots/bays for 40 m³ roll-on/off metal containers; access area with office building and weighbridge; access roads for waste collection trucks and long-distance transport trucks; protection dam between working area and the road; parking area; temporary storage area for the special waste streams (hazardous household waste, bulky waste, and construction/demolition waste). The transfer station area shall be completely asphalted.

The equipment for the transfer station includes the following: 2 hook-lift trucks; 2 units of 2nd hook-lift trailer; rolling compactor (for compaction the waste in the containers); pick-up truck for supervisor; 12 units of 40 m³ roll-on/off containers. It is important to notice that one hook-lift truck with a 2nd hook-lift trailer (equipped with 40 m³ roll-on/off containers) shall be parked at Cahul Sanitary Landfill site and used as a reserve truck (for all WMZ-1) and for transporting the park/green waste from Cahul Town to composting station in Cahul when necessary.

Even if the needed capacity of Taraclia transfer station is 15,000 tons per year, the constructed transfer station will have a minimum capacity of 18,000 tons per year. For the calculation of the capacity, it is considered that the hook-lift truck (station at the transfer station) works 250 days per year, making three trips per day and transporting two containers of 40 m³ (or 12 tons) during one trip (250x1x3x2x12=18,000). When necessary, the capacity of the transfer station can be increased by increasing the number of trips made by the hook-lift truck and/or by increasing the number of working days. Also, the second hook-lift truck station at Cahul Sanitary Landfill site could be used to increase the number of loads transported when necessary.

The collected MSW (about 15,000 tons/year) from the localities within Taraclia Waste Collection Catchment will be delivered to this transfer station by the compaction trucks. From the transfer station the waste will be transported by the long-distance truck to the treatment and disposal facilities at regional sanitary landfill site in Cahul Town, Cahul Rayon.

Transfer Station, Comrat Town, Comrat District of ATUG

The transfer station site, proposed by Comrat Town Municipality, is located near the Comrat Dumpsite and has an area of 0.37 ha. The area is sufficient for the construction of the transfer station. Anyway, the entrance area of Comrat Dumpsite could be used to increase the area of the transfer site if necessary. The transfer site is located East of Comrat Town. The land is public and belongs to Comrat Town Municipality.

Currently (2022), the land of transfer site is covered by grass. If the main road is used, the distance from the centre of Comrat Town to the transfer station site is 7.5 km. The distance from Comrat transfer station site to Cahul Landfill site is 80 km.

The site is near the main national road R35 (Comrat-Basarabeasca) just on the access road to Comrat Dumpsite. Electricity is available at about 300 m from the site. Water supply and sewerage networks are not available near the site.

Since Comrat District of ATUG was not included in WMZ-1 when the FS (GIZ, 2015) was elaborated, no site for a transfer station in Comrat was proposed. However, the design criteria for the other two transfer stations can be applied to elaborate the detailed designs for the needed transfer station in Comrat Town, at the proposed site. Similar conceptual design of the transfer stations to be built in WMZ-5 and WMZ-8 shall be used for the transfer station in Comrat.

The layout of the transfer station in Comrat shall include the following: 2 level roofed transfer ramps with 5 slots/bays for 40 m³ roll-on/off metal containers; access area with office building and weighbridge; access roads for waste collection trucks and long-distance transport trucks; protection dam between working area and the road; parking area; temporary storage area for the special waste streams (hazardous household waste, bulky waste, and construction/demolition waste). The transfer station area shall be completely asphalted.

The equipment for the transfer station includes the following: 2 hook-lift trucks; 2 units of 2nd hook-lift trailer; rolling compactor (for compaction the waste in the containers); pick-up truck for supervisor; 12 units of 40 m³ roll-on/off containers.

Even if the needed capacity of Comrat transfer station is 9,000 tons per year, the constructed transfer station will have a minimum capacity of 12,000 tons per year. For the calculation of the capacity, it is considered that the two hook-lift trucks work 250 days per year, making one trip per day each and transporting two containers of 40 m³ (or 12 tons) during one trip ($250 \times 1 \times 2 \times 12 = 12,000$). When necessary, the capacity of the transfer station can be increased by increasing the number of trips made by the hook-lift truck and/or by increasing the number of working days. Also, the second hook-lift truck station at Cahul Sanitary Landfill site could be used to increase the number of loads transported when necessary.

The collected MSW (about 9,000 tons/year) from the localities within Comrat Waste Collection Catchment will be delivered to this transfer station by the compaction trucks. From the transfer station the waste will be transported by the long-distance trucks to the treatment and disposal facilities at regional sanitary landfill site in Cahul Town, Cahul Rayon.

Appendix 6

Comparison of the original and updated SWM systems

Table 1 Comparison of the main components of the original and updated SWM systems (1st year of operation)

System components:	SWM system as per FS (GIZ, 2015)	Updated SWM system
Population to be serviced (max.)	295,500	278,800
MSW, generated per year (average, t/y)	68,000	60,000
Collected waste (t/y):	67,900	58,800
-Residual waste (t/y)	59,000	51,900
-Recyclables, incl. rejects (t/y)	5,600	6,400
-Green waste (t/y)	1,900	1,500
Recyclables, recovered (t/y)	4,245	5,400
Collections system urban areas	<u>Apartment buildings/ institutions & companies:</u> -Bring system (1.1m ³ containers for: 1. residuals, 2. Paper/cardboard, 3. plastic & metal, 4. glass) Collection frequency (times/year): residuals - 104; plastic - 52; paper/cardboard - 52; glass - 26.	<u>Apartment buildings/ institutions & companies:</u> -Bring system (1.1m ³ containers for: 1. wet waste/residuals, 2. dry waste - paper/cardboard, plastic, metal, 3. glass) Collection frequency (times/year): residuals - 104; plastic - 52; paper/cardboard - 52; glass - 16.
	<u>Individual houses:</u> -Door-to-Door collection (120 l bin for residuals) -Bring system (1.1m ³ containers for: 1. paper/cardboard, 2. plastic & metal, 3. glass) Collection frequency (times/year): residuals - 52; plastic - 52; paper/cardboard - 52; glass - 26.	<u>Individual houses:</u> -Door-to-Door collection (120 l bins for: 1. wet waste/ residuals, 2. dry waste - paper/cardboard, plastic, metal) -Bring system (1.1m ³ containers for glass) Collection frequency (times/year): wet bin - 52; dry bin - 26; glass container - 16.
	<u>100% of households/ institutions & companies:</u> -Bring system (1.1m ³ containers for: 1. residuals)	<u>75% of households/ 100% institutions & companies:</u> -Bring system (1.1m ³ containers for: 1. wet waste/residuals, 2. dry waste - paper/cardboard, plastic, metal, 3. glass)

	Collection frequency (times/year): residuals - 52).	Collection frequency (times/year): wet bin - 52; dry bin - 52; glass container - 16.
		<u>25% of households:</u> -Door-to-Door collection (120 l bins for: 1. wet waste/ residuals, 2. dry waste - paper/cardboard, plastic, metal) -Bring system (1.1m ³ containers for glass) Collection frequency (times/year): wet bin - 52; dry bin - 26; glass container - 16.
No of equipment	-Containers (1.1m ³) for residual waste: 6,139 (for urban & rural areas) -Containers (1.1m ³) for recyclables: 1,512 (for urban areas only) Net cages for recyclables (1,100 l): 1,071 (for urban areas only) Bell container for glass (1,100 l): 125 (for urban areas only) -Bins (120 l) for residual waste: 12,057 (urban areas only) -Compaction trucks for residual waste (16 m ³ /6 m ³ capacity): 23/16 -Compaction trucks for recyclables (16 m ³ capacity): 5	-Containers (1.1m ³) for wet waste/residual waste: 4,350 -Containers (1.1m ³ , metal see-through) for dry waste - paper/cardboard, plastic, metal: 4,350 -Containers (1.1m ³ , metal) for glass: 680 -Bins (120 l) for wet waste/residuals: 35,400 (14,900 - urban; 20,500 - rural) -Bins (120 l) for dry waste - paper/cardboard, plastic, metal: 35,400 (14,900 - urban; 20,500 - rural) -Compaction trucks (16 m ³ /10 m ³ /6 m ³ capacity): 9/13/16 (the same trucks are used for collection of residuals and recyclables)
Transfer Station (TS)	TS 1, Cania, Cantemir: capacity 11,000 t/y TS 2, Taraclia: capacity 22,000 t/y	TS 1, Cania, Cantemir: capacity 8,000 t/y TS 2, Taraclia: capacity 15,000 t/y TS 2, Comrat: capacity 12,000 t/y
Sorting Station (SS), recyclables	SS 1, Cahul: capacity 4,000 t/y SS 2, Taraclia: capacity 2,000 t/y	SS 1, Cahul: capacity 6,000 t/y
Composting Station (CS), green waste	CS 1, Cahul: capacity 1,700 t/y CS 2, Cania: capacity 225 t/y CS 3, Taraclia: capacity 1,400 t/y	CS 1, Cahul: capacity 1,600 t/y
Regional Landfill (LF)	LF, Cahul: capacity 1.2 Mio t/>21 years	LF, Cahul: capacity 1.2 Mio t/>21 years

Table 2 Comparison of CAPEX for the original and updated SWM systems

Items:	SWM system as per FS (GIZ, 2015) (1,000 EUR no VAT)	Updated SWM system (1,000 EUR no VAT)
1. Construction Works and Buildings	7,555	7,700
2. Plants Equipment	1,329	2,782
3. Waste Collection Equipment	5,861	10,499
4. Closure of all dumpsites	0	2,808
5. Contingency (FS - 10% of items 1-2; adjusted system - 12% of items 1, 2, 4)	1,475	1,595
Total (priority investments):	16,220	25,384
Additional CAPEX not part of priority investments:		
7. Technical assistance contract to support implementation and Supervision	749	900
8. Technical assistance in corporate development, setting of user charges, implementation of ESAP, SEP, public awareness	675	200
Grand Total:	17,644	26,484

Table 3 Comparison of OPEX for the original and updated SWM systems

Items:	SWM system as FS (GIZ, 2015) (1,000 EUR no VAT)	Updated SWM system (1,000 EUR no VAT)
1. Residual waste collection from households*	1,346	1,338
2. Residual waste collection from legal entities	-	202
3. Green waste collection	-	131
4. Bulky waste collection	-	63
5. Street cleaning waste collection	-	113
6. Recyclables collection	231	183
7. Transfer station Cania, Cantemir	68	67
8. Transfer station Taraclia	89	134
9. Transfer station Comrat	-	123
10. Landfill and facilities at Cahul*	223	973
11. Administrative costs of IDA/RDA (JSC)**	-	55
12. Awareness campaign costs (for home composting)	-	19
Total OPEX (in 1,000 EUR/year)	1,957	3,4001

Notes:

* Includes the costs for the collection of waste from households and legal entities for FS, GIZ 1015.

** Administrative costs represent the costs for the JSC (regional operator) for the adjusted system.

Appendix 7

Access roads – requirement for upgrading / construction

The access roads for some of the regional SWM facilities in WMZ-1 need improvement to allow for proper operation of the facilities. The Feasibility Study (GIZ, 2015) did not include funds for any construction or upgrading of access roads to the planned SWM regional facilities. At the same time, the current funds allocated for the SWM projects by the EBRD and EIB are not envisioned to cover the costs for construction/ upgrading of major access roads.

The lengths of access roads which need to be constructed/ upgrading and the related investments are presented in the Table 1 below. The maps of the roads to be constructed/ upgrading are presented in Figure 1.

A total of 2.2 km roads need construction/ upgrading, 0.7 km is represented by a dirt/unpaved road requiring construction of a new road, while the other 1.5 km is represented by gravel road requiring upgrading works. The total cost for road construction/ upgrading works is estimated at 1.32 million EUR, at a unit cost of 600,000 EUR per km of constructed / upgraded road.

The access road connecting Taraclia Transfer Station site is a dirt/unpaved road with a total length of 0.7 km. This access road belongs to Taraclia Town Municipality. It is essential that this access road is constructed while the planned transfer station is built. Taraclia Transfer Station cannot be operated without this access road.

The access road connecting Regional Sanitary Landfill site with the local road is represented by a 1.5 km gravel road requiring upgrading to allow the collection and transfer vehicles efficiently operate. This access road belongs to Cahul Town Municipality.

The other regional SWM infrastructure (i.e., Cania Transfer Station and Comrat Transfer Station) do not need long segments of access roads as they are located near the national road network.

During project implementation the detailed designs for the construction/ upgrading of these access roads should be prepared and required funds identified.

Table 1 Investments required for construction/upgrading of access roads to regional SWM facilities

#	Investment cost item	Units	Cost per unit/km	Cost, EUR (excl. VAT)
1	Upgrading of access road to Cahul Regional Sanitary Landfill: - 1,500 m access road (gravel road needing reconstruction).	1.5	600,000	900,000
2	Construction of access road to Taraclia Transfer Station: - 700 m access road (dirt/unpaved road needing construction).	0.7	600,000	420,000
	Total:	2.2	600,000	1,320,000

Figure 1. Access roads to regional SWM facilities requiring construction/upgrading

1. Access Road to Cahul Regional Sanitary Landfill



2. Access Road to Taraclia Transfer Station

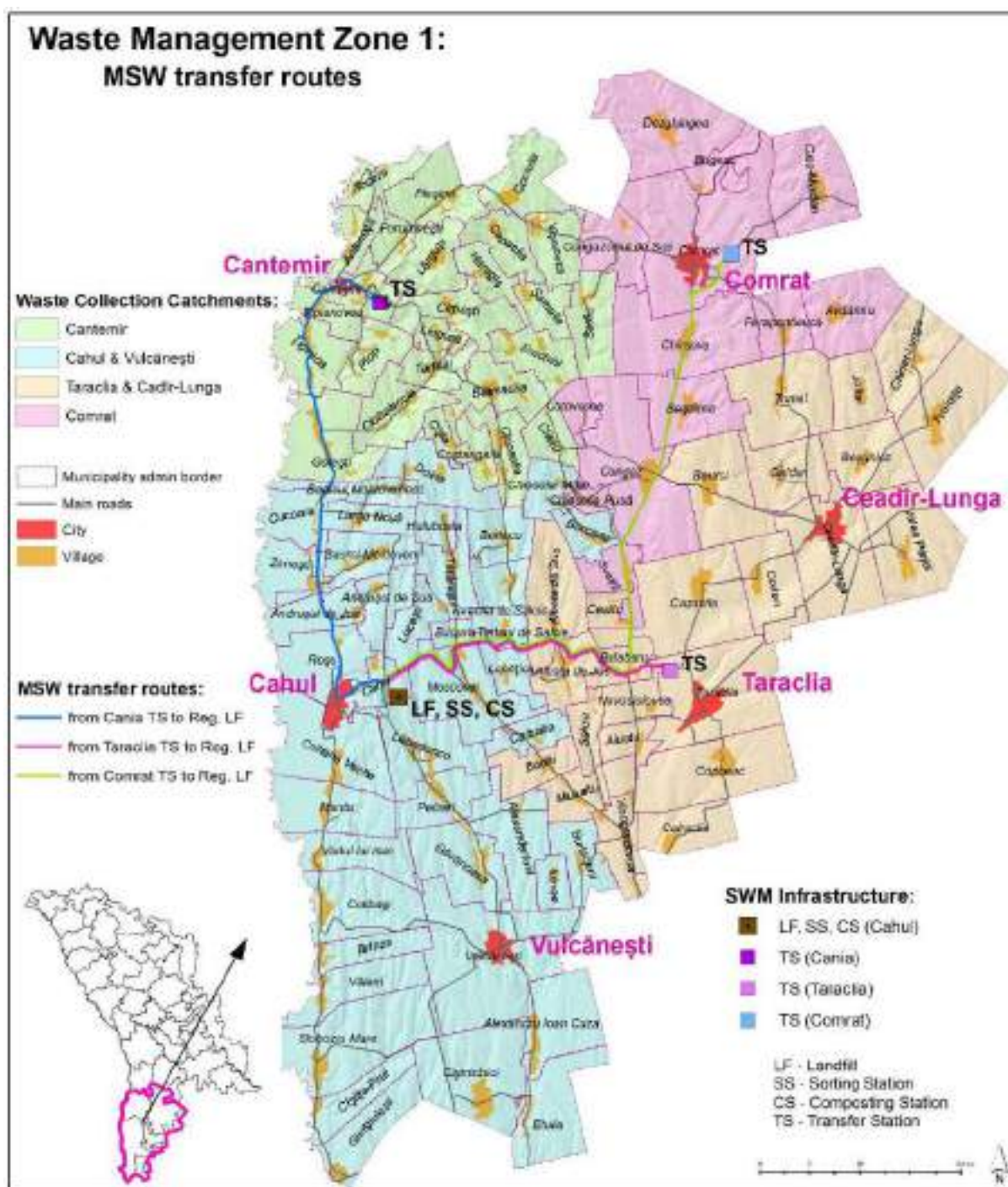


Appendix 8

MSW transfer within WMZ-1

According to the upgraded SWM system for WMZ-1, the regional SWM infrastructure is organised in four waste collection catchment areas as presented in Figure 1 below. The transfer system for MSW includes three Transfer Stations (TSs) located in Cania (Cantemir Rayon), Taraclia Town (Taraclia Rayon), and Comrat Town (ATUG). The regional sanitary landfill (LF), sorting station (SS) for recyclables, and composting station (CS) for green waste are located at the same site near Cahul Town (Figure 1).

Figure 1. MSW transfer routes within the waste collection catchments, WMZ-1



Appendix 5 presents an overview of the regional SWM infrastructure in WMZ-1; each component of the SWM system (i.e., Transfer Stations, Regional Sanitary Landfill, Sorting Station, Composting Station) is described. The waste flow diagram in Appendix 4 describes the MSW flow within catchment areas.

According to the map in Figure 1, the municipalities within WMZ-1 were grouped in four waste collection catchment areas taking into consideration their proximity to Transfer Stations and the Landfill. The MSW collected by compaction trucks within Cahul catchment area is transported directly to Landfill/Sorting Station/Composting Station near Cahul Town. The MSW collected by compaction trucks within the other three catchment areas is transported to Transfer Stations. The long-distance trucks (equipped to transport 2 large containers of 40 m³ per route) are used to transport the MSW from TSs to Landfill/Sorting Station/Composting Station near Cahul Town. A long-distance truck transports 80 m³ of MSW per one transport/route.

The map in Figure 1 above presents the routes for the transfer of MSW from the TSs to Regional Sanitary Landfill site. The recyclables are delivered to the Sorting Station for recovery of recyclables materials, while the residual waste is delivered to the landfill cells for landfilling. The traveling distance from Cania TS, Taraclia TS, and Comrat TS is respectively 60, 41, and 80 km.

The operation indicators for MSW transfer are presented in Table 1. The long-distance truck operating at Cania TS shall transfer maximum 131 tons of MSW per week, making 6 routes and driving a total of 360 km per week. The long-distance truck operating at Taraclia TS shall transfer maximum 312 tons of MSW per week, making 13 routes and driving a total of 533 km per week. The two long-distance trucks operating at Comrat TS shall transfer both maximum 240 tons of MSW per week; each long-distance truck shall make 5 routes and drive 400 km per week. Both long-distance trucks operation at Comrat TS shall make a total of 10 routes and drive 800 km per week.

Table 1. Operation indicator for MSW transfer in WMZ-1

Operation indicators:	Cania TS	Taraclia TS	Comrat TS
Distance from TS to LF/SS/CS, km	60	41	80
Max MSW delivered by the collection vehicles to TSs, tons/week	131	312	240
Nr of loading bays at TS	4	5	5
Nr of 40 m ³ containers at TS (including with long-distance trucks)	8	10	12
Nr roiling mobile compactor (for the compaction of MSW in the 40 m ³ containers) operating at TS	1	1	1
Nr of long-distance trucks (with 2 nd trailer) operating at TS	1	1	2
Nr of pick-up truck for supervisor operating at TS	1	1	1
Max nr of 40 m ³ containers transported per week	12	26	20
Max nr of routes made by a long-distance truck per week	6	13	5
Max distance travelled by a long-distance truck per week, km/week	360	533	400
Total distance travelled by all long-distance trucks at TS per week, km/week	360	533	800

Note: One hook-lift truck with a 2nd hook-lift trailer (equipped with two 40 m³ roll-on/off containers) shall be parked at Cahul Sanitary Landfill site and used as a reserve truck (for all WMZ-1) and for transporting the park/green waste from Cahul Town to composting station in Cahul when necessary.

The green waste is transported to CS by the long-distance trucks using the containers for C&D waste (or the larger metal containers at the TSs when necessary) as they get filled up during cleaning and landscaping activities. The other waste (i.e., street waste, bulky, waste from markets, etc.) are also transported by the long-distance trucks using the containers for C&D waste.