



Project funded by the  
EUROPEAN UNION



# **Feasibility study**

## **Deliverable D.T1.7.1**

**Activity A.T1.7 Evaluate waste recycling/reuse opportunities  
(plastics/organic waste) in the region**

**Cleaner Rivers - Cleaner Seas**  
**BSB-784**

Common borders. Common solutions.

# CONTENT

## A. *WRITTEN PARTS*

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### **1. General information on the investment objective**

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- 1.1 Name of the investment objective
  - 1.2 Principal Authorizing Officer / Investor
  - 1.3 Authorizing officer (secondary / tertiary)
  - 1.4 Beneficiary of the investment
  - 1.5 The developer of the feasibility study
- 

### **2 Existing situation and the need to achieve the investment objective / project**

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- 2.1 Conclusions of the pre-feasibility study
  - 2.2 Presentation of the context
    - a) the need and opportunity to promote the investment
  - 2.3 Analysis of the existing situation and identification of deficiencies
  - 2.4 Analysis of the demand for goods and services,
  - 2.5 Objectives expected to be achieved by making public investment
- 

### **3. Identification, proposal and presentation of at least two scenarios / technical-economic options for achieving the investment objective**

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- 3.1 Particularities of the location:
  - 3.2 Description from a technical, constructive, functional-architectural and technological point of view
  - 3.3 Estimated investment costs:
  - 3.4 Specialized studies, depending on the category and importance class of the constructions, as the case may be
  - 3.5 Indicative charts for making the investment
-

#### **4. Analysis of each proposed technical / economic scenario / option (s)**

4.1	Presentation of the analysis framework, including specification of the reference period and presentation of the reference scenario
4.2	Analysis of vulnerabilities caused by risk factors, anthropogenic and natural, including climate change, which may affect investment
4.3	Utilities situation and consumption analysis
4.4	Sustainability of achieving the investment objective
a)	social and cultural impact, equal opportunities
b)	estimates of the labor force employed by making the investment: in the realization phase, in the operation phase
c)	the impact on environmental factors, including the impact on biodiversity and protected sites, as appropriate
d)	the impact of the investment objective in relation to the natural and anthropic context in which it is integrated, as the case may be
4.5	Analysis of the demand for goods and services, which justifies the sizing of the investment objective
4.6	Financial analysis, including calculation of financial performance indicators: cumulative flow, net present value, internal rate of return; financial sustainability
4.7	Economic analysis, including calculation of economic performance indicators: net present value, internal rate of return and cost-benefit ratio
4.8	Sensitivity analysis
4.9	Risk analysis, risk prevention / mitigation measures

#### **5. Optimal scenario / recommended economic option**

5.1	Comparison of proposed scenarios / options, from a technical, economic, financial, sustainability and risk point of view
5.2	Selection and justification of the optimal recommended scenario / option (s)
5.3	Description of the optimal recommended scenario (s) for:
a)	obtaining and arranging the land
b)	ensuring the utilities necessary for the operation of the objective
c)	the technical solution, including the description, from a technological, constructive, technical, functional-architectural and economic point of view, of the main works for the basic investment, correlated with the qualitative, technical and performance level resulting from the proposed technical-economic indicators

	d)	technological tests and trials
5.4		The main technical-economic indicators related to the investment objective
	a)	maximum indicators, respectively the total value of the investment object, expressed in lei, with VAT and, respectively, without VAT, of which constructions-assembly (C + M), in accordance with the general estimate
	b)	minimum indicators, respectively performance indicators - physical elements / physical capacities to indicate the achievement of the investment objective target - and, as the case may be, qualitative ones, in accordance with the standards, norms and technical regulations in force
	c)	financial, socio-economic, impact, result / operation indicators, established according to the specifics and target of each investment objective
	d)	estimated duration of execution of the investment objective, expressed in months
5.5		Presentation of the way in which compliance with the regulations specific to the intended function is ensured from the point of view of ensuring all the fundamental requirements applicable to the construction, according to the degree of detail of the technical proposals
5.6		Nomination of public investment financing sources, as a result of the financial and economic analysis: own funds, bank loans, allocations from the state budget / local budget, external loans guaranteed or contracted by the state, non-reimbursable external funds, other legally constituted sources

## **6. Urbanism, agreements and compliant opinions**

6.1		The town planning certificate issued in order to obtain the building permit
6.2		Land book extract, except in special cases, expressly provided by law
6.3		Administrative act of the competent authority for environmental protection, measures to reduce the impact, compensation measures, the way of integrating the provisions of the environmental agreement in the technical-economic documentation
6.4		Conformity advice on utility insurance
6.5		Topographic study, endorsed by the Office of Cadastre and Real Estate Advertising
6.6		Specific opinions, agreements and studies, as appropriate, depending on the specifics of the investment objective and which may condition the technical solutions

## **7. Investment implementation**

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- |     |   |
|-----|---|
| 7.1 | Information about the entity responsible for implementing the investment  |
| 7.2 | Implementation strategy, comprising: duration of implementation of the investment objective (in calendar months), duration of execution, investment implementation schedule, staggered investment by years, necessary resources |
| 7.3 | Operation / maintenance and maintenance strategy: steps, methods and resources required   |
| 7.4 | Recommendations on ensuring managerial and institutional capacity   |
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## **8. Conclusions and recommendations**

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# **1. GENERAL INFORMATION ON THE INVESTMENT OBJECTIVE**

## **1.1. Name of the investment objective**

Feasibility study within the project “Cleaner Rivers - Cleaner Seas BSB-784”

## **1.2. Principal authorizing officer / investor**

Oancea commune, Galati county and the Cleaner Rivers - Cleaner Seas BSB-784 program.

## **1.3. Authorizing officer (secondary / tertiary)**

It's not necessary.

## **1.4. Beneficiary of the investment**

Oancea commune, Galati county

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## **1.5. The developer of the feasibility study**

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## **2. EXISTING SITUATION AND NEED TO ACHIEVE THE INVESTMENT OBJECTIVE / PROJECT**

### **2.1. Conclusions of the pre-feasibility study (if it has been prepared in advance) on the current situation, the need and opportunity to promote the investment objective and the scenarios / technical-economic options identified and proposed for analysis**

In accordance with Decision no. 907/2017 on the stages of elaboration and the framework content of the technical-economic documentation related to the objectives / investment projects financed from public funds, the pre-feasibility study is elaborated for investment objectives whose total estimated value exceeds the equivalent of 75 million euros in case of investments for the promotion of sustainable transport systems and the elimination of bottlenecks in the infrastructure of major networks or the equivalent of EUR 50 million in the case of investments promoted in other areas.

For this project, the source of funding is identified by accessing funds through the Cleaner Rivers - Cleaner Seas BSB-784 program.

### **2.2. Presentation of the context: policies, strategies, legislation, relevant agreements, institutional and financial structures**

The existing economic and social imbalances between the levels of development of the different regions of the country, but also between the rural-urban areas of residence, require the adoption of active policies that ensure at the same time economic development, social welfare and environmental protection. In orienting these policies, it is necessary to evaluate realistically the rural space from the point of view of the available resources, but also of the favorable and restrictive factors of the development. Most of the 2861 communes that currently make up the Romanian rural area face an inadequate degree of basic infrastructure development, being apparently eligible for investment projects. However, the existing resources in the sector - natural and human, are not evenly distributed among ATUs.

From an administrative point of view, the Romanian rural area includes 2861

communes that include 12,957 villages.

In recent years, the concerns for achieving a balanced economic and social development in the territorial profile have expanded. This trend was first and foremost due to the important role that local economic development plays in the efficient use of existing resources. The development of basic local infrastructure and services in rural areas are essential elements in any effort to capitalize on the growth potential and promote the sustainability of rural areas. In fact, the creation of infrastructure is the first step in the local development process, in the idea that access to utilities, goods and / or services increases the attractiveness of the area, so it acts as a "magnet" for potential investors.

There is a reciprocal relationship between the infrastructure of an area and its economic development. The development potential of an area is greater the more developed the infrastructure. Also, the economic growth exerts a pressure on the existing infrastructure and determines a more accentuated need for its development. Thus, the construction and maintenance of infrastructure have a multiplier effect that creates many jobs and boosts economic development.

The sustainable development of local communities is a priority because the way the locality develops affects its present and future chances. A sustainable community values and promotes a healthy environment, uses resources efficiently, develops and ensures a viable local economy. The sustainable community has a vision of development supported and promoted by all its members.

### **2.3. Analyzing the existing situation and identifying deficiencies**

The investment project is located in Oancea Commune, Galati County, urban equipped area - electricity, telephony.

Analyzing the needs of the community, it is considered a priority to purchase equipment for recycling plastics and composting organic waste.



	Galati County Average 2018 %	Justification
Bio-waste	65,5	The average share of biowaste is reported in the MUN questionnaires for the Municipality of Galati and the rural area in 2019, a value also confirmed by the results of the measurements made by SP Ecosal for the Municipality of Galati in 2014
Paper and cardboard	11,4	The share of recyclable waste was estimated to be 27.3%, respectively the average of the weights of recyclable waste reported in the MUM questionnaires and the weights resulting from measurements for the Municipality of Galati.
Glass	4,1	
Metals	1,5	
Plastic	10,3	
Textiles	1	
Wood	2.2	There are no data available at county level, therefore the weights presented at national level in PNGD were considered
Bulky	0.9	
Other	4,3	

***Table 1. The composition of household and similar waste in Galați County, year 2019***

According to the data received from the local authorities, in 2019, all 65 localities of Galati County have concluded sanitation contracts. From the data provided by APM Galați, it resulted that in 2019, Drăgănești locality did not report the quantities of waste collected and managed.

Data on sanitation operators that collect and transport household and similar waste from Galați County are presented in the following table.

Nr. crt.	Operator name	Authorized activity	Localities served	ANRSC license
1	LEONMAR S.R.L.	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators	Berești, Barcea, Bălăbănești, Bălășești, Băleni, Berești-Meria, Cavadinești, Corni, Costache Negri, Cudalbi, Jorăști, Pechea, Priponești, Rediu, Scînteiești, Suhurlui, Tudor Vladimirescu, Valea Mărului	Licență nr. 4516/18.01.2019 clasa 3 valabilă până la data de 31.12.2020
2	COSMESIRET S.R.L. Cosmești	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow	Buciumeni, Draguseni, Gohor, Nicorești, Poiana	Licență nr. 3830 /29.08.2016 clasa 3 Valabilă până la data de 29.08.2021

Nr. crt.	Operator name	Authorized activity	Localities served	ANRSC license
		of waste electrical and electronic equipment, batteries and accumulators(pre-collection)		
3	SERVICIUL PUBLIC ECOSAL GALAȚI	Local sanitation	Galați	Licenta nr. 4743/25.09.2019 clasa I.Valabilă până la 26.11.2024
4	COMUNA SCHELA	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators(pre-collection)	Schela	Licență nr. 3780/22.06.2016 clasa 3 Valabilă până la data de 22.06.2021
5	COMUNA DRĂGĂNEȘTI	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators	Drăgănești	Licență nr. 3703/16.05.2016 clasa 3 Valabilă până la 16.05.2021
6	ECOPREST BRAHA 2015 SRL Brăhășești	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators	Brăhășești	Licență nr. 3662/15.12.2017 clasa 3 Valabilă până la 19.04.2021

Nr. crt.	Operator name	Authorized activity	Localities served	ANRSC license
7	Salubritate Şendreni SRL	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators	Şendreni	Licență nr. 4404, 4405, 4406/ 01.10.2018 Clasa 3, Valabilă până la 5.12.2022
8	COMUNA IVEȘTI	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators	Ivești	Licență nr. 3425/ 19.10.2015 clasa 3 Valabilă până la 19.10.2020
9	COMUNA ȚEPU	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators (pre-collection)	Țepu	Licență nr. 2919/23.07.201 4 clasa 3 Valabilă până la 23.07.2019
10	COMUNA BRANIȘTEA	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and	Brăniștea	Licență nr. 3387/ 09.09.2015 clasa 3 Valabilă până la 09.09.2020

Nr. crt.	Operator name	Authorized activity	Localities served	ANRSC license
		accumulators		
11	Compania de Utilități Publice Tecuci S.R.L.	<p>Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators</p> <p>Collection and transport of household waste, generated by their and / or exterior refurbishment and rehabilitation activities;</p> <p>Sweeping, washing, spraying and maintenance of public roads, including scraping gutters and sanitation of pre-collection points for household waste;</p> <p>Cleaning and transporting snow from public roads and keeping them in operation during frost;</p> <p>Sorting of municipal waste and similar waste at the sorting station.</p>	Tecuci	Licență nr. 4231 4232 4233/ 22.05.2018 clasa 3 Valabilă până la 01.07.2022
12	Serviciul local de salubritate Tg. Bujor	-	Tg Bujor	No license
13	Gemina Servexim S.R.L.	-	Cosmești, Cuza-Vodă, Fundeni,	Licență nr. 3508/

Nr. crt.	Operator name	Authorized activity	Localities served	ANRSC license
			Grivița, Independența, Mastacani, Oancea, Piscu, Slobozia Conachi, Smulți, Vîrlezi, Vlădești	16.12.2015 clasa 3 Valabilă până la data de 16.12.2020
14	Recorwood S.R.L.	-	Nămoloasa	Licență nr. 4346/08.08.2018 clasa 3 Valabila până la 31.03.2020
15	SC TOP RECYCLE FOR ALL SRL		Smulți, Suceveni	No license
16	Compania de Utilități Publice S.A. Bârlad	Local sanitation	Rădești, Băneasa Negriștei	Licență nr. 4128/15.01.2018 clasa 2 Valabilă până la data de 17.12.2022
17	Rer Ecologic Service Brăila S.R.L.	Local sanitation (renewing their license)	Smârdan	Licență nr 4523/31.01.2019 clasa 2 Valabilă până la data de 31.01.2024
18	Serviciul local de salubritate TULUCEȘTI	Separate collection and transport of municipal and similar wastes from commercial activities in industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators	Tulucești	Licență nr. 4140/05.02.2018 clasa 3 Valabilă până la 05.02.2023
19	Ghidigeni	Separate collection and transport of municipal and similar wastes from commercial activities in	Ghidigeni	Licență nr. 4381/

Nr. crt.	Operator name	Authorized activity	Localities served	ANRSC license
		industry and institutions, including separately collected fractions, without prejudice to the flow of waste electrical and electronic equipment, batteries and accumulators		06.09.2018 clasa 3 Valabilă până la 06.09.2023
20	Serviciul Local de salubritate Matca		Matca	No license
21	Munteni	-	-	-
22	Serviciul Public de Salubritate din Comuna Corod	Salubritate	Corod	Licență nr. 3700/ 16.05.2017 clasa 3 Valabilă până la data de 16.05.2021
23	Serviciul Public Local de Salubritate Foltești	Salubritate	Foltești	No license
24	Serviciul Local Salubritate Liești	Pre - collection, collection, transport of municipal waste, sorting of municipal waste, sweeping, washing, spraying of public roads, . snow cleaning and transport, collection, transport of construction waste	Liești	No license
25	Serviciul Local Salubritate Vânători		Vânători	Licență nr. 4690/ 13.08.2019 clasa 3 Valabilă până la data de 13.08.2024

*Table 2 Sanitation operators in Galati County*

In Galați County, most of the administrative-territorial units have established a fee for the payment of sanitation services, both for individuals and for legal entities (Bălășești, Băleni, Braniștea, Buciumeni, Cerțești, Cuca, Cuza Vodă, Drăgușeni, Foltești, Ghidigeni, Ivești , Jorăști, Movileni, Munteni, Negrilești, Pechea, Poiana, Oancea, Piscu, Rădești, Schela, Scânteiești, Suhurlui, Tulucești, Țepu, Valea Mărului, Vânători, Vârlezi, Suceveni).

The amount of waste collected and reported in Oancea commune at the level of 2020 is:

No.	Month	Amount of waste (tons)
1	January	0,42
2	February	1,56
3	March	2,02
4	April	1,42
5	May	2,80
6	June	0,82
7	July	1,22
8	August	1,78
9	September	1,68
10	October	3,50
11	November	0,00
12	December	3,58
	<b>TOTAL</b>	<b>20,80</b>

*Table 3 Amount of waste collected and reported in Oancea commune at the level of 2020*

Household waste resulting from households is transported and stored by CMID Rosiesti, of SC ROMPREST ENERGY SRL.

The table below shows the in-house tariffs for waste collection:



Nr. crt.	Denumire U.A.T.	Operator	Contract de	Numar contract	Data expirare contract	CLAUZA	TARIF/TAXA
43	OANCEA	SC Gemina Servexim SRL	service contract	45 din 22.01.2019	21.01.2020	the legal clause at the date of awarding within the project Integrated waste management system in Galati county the contract for delegating the management of waste collection and transport activities, to an operator designated winner of the tender organized for this purpose	PF 3 lei / pers /luna; P3 si institutii 20 lei /luna

#### **2.4. Analysis of the demand for goods and services, including medium and long-term forecasts of the evolution of demand, in order to justify the need for the investment objective**

An important component of the development, with a direct impact on the social and economic situation of the inhabitants, is the physical infrastructure, the housing stock, the infrastructure of the roads and of the municipal and communal management networks, which ensure the public utilities of local interest.

Ensuring the minimum communal management infrastructure supports commercial activities, the development of small organic farms, workshops for the superior processing of their own agricultural products, as well as the improvement, in accordance with the standards in force, of the hygienic-sanitary conditions of the inhabitants.

Also, in the long run, the promotion of this type of investment objective leads to the improvement of the quality of the environment and the reduction of pollution sources.

According to the Galati County Waste Management Plan, the strategy for The separate collection of paper / cardboard, plastic / metal and glass waste is as follows:

##### *Existing situation*

The recycling rate of recyclable waste is very low (about 1% in year 2019) this being the result of a deficient collection and transport infrastructure as well as the

lack of sorting capacities. In most localities in the county, the separate collection of recyclable waste is not provided, although it is a legislative obligation since 2012. An organized system for the collection of recyclable waste is implemented only in the Municipality of Galati (only for the population).

### *Objectives*

Extension of the separate collection system for recyclable waste the entire county so as to ensure the fulfillment of the recycling targets provided by the legislation - term, year 2022.

Technical options for separate collection of recyclable waste from a technical point of view, there are three possibilities for organizing the collection separate types of recyclable waste, namely:

- Separate collection system "from gate to gate";
- Separate collection system by voluntary contribution in street collection points;
- Collection centers.

The choice of one of the alternatives depends mainly on the collection rates which must be achieved, but also by the way in which the waste collection system is organized, the existing charging system, the behavior of the population and the presence of unauthorized persons.

The choice of separate collection system also has an impact significantly affect the quality of the materials collected. The quality of recyclable waste, depending on the collection system chosen, may be affected by:

- Contamination with non-recyclable materials that should be in the waste stream;
- Contamination with non-target materials being collected incorrectly;
- Targeted materials collected but contaminated with liquids, oils or putrescible, e.g. food waste.

In defining the options, the results of the studies were also taken into account:

- "Evaluation of separate collection schemes in 28 capitals of the European Union" prepared for the European Commission in 2015;

- "Analysis of Eurostat data on packaging recycling, studies for the years 2006-20126", prepared by EXPRA in 2015.

In the first study, the collection schemes used in the 28 capitals of the European Union. The conclusions of the study regarding separate waste collection schemes are:

- Door-to-gate collection. The percentage of recyclable materials increases when public authorities introduce the door-to-door collection system. This system leads to the highest capture rates and the best quality of recyclable materials. Collection costs for such systems are higher than other collection systems, but collection rates and revenues are also usually higher, and impurity rates (contaminated recyclable errors and waste) and treatment costs are lower..
- Collection through street collection points. This system in many cases discourages residents from separating their waste and generally leads to a higher percentage of impurities. Therefore, the final amount of recycled municipal waste is lower compared to the amount obtained with the door-to-gate collection system. Revenues could also be lower due to the poor quality of recyclables. However, this system is a reasonable solution for certain fractions (eg glass).
- Sharing of recyclables (2, 3 or 4 fractions in the same container collection).

This system is implemented in several Member States and tends to leads to cost reduction. However, mixing several fractions together may result in a higher incidence of counting.

## Assessment of technical options for separate collection of recyclable waste

	<b>OPTION 1 COLLECTION FROM GATE TO GATE, IN 3 FRACTIONS (H / C, P / M, S)</b>	<b>OPTION 2 COLLECTION BY VOLUNTARY CONTRIBUTION IN STREET COLLECTION POINTS, IN 3 FRACTIONS (H / C, P / M, S)</b>	<b>OPTION 3 COLLECTION FROM GATE TO GATE ON THE FRACTION (H / C / P / M) AND COLLECTION BY VOLUNTARY CONTRIBUTION FOR GLASS</b>	<b>OPTION 4 FROM GATE TO GATE ON 2 FRACTIONS (H / C AND P / M) AND VOLUNTARY COLLECTION FOR GLASS</b>
<b>Technical aspects</b>				
Collection	Great flexibility in terms of collection frequency.  The system involves placing 3 containers inside the household.  Possible space issues.	Average flexibility in collection frequency.  The system involves placing 3 containers at street points.  Space issues for placing containers in public space	High flexibility in terms of collection frequency.  The system involves placing a bin in the premises of the household and a container at street points, the space required to store the containers is the smallest compared to the rest of the alternatives.	Great flexibility in terms of collection frequency.  The system involves placing two containers (pubs / bags) inside the household and one container at street points.  Container storage space is smaller compared to option 1 but larger compared to option 3
Capture rate	The largest capture	Lowest capture rate	High capture rates	High capture rates
Recyclability rate	The highest recycling rate	High recycling rate	Low recyclability rate for paper (due to contamination with potentially dirty plastic and metal waste)	High recycling rate
Impurity rate	Low	High	Low	Low
<b>Social aspects and degree of acceptance</b>				
User comfort	High comfort due to the fact that recyclable materials are collected directly from individual homes.	Low comfort due to the fact that waste generators have to move to containers.	High comfort for P / H / H / C waste and low for glass	High comfort for P / H / H / C waste and low for glass
<b>Environmental issues</b>				
Predictable issues	Environmental issues are minimal	Containers destroyed due to vandalism for material recovery. Waste placed near the container.	Environmental issues are minimal	Environmental issues are minimal
<b>Cost</b>				
Investment costs - collection vehicles	The biggest investment costs  Large no. of vehicles (for each of the 3 fractions)	The smallest investment  Lowest number of vehicles due to the small number of collection points	Average investment > compared to option 2 <compared to options 1,4, given that the transport car moves twice	Average investment > options 2,3 <compared to option 1 given that the transport car moves three times.
Investment costs bins / containers	36-60 Euro/bin	120 Euro / plastic container 500 Euro / metal container	The system involves a mix of bins and containers	The system involves a mix of bins and containers

	<b>OPTION 1 COLLECTION FROM GATE TO GATE, IN 3 FRACTIONS (H / C, P / M, S)</b>	<b>OPTION 2 COLLECTION BY VOLUNTARY CONTRIBUTION IN STREET COLLECTION POINTS, IN 3 FRACTIONS (H / C, P / M, S)</b>	<b>OPTION 3 COLLECTION FROM GATE TO GATE ON THE FRACTION (H / C / P / M) AND COLLECTION BY VOLUNTARY CONTRIBUTION FOR GLASS</b>	<b>OPTION 4 FROM GATE TO GATE ON 2 FRACTIONS (H / C AND P / M) AND VOLUNTARY COLLECTION FOR GLASS</b>
	The investment costs for option 1 are the highest, followed by option 4 and then 3- Lastly, the option with the lowest costs is option 2.			
Operating costs, sorting costs	Although the system requires a larger number of bins and vehicles, the existence of bins for each fraction has the advantage of reducing sorting costs.	This option has the advantage of lower collection costs, but the sorting costs are higher than in the case of alternative 1.	Operating costs for waste collection and transportation are lower compared to alternative 2 but the sorting costs are higher	Operating costs for waste collection and transportation are low compared to alternative 1 and sorting costs are similar.
<b>Applicability for typical housing areas / targeting</b>				
1. Urban Areas				
1.1 Blocks of housing (BDL)	This collection system is not feasible for BDL.	This collection system is feasible for BDL.	This collection system is not feasible for BDL.	This collection system is not feasible for BDL.
1.2 Individual houses (CI)	Suitable for individual houses.	Suitable for individual houses.	Suitable for individual houses.	Suitable for individual houses.
2. Rural Areas				
	Applicable only for rural areas only if roads allow access for special vehicles. The system is expensive due to the density of the waste Household is small in these areas.	Applicable to rural areas, as the container may be located on the side of the road and special vehicles can unload containers in in short, which will reduce collection costs.	Applicable only for rural areas only if roads allow access for special vehicles.	Applicable only for rural areas only if roads allow access for special vehicles.

### *The proposed technical option for Galați county*

Following the evaluation of the options presented above, the system for the separate collection of recyclable waste in Galați County was established.

In urban areas, in the area of blocks of flats, the collection system from gate to gate has some drawbacks and is not recommended. Thus, the collection system was chosen by voluntary contribution in street collection points equipped with 3 containers each. Their volume depends on the population density and the number of inhabitants served by the collection point.

In rural and urban areas, all of the 4 are feasible in the area of houses options analyzed. Option 1, considering on the one hand the high investment and operating costs, and on the other hand the fact that so far the recyclable waste collection system

has not been implemented in these areas, was considered unsuitable for Galati County.

In general, in the SMID projects, the option of collecting by voluntary contribution was chosen street collection points (option 2). However, this system has some disadvantages, essential for the project, such as:

- The recycling rate of recyclable waste is low. Given the targets proposed to be achieved through the project, this system may not ensure that these rates are met;
- The rate of impurities or non-recyclable materials that should be in the flow of residual waste and / or misused recyclable materials is high.

Thus, for the area of houses in both rural and urban areas, they were considered as options 3 and 4 are optimal, which involve a door-to-door collection system for paper / cardboard, plastic and metal waste and voluntary collection for glass waste. As mentioned above, in the case of these two options the catch rates are high which can ensure the achievement of the recycling targets set by the legislation.

Therefore, the proposed recyclable waste collection system for the county Galati is as follows:

*Urban area:*

- Apartment block area: a pre-collection point equipped with 3 collection containers:
  - o A waste container made of paper and cardboard;
  - o A container for plastic and metal waste;
  - o A glass waste container.
- Area of individual houses:
  - o Door-to-gate collection system. Each household will receive an 80 l bin for plastic / metal waste and a 60 l bag for paper / cardboard waste;
  - o Collection points equipped with a waste collection container of glass.

*Rural area:*

- Door-to-gate collection system. Each household will receive an 80 l bin for paper / cardboard / plastic / metal waste;

- Street collection points equipped with a glass waste collection container.

**In 2021, 1 composting station and 1 sorting station are in operation Galați (ISPA investments) which deserves exclusively the Municipality of Galați. For the rest there are no solutions for the treatment of bio-waste / recyclable waste collected separately from the localities in the county.**

### *Separate collection of biowaste*

#### *Existing situation*

Currently, the separate collection system for household, similar and marketable biowaste is not implemented in Galati County. The separate collection of biowaste from parks and gardens is carried out in the Municipality of Galați and in Tecuci.

#### *Objectives*

Introduction of separate collection and collection at source and separate collection for treatment in bio-waste recycling facilities throughout the county starting with 2023. The implementation of this measure will also ensure compliance with the objective of reducing the amount of biodegradable waste stored.

#### *Assessment of technical options for separate collection of bio-waste*

Depending on the location of the bins and containers for the collection of household biowaste, the following technical options were analyzed:

- Option 1: door-to-door collection system
- Option 2: collection system by voluntary contribution, in street collection points

#### *Options for separate collection of similar biowaste*

The collection of biodegradable waste generated by economic operators is important in the case of those economic operators whose activity mainly results from this category of waste. These are public catering units: restaurants, hotels, canteens, catering units, etc. Due to the specifics of their business, these operators can easily implement a separate bio-waste collection system. In addition, obligations can be imposed on these economies through either environmental permits or operating permits (issued by town halls).

A similar approach can be imposed on schools (schools and high schools), which, through operating permits and internal regulations, can organize the collection of bio-waste, making it easier to monitor the correct collection of this waste.

*Options for collecting biodegradable waste from markets*

Similar to similar biowaste, biowaste from markets can be collected separately relatively easily, by equipping each market with separate collection containers (usually brown, to differentiate them from residual ones).

Market managers, through the operating permit issued by the town halls, may be obliged to ensure the separate collection of this waste, and based on the sanitation contract, this waste can be transported to the composting stations.

*Options for collecting biowaste from parks and gardens*

Biodiversity in parks and gardens is generally generated on a regular basis. The actions of cleaning and grooming the vegetation in public spaces usually have spring and autumn (similar to the generation of green biowaste from households), being carried out by specialized operators (companies or city hall services).

The collection of this waste is easy to implement, once it is generated, the waste can be managed in two major ways:

- Collection from the place of generation and transport to the composting facilities even by operators specializing in suitable vehicles, no collection containers being required,
- Treatment by in situ composting systems on arranged platforms.



## Analysis of technical options for bio-waste collection

	<b>URBAN AREAS: DOWNTOWN AND BLOCK AREAS</b>	<b>URBAN AREAS: SINGLE-FAMILY HOMES</b>	<b>RURAL AREAS</b>
Green waste (public areas, blocks and green areas)	Separate collection is applicable, as it is usually performed by specialized operators. Branch pruning and shredding are applied	Separate collection is applicable.	Separate collection is applicable
Waste from markets	Separate collection is applicable by equipping markets with containers for separate collection of bio-waste		Separate collection is applicable by equipping markets with containers for separate collection of bio-waste
Food waste from catering companies, restaurants, hotels, etc	Separate collection is applicable		Separate collection is applicable
Household food waste	The anonymity of the collection system in the block areas is a big problem. The quality and quantity of biowaste collected is low.	The collected biowaste is of better quality.  Separate collection is applicable, as is individual composting	Separate individual composting is applicable.  Waste can also be used as animal feed.
Separate collection costs	40-70 euro/t	50-80 euro/t	90-110 euro/t

### *The proposed technical option*

The proposed technical option for the separate collection of household bio-waste Taking into account the evaluation of the options presented above, for the county of Galați it is proposed to implement the following system for the separate collection of bio-waste:

#### *In the URBAN environment*

In the area of individual houses in the urban area, it is mainly recommended to introduce the door-to-gate type collection system. Thus, households will be equipped with a trash can that will be picked up by the weekly sanitation operator (similar to the frequency of waste collection).

In the area of urban blocks of flats, it is recommended to introduce the collection system by voluntary contribution in street collection points. The implementation of separate collection of biowaste in the block area must be strongly supported by public awareness and information campaigns as well as financial

incentives (eg proper implementation of the Pay as You Throw system). After the first year of implementation, an evaluation of the results of this system will be carried out and improvement measures will be proposed.

#### *In the RURAL environment*

According to the Study on the estimation of the quantities of biowaste that could be collected separately and of the individual composting potential, the following resulted:

- Given the mandatory separate collection of biowaste from 2023, there is a high potential for individual composting, over 65% of respondents stating that they are willing to set up a space / crate in their garden to store green waste from the garden and thus obtain compost for agriculture;
- Given the mandatory separate collection of biowaste from 2023, there is a high potential for individual composting, with over 65% of respondents stating that they are willing to set up a space / crate in their garden to store green waste from the garden and thus obtains compost for agriculture.

#### *The proposed technical option for the separate collection of biowaste from similar waste*

With the implementation of separate collection of bio-waste from household waste, the separate collection of bio-waste from similar household waste will be implemented, especially for HoReCa and the retail and other forms of distribution. The study on the estimation of bio-waste quantities shows for these two sectors (main biowaste generators) a separate bio-waste collection availability for recycling of over 95%.

#### *Collection of biodegradable waste from markets*

Similar to the collection of similar biowaste, biowaste from markets can be collected relatively easily separately, by equipping each market with separate collection containers (usually brown, to differentiate them from residual ones). The vast majority of biowaste in the markets is of plant origin, so it is suitable for composting in composting plants. Market managers, through the operating permit issued by the town halls, may be obliged to ensure the separate collection of this

waste, and based on the sanitation contract, this waste can be transported to the composting stations.

### *Collection of biowaste from parks and gardens*

Biodegradable waste from parks and gardens is expected to be collected and transported to composting facilities. Their management up to the composting stations is managed by the specialized operators or the services of the town halls.

## **INFORMATION ON WASTE TREATMENT IN PROJECT PARTNER COUNTRIES**

### **1. BULGARIA**

Management and utilization of wastes in Bulgaria is based on the requirements of the Wastes Management Act from 2012 , latest amended on 05.03.2021 and a number of relevant ordinances transposing of EU Directive 2008/98/EC on waste (Waste Framework Directive), Regulation (EC) No 1013/2006 Directive 94/62/EC, Directive 1999/31/EC, Directive 2003/35/EC or, if relevant, Directive 2001/42/EC, Decision 1999/468/EC, etc.

The Waste Management Act and related ordinances regulate the measures and control for the protection of environment and human health by preventing or reducing the generation and handling of waste, as well as reducing the overall impact of the handling, use, reuse, treatment and recycling of materials and products in order to facilitate the transition to a circular economy and ensure long-term competitiveness of the national economy.

This waste legislation regulates the requirements to products in the process of their production or in case their final usage results in dangerous or widespread waste. The waste legislation controls the extended producer responsibility and encourages wise use, reuse, prevention, recycling or any other type of utilization of the wastes while taking into account the technical feasibility, economic viability and the overall environmental, human health and social impacts, respecting the need to ensure the proper functioning of the internal market.

The competent management authorities and persons due to which activities

waste is formed, handled and/or treated, apply the following hierarchy of wastes: 1) prevention; 2) preparing for re-use; 3) recycling; 4) other recovery, e.g. energy recovery; and 5) disposal.

The Minister of Environment and Water – or any authorized by him/her body, would have the competency to apply and control handling and utilization of wastes. S\he shall take measures to encourage the options that deliver the best overall.

*Environmental outcome.*

This may require specific waste streams departing from the hierarchy where this is justified by life-cycle thinking on the overall impacts of the generation and management of such waste.

Certain specified waste shall cease to be waste when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions: 1) the substance or object is commonly used for specific purposes; 2) a market or demand exists for such a substance or object; 3) the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and 4) the use of the substance or object will not lead to overall adverse environmental or human health impacts.

Appropriate measures for good management waste may encourage, inter alia, the development, production and marketing of products that are suitable for multiple use, that are technically durable and that are, after having become waste, suitable for proper and safe recovery and environmentally compatible disposal.

In accordance with the requirements of the WFD and Article 49 and Article 50 of the Waste Management Act, Bulgaria has developed a National Waste Management Plan (NWMP) based on the following principles:

- “Prevention ”- waste should be reduced and avoided where it is possible.
- "Extended producer responsibility" and "polluter pays" - those who produce or contribute to waste generation or pollute the environment or current waste holders must cover the full costs for waste treatment and should manage them in a way that ensures high level of protection of the environment and human healthcare.

□ “Precaution” - potential waste problems should be foreseen and avoided at the earliest possible stage.

□ “Self-sufficiency and proximity” – waste should be disposed as near as possible to the place of their generation as waste generated in the EU should be treated within the union.

□ „Public participation“ – relevant stakeholders and authorities as the general public have the opportunity to participate in the development of waste management plans and waste prevention programs and have access to them after their development.

The National Waste Management Plan (NWMP) 2021-2028 is based on three major poles: 1) reduced generation of waste; 2) facilitated transition to a circular economy, i.e. management that ensures the effective use of waste as a resource; and 3) last but not least, 55% recycling of the entire volume of the municipal waste by 2025.

The cost of implementation of NWMP 2021-2028 amounts to 730 million EUR -78% for investment and 22% for soft measures. 133 million EUR are foreseen for the completion of regional waste management systems; 20 million EUR for construction of waste recycling plants through financial instruments; 74 million EUR for construction of new and expansion of existing systems for separate collection of municipal waste; 50 million EUR for preparation and implementation of projects for closure and reclamation of municipal landfills for household waste; 90 million EUR for construction of landfills or additional cells for municipal waste.

Among other objectives, NWMP aims to achieve the objectives for preparing of re-use and recycle of municipal paper, metal, plastic and glass waste; to achieve the objectives of biodegradable waste, including bio-waste; to achieve the targets for recycling and recovery of widespread waste; to improve the management hierarchy of other waste streams and reduce the risk to the environment from landfills for municipal waste; to improve the capacity of institutions for waste management; to improve the quality of information helping to make informed management decisions; to improve awareness and participation of the population and business in waste

management activities.

As the local authorities are required to comply with a wide range of waste and recycling legislation, the NWMP provides a framework for them in the development of policy for waste management activities at regional and local level.

The mayor of the municipality organizes the management of household and construction waste generated on its territory - collection, transportation, recovery and/or disposal.

The mayor of the municipality is responsible for:

- provision of containers for collection of household waste - containers, buckets and others;
- collection of household waste and their transportation to landfills or other installations and facilities for their recovery and / or disposal;
- separate collection of household waste on the territory of the municipality at least for the following waste materials: paper and cardboard, metals, plastics and glass;
- organization of the activities for separate collection of widespread waste and / or renders assistance to the organizations for utilization of widespread waste, incl. determines the locations for the necessary elements of the separate collection systems and the locations for the transfer of widespread waste;
- assistance for the establishment of reuse centers, repair and preparation for reuse;
- separate collection and storage of household biodegradable waste, incl. determine the locations for the necessary elements of the system for separate waste collection and transfer for composting or anaerobic digestion;
- maintaining a register of the sites for transfer of waste of plastics, glass, paper and cardboard on the territory of the respective municipality;
- prevention of the dumping of waste in unauthorized places and / or the creation of illegal landfills and the organization of their cleaning.

Waste Management Act requires local authorities to coordinate programs for municipal waste management with NWMP and encourages municipalities to develop

municipal and regional plans for waste management in the territorial scope of the regional waste management associations (RWMA).

RWMA are registered as juridical persons to support the municipalities for general management of municipal waste, and especially for the construction and operation of facilities for municipal waste and preparation and implementation of projects with European and national funding.

Among other areas, RWMAs are active in:

- Organizing and conducting informational and awareness raising campaigns on the benefits of separate waste collection and nature protection and conservation;
- Awareness-raising and training of children and youth on separate waste collection at home and in schools; mobilizing of citizens for separate waste collection; organization of events and projects for separate waste collection;
- Sharing of best practices among communities, local administration and internationally;
- Revitalization of recycling businesses in smaller communities (glass, plastics, paper);
- Fair payment for waste collection, transportation, treatment and deposit/recycling;
- Mobilize the population to participate in separate waste collection at broad scale by payment for glass, plastic and metal packaging;
- Introduction of multiple usage of glass packaging;
- Building of incinerators for household waste as a final component of the existing separation facilities;
- Building of composting facilities at various levels – household, community, regional;
- Encouraging household composting wherever possible;
- Supplying households with free composters who are interested to compost.

Maglitzh Municipality is a member of RWMA – Stara Zagora (registered on

22.12.2014), and uses a regional depot, regional composting facility and regional separation installation located in Rakitnitsa, Stara Zagora Municipality . These facilities are shared among 12 municipalities.

The distance between Maglizh and Rakitnitsa is – 44 km in one direction while some of the villages of Maglizh Municipality are rather farther away – Banzareto, Darzhaven, Raduntsi, Borushtitsa are more than 75 km away in one direction and on very difficult to access high-mountain terrain. Maglizh is served by Preshipment Station – Kazanlak.

The total cost of the RWMA is 27 million EUR, 21 million EUR provided through EU funding under the Operational Programme Environment 2007-2013.

The separation installation does not have the capacity to stabilize 0-50 mm fraction consisting mainly of an inert and a biological component – as a result this fraction could not be treated but is directly sent to depot. The applied principle of separation covers the extraction of recyclable fractions from mixed collections of household waste - paper, plastic, metal, glass. By stabilizing the biological fraction, the volume of the deposited waste could be reduced by 25-30%. Additionally, the risk for the environment will be reduced, as well as the negative consequences of the disposal of biodegradable waste - minimizing the formation of infiltrate, gases (incl. greenhouse gases), odors, etc.

The facility for separation of mixed municipal waste can be equipped with a second module - installation for stabilization of subsite bio-fraction in order to facilitate the achievement of the objectives under Article 31, paragraph 1 of the WMA, as well as the achievement of the following objectives set by the European legislation - Directive (EU) 2018/851 and Directive (EU) 2018/850:

- by 1 January 2020 at the latest, preparation for re-use and recycling of waste materials, including paper and cardboard, metal, plastic and glass from households and similar waste from other sources of not less than 50 per cent of the total weight of this waste;

- by December 31, 2020 at the latest, limiting the amount of landfilled biodegradable municipal waste to 35 percent of the total amount of the same waste



generated in the Republic of Bulgaria in 1995;

- by December 31, 2025, the preparation for re-use and recycling of municipal waste should be increased to at least 55% by weight;
- by December 31, 2030, preparation for re-use and recycling of municipal waste should be increased by at least 60% by weight;
- by December 31, 2035, the preparation for re-use and recycling of municipal waste should be increased to at least 65% by weight;
- by December 31, 2035 the amount of landfilled municipal waste is reduced to 10% or less of the total amount of municipal waste generated (by weight).

The systems for separate collection of packaging waste cover necessarily include all settlements with a population of more than 5000 inhabitants, and resort settlements. Waste from paper and cardboard, glass, plastics and metals, generated from commercial sites, production, farm and administrative buildings, are collected separately in settlements where there is no system for separate collection of the same household waste.

Biowaste from the maintenance of public areas, parks and gardens is collected separately, and waste from green areas to commercial sites, production, farm and administrative buildings is treated by composting or anaerobic digestion, in a way that provides a high degree of environmental protection.

In addition to these objectives, the recently adopted European legislation of the Circular Economy package places special requirements on one of the most common plastic packaging, namely plastic beverage bottles for single use. In particular, each Member State shall be required to ensure that :

- from 2025, some beverage bottles must contain at least 25% recycled plastic, and from 2030 - at least 30%.
- Member States to ensure separate collection for the purpose of recycling disposable plastic bottles up to 3 liters at a level of at least 77% by 2025 and 90% by 2029.

At the European level, new provisions have been adopted for reporting data on packaging waste, which our country must implement.

According to ORDINANCE FOR SEPARATE COLLECTION OF BIOWASTE AND TREATMENT OF BIODEGRADABLE WASTE Art. 13 (4) for 2020 the permitted for disposal biodegradable waste in the respective region is 109 kg/inhabitant and separate collection of biowaste is mandatory from 2023, namely - biodegradable waste from parks and gardens, food and kitchen waste from households, restaurants, catering establishments and shops, as well as similar waste from the enterprises of the food industry.

The analysis of the possibilities for stabilization of 0-50 mm fraction shows that, if such system would be built, the disposal of about 100,000 tons of waste will be prevented annually. Thus, in addition to the direct benefits of the objectives set in the WMA, will have indirect benefits such as:

1. Extending the "operational" life of waste disposal facilities;
2. Reducing the environmentally hazardous properties of waste;
3. Reducing greenhouse gas emissions gases;
4. Determination of lower fees for the population for treatment of household waste;
5. Reduction of the formation of infiltrate in the landfills and respectively reduction of the operating costs and minimization of the risks for the environment.

There is a tendency of gradual increase in the share of household waste submitted for recycling. In absolute values for the country this increase is from 350 tons (2006) to 214.62 thousand tons (2018), which for the same period represents an increase from 0.01% to 7.5% of the share of total waste.

The waste management sector developed significantly after Bulgaria became a member of the EU in 2007. By 2008, only a few regional landfills for municipal waste were built in accordance with European standards, and a large number of municipalities dumped their waste in landfills that did not meet environmental safety standards for the environment and human health; there were no municipal installations for pre-treatment of municipal waste and municipal installations for composting and anaerobic digestion for biodegradable waste. As of 2018, all landfills for waste management have been built and are functioning on a regional basis. The

municipal infrastructure for preliminary treatment of municipal waste has been built to a high degree or is in the process of construction - by 2018 there are 24 installations for separation / preliminary treatment of municipal waste with approximate capacity<sup>1</sup> is 1 189 678 t/year. The capacity of the separation/ pre-treatment infrastructure is expected to increase to approximately 1 533 695 t/year. as a result of the implementation of current projects.

19 installations for utilization of biowaste have been built and are functioning. The capacity of the existing infrastructure for recovery of biowaste (in operation by 2020) amounts to approximately 2 267 262 t/year. The capacity of the existing separation/pre-treatment infrastructure is not complete, as not all regional systems have indicated an annual capacity in the GEF of operators.

The capacity of the existing infrastructure for recovery of biowaste is not complete. The population in the country covered by organized waste collection increased from 94.4% to 99.8%. The number of settlements provided with organized garbage collection services increases from 3128 in 2008 to 4698 in 2018.

Significant improvement is observed in the hierarchy of municipal waste management:

- The quantities of directly disposed household waste for the period decreased from 3359 tons to 834 tons.

- Landfilled household waste per capita decreased from 460 kg/inhabitant in 2009 of 249 kg/inhabitant in 2018.

- The trend regarding the generated household waste per capita is also positive - from 590 kg in 2008 to 407 kg/capita in 2018. According to this indicator Bulgaria is above the EU average, given that in the northern EU countries the norm of waste accumulation in 2018 exceeds 700-800 kg/inhabitant.

- The relative share of recycled municipal waste increased for the period under review - from 19.4% in 2008 to 31.5% in 2018.

- The quantities of composted municipal waste increased from 0 kg/inhabitant in 2008 to 34 kg/inhabitant in 2017, as well as the household waste incinerated with energy recovery, which rose from 0 kg/inhabitant in 2009 to 30

kg/inhabitant in 2018.

High levels of recycling and recovery of packaging waste, WEEE, ELVs, NUBA, waste oils and IBM are achieved:

□ For 2018 the country has met the national targets for recycling of materials, as follows:

- o Waste from plastic packaging - 59%, with normative - 22.5%;
- o Waste from paper and cardboard packaging - 63%, at normative - 60%;
- o Waste from metal packaging - 81%, with regulations - 50%;
- o Waste from wooden packages - 21%, at normative - 15%;
- o Waste from glass packaging - 78%, with normative - 60%.

□ For 2018, Bulgaria has met its objectives for the collection of WEEE, formed by household and non-domestic, as well as the objectives of recovery and recycling.

o Bulgaria has achieved the set national targets for 2018 for reuse and recovery (95.76% with 95%) and reuse and recycling of ELVs (94.82% with 85%).

As a whole at national level, the most noticeable change in terms of capacity is expected in the infrastructure for bio-waste recovery. The improvement of the active infrastructure will favor the respective municipalities in achieving the objectives for gradual reduction of the quantities of biodegradable waste intended for landfill, set by the Directive 99/31/EC on landfills. The quantities are determined on the basis of the quantity of the biodegradable fraction in 1995. Bulgaria has provided to EUROSTAT for approval, the available data on the generated and disposed household waste for 1995 (2 247 500 t); to be reduced to 786 625 t (2020) .

The average amount of biodegradable waste depot per capita in 2018 amounts to 161 kg. In addition to achieving the objectives of limiting the amount of landfilled household biodegradable waste, each of the waste management regions aims to provide conditions conducive to preparation for reuse and recycling of waste materials, including paper and cardboard, metal, plastic and glass from households. Wastes from other sources are not less than 50 per cent of the total weight of those wastes. According to data from the EEA for 2018 regarding the implementation of

the objectives under Art. 31, para. 1 of the Waste Management Act, as of 2018, 41 municipalities fulfill the set goals under Art. 31 (preparation for reuse and recycling of waste materials, including paper and cardboard, metal, plastic and glass from households and similar waste from other sources of not less than 40 percent of the total weight of this waste). Maglzh Municipality did not register a target value.

In order to implement effective waste management at the national level, a high level of information data bases is needed on the ongoing processes related to waste in the country . It is important to define clearly the main areas in which information is needed and available. It is essential to build a working information system to connect the users of information and sources.

For the creation of an information base, meeting as much as possible the needs, a database was created organized by sources of information (NSI, Eurostat, RWMS, MoEW, Ministry of Finance, etc.). The database is structured in a way that facilitates the preparation of various types of reports, including composite indicators, as well as the preparation of forecasts, taking into account various factors and limitations with digital characteristics. Experience has shown that the adequacy and quality of information (including historical data) and the ability to analyze on various grounds (e.g. territorial, sectoral, waste types, etc.) depend to a large extent on the ability to collect information from the lowest possible level. In this regard, information on the population, the quantities of waste generated, the available waste treatment infrastructure and other similar information is most appropriate to be available at settlement level. At the same time, some of the available information is at a higher level. The relationship between the different levels of information collection will require the use of different methods for its collection.

According to the morphological composition of waste (2019) , 28% is the fine fraction (<4cm); parks – 13%, plastics – 11%, food waste – 10%, etc.

Maglzh Municipality is formed on the basis of a settlement network consisting of 15 settlements. Maglzh is the administrative center of the municipality.

According to the rate of the settlements, the settlements in the Municipality fall into the following categories: 1 very small town - town of Maglzh (population under

10 000 inhabitants), 4 medium-size villages - Vetren, Dabovo, Tulovo and Yagoda (population between 1000 and 2000 inhabitants), 3 small villages Shanovo, Yulievo and Zimnitsa (population between 250 and 1000 inhabitants) and 7 very small villages - population up to 250 inhabitants. According to NSI as of 2011 2 of the villages are almost depopulated.

According to the categorization of the municipalities, the municipality of Maglzh falls into the fourth category. It is a rural municipality with very low level of urbanization.

Maglzh Municipality is among the 11 municipalities in Stara Zagora District and occupies 7.55% of the district territory. In terms of population, it ranks 7th, and the population density is 26.2 people/km<sup>2</sup> - significantly lower than the average for Stara Zagora district (64.7 people/km<sup>2</sup>). According to NSI, the population of Maglzh municipality is 9 972 inhabitants. Maglzh has 3500 inhabitants, and in the villages - 6 809 inhabitants.

The villages of Vetren, Dabovo and Tulovo are characterized by relatively stable demographic status. Elderly population predominates in the villages of Shanovo and Yulievo. The village of Yagoda has a relatively large percentage of Turkish and Kupanar population, but also a strongly expressed migration process. A similar process of sharp decline in the number of inhabitants in recent years has been observed in the high-Balkan villages, where mostly elderly people live. The population of Zimnitsa increases while 84% are Roma.

Waste management in Maglzh municipality is implemented according to the requirements, goals and needs identified in the Ordinance for waste management on the territory of Maglzh municipality.

The Ordinance determines the conditions and procedure for disposal, collection, including separation, transportation, transshipment, utilization and disposal of household, construction waste, including bio-waste, hazardous household waste, mass distributed waste on the territory of Maglzh Municipality.

The Ordinance determines the environmentally sound waste management measures in the municipality, as a set of rights, obligations, decisions, actions and

activities related to their formation and treatment, on the basis of certain information, as well as on the various forms of control. Rights and obligations with regard to waste management activities on the territory of Maglzh municipality, to the natural persons living or temporarily reside in the municipality, as well as the legal entities that carry out activities of the territory of the municipality.

It lists control measures, fines and penalties for violation of the provisions of this Regulation.

The waste management organized by the local government aims to prevent or reduce harmful waste impact on human health and the environment and is carried out in accordance with the requirements of the normative acts regarding:

1. protection of water, air, soil, plants and animals;
2. noise and odors;
3. protection of the natural environment and the places, which are object of special protection.

Waste management activities in the municipality are managed in a transparent way, while it is still necessary to become more inclusive.

According to the conclusions of Municipal plan for waste management of Maglzh municipality (2016-2020), it is necessary to organize annual information and awareness-raising campaigns and/or other activities through which the population to get acquainted with their rights and responsibilities.

Examples of measures that the Municipality can take in this direction are:

- Maintaining up-to-date information about the activity through the section on the website of the municipality;
- Creating easy and accessible conditions for proposals and public participation in the development of waste management policy, in the preparation of regulations, programs, strategies, guidelines, etc.;
- Organizing various events with the participation of citizens - Earth Day (April 22), World Environment Day (June 5), Mobility Week (September 16-22), waste cleaning campaigns, competitions related to the management of waste,

awareness campaigns, celebrations, public events, etc.;

- Raising the environmental awareness through trainings and preparation of advertising materials;

- Maintaining "hot green telephone line" for submitting signals, complaints, opinions and suggestions related to waste management.

The information on waste provide by NSI shows that 99,3% of the population in Maglitzh municipality is served by organized household collection and while 3685 t were generated and directly landfilled in the municipality in 2015, with the joining to the improvement of the waste management and the construction of the Regional waste management facility in Rakitnitsa in 2018 the generated waste was 3300 t – 2 t directly landfilled and 3398 t were pre-treated before deposition. No recycling facility operates in the municipality yet .

## **2. REPUBLIC OF MOLDOVA**

### *Plastic waste generation rate*

The rate of waste generation per capita in the Republic of Moldova varies, this being in rural areas, usually between 0.3-0.4 kg / capita / day, respectively 0.9 kg / capita / day or more in urban areas. A study conducted by the association WiSDOM in 2021, in the village of Cheltuitor, Chisinau municipality at the level of individual household and community showed that the amount of plastic generated kg / capita / day varies between 0.13 and 0.2 kg / capita / day, and the total amount of waste is about 0.7-0.75 kg / capita / day. Organic waste can make up about 60-73%, and plastic waste - 17%. Separate collection of plastic by the local population is relatively low. Thus, according to the local entrepreneur Salubris SRL, 16 metal containers with plastic and metal waste with a capacity of 1 m<sup>3</sup> located in Tohatin commune, are evacuated weekly, but are not always full, the reason being that the population probably prefers convenience (mixed collection, storage plastic as close as possible to the place of generation). At the time of measurement, the amount of plastic and metal waste in the containers (in case of compaction and shrinkage), ranged from 30-40 kg. If it is considered an ideal case when the stored plastic and metal is well sorted and



cleaned of dirt, it would probably be profitable and relatively easy for local entrepreneurs to collect plastic and metal. But in reality, the situation is far from ideal, because other types of waste are stored in plastic and metal containers, such as construction waste, glass, organic waste. Also, stored plastic and metal are often very dirty and smelly, which greatly reduces the ability to recycle plastic, as Moldovan entrepreneurs do not have plastic washing techniques. It is also worth noting that often waste-collecting contractors are forced to empty empty containers, thus increasing their transport costs.

The amount of organic waste varies greatly depending on the presence of animals (cows, sheep, goats, rabbits, pigs, chickens). The number of large domestic animals producing large amounts of organic waste in rural areas of the Republic of Moldova is declining. For example, according to a survey conducted in Slobozia Mare, with about 2000 households there are only 40-50 cows and around 250-300 pigs. The vast majority of the population in the region grows more birds (chickens, ducks, geese) and less often pigs, sheep, rabbits, horses or donkeys.

From organic, garden and agricultural waste is accumulated in the warm season (March-November), their amount at the level of individual household can vary from a few hundred kg / month to a few tons, depending on the capacity of agricultural activity. . According to a survey conducted in 2016 by the WiSDOM association, 62% of those surveyed compost a lot of organic waste such as weeds, dried leaves, woodpeckers. the ard. Much of the garden waste is dumped in ditches and on the roadsides, and during heavy rains it is carried away by rainwater runoff into the Prut River. This waste could serve as a good potential energy source (eg for the production of pellets, coal).

The amount of plastic collected with the help of students would be an action with a considerable impact on the environment. Thus, in the locality of Slobozia Mare, Cahul during one day a number of 3-4 students from the Alecu Mare gymnasium from Slobozia Mare, Cahul, managed to collect / bring to school between 50 and 100 kg of plastic. The students were also very active in collecting plastic waste and in the area of the “Prutul de Jos” biosphere reserve.



Collection of plastic by students in sanitation activities organized on April 22, 2021, by the association WiSDOM in collaboration with the association Ecotox in Slobozia Mare, Cahul

Plastic is a major problem for many localities in Moldova. Chaotic storage of plastic bottles and bags is a widespread practice. If the issue is addressed in terms of monetary value and local actors develop business plans, in the long run it could also be a source of income, providing some additional jobs for low budget groups. The study conducted by the association WiSDOM in September, 2021 showed that a sanitation activity would be a source of income for people on a budget. Thus, during a day in the vicinity of Tohatin commune it was possible to collect approximately 32-35 kg of plastic / per capita, which could bring additional income for the population. It is worth mentioning that in addition to plastic, film, paper, glass and aluminum / metal waste are also stored in public spaces, which also represent economic value.

The only downside is that much of the discarded plastic is dirty and filled with various debris, making it difficult to clean. Also, for those who collect plastic, it would be quite difficult for the agencies that receive the plastic to provide too little money for small amounts of plastic (the difficulty of providing financial

documentation for legal entities). One solution to this problem would be to accumulate virtual money for people who collect plastic for recycling using the mobile application and pay at the end of a certain period (for example at the end of the month or quarter).

Other factors that make the recycling process difficult are:

1) Lack of information to the public on the potential for recycling and the correct sorting and storage of materials for recycling

2) Lack of separate collection points or separate waste collection containers at Community level

3) The high costs of transporting them to existing collection / recycling points (use of bicycles / tricycles) would be an appropriate solution for recycling centers.

4) Lack / inadequacy of collection / recycling points at district level. Most collection / recycling points are located in the capital Chisinau.

5) Storage of other types of waste along with waste for recycling

### **3. UKRAINE**

In 2019, at the initiative of the Non-Governmental Environmental Organization of the City of Nova Kakhovka "Mama-86-Nova Kakhovka", a campaign was conducted to study the pollution of the surface waters of the Kherson region.

As a result, the identified waste included: plastic waste - 56%, paper and cardboard - 19.46%, construction materials, ceramics, glass - 11.12%, metal - 7.47%, rubber - 2.57% , treated wood - 2.03%, textiles - 1.38% and other waste - 0.04%. All this waste enters the Black Sea through the Dnieper and is one of the biggest threats to its ecosystem, as well as to human health and economic well-being.

577 kg of plastic waste were collected using manual presses and given for recycling. 12 cubic meters were collected through the leaf vacuum and composted. The wood chipper fed with processed gas 100 cubic meters of dry branches, 10 cubic meters were used as solid. fuel in kindergarten and distributed among socially unprotected families. the rest was used as compost. 650 kg of compost was obtained using the rotary composting beaker.

The data are according to the work of 9 schools, which had hand presses - one press in each school, and the private Pavlivski farm was concerned with composting.

From 1 January 2018, it is forbidden to store untreated household waste on land according to the Ukrainian Law on Waste. Citizens must sort the waste and dispose of it in the appropriate containers

In November 2020, the Supreme Council adopted the bill №2051-1, which proposes to ban the use of plastic bags in trade with a thickness of 50 mkm starting with January 1, 2022. On June 1, 2021, the Parliament approved the bill №2051- 1.

### **2.5. Objectives expected to be achieved by making public investment**

The general objectives of this investment project are: to make new investments that will contribute to improving the protection of the population's health and comfort.

The specific objectives of this investment project are: to protect human health, reduce the risk of human disease and protect all environmental factors. Also, promoting this type of investment objective leads to improving the quality of the environment and reducing pollution sources.

## **3. IDENTIFICATION, PROPOSAL AND PRESENTATION OF A MINIMUM OF TWO SCENARIOS / TECHNICAL-ECONOMIC OPTIONS FOR THE ACHIEVEMENT OF THE INVESTMENT OBJECTIVE**

### **3.1. Peculiarities of the location for both scenarios:**

**a) description of the location (location - urban / extra-urban, land area, dimensions in plan, legal regime - nature of the property or title deed, easements, right of preemption, area of public utility, information / obligations / constraints extracted from urban planning documents, as the case);**

The investment that is the subject of this documentation is within the urban

perimeter of Oancea commune, located in the eastern part of Romania, on the right bank of the Prut River, 57 km north of Galati county seat and 7 km west of Cahul in Moldova.

The objective proposed for modernization belongs to the public domain.

**b) relations with neighboring areas, existing accesses and / or possible access routes;**

Galați County is located in the eastern part of Romania, being watered and therefore naturally delimited on three of its sides by the Prut and Siret rivers, as well as by the Danube river. It borders on the east with the Republic of Moldova the border being Prut, on the south with Tulcea county, the border being the Danube river, on the west with Brăila and Vrancea counties the border being made by the Siret river and a drawn border, and on the north with Vaslui county.

It covers an area of 442,500 ha, of which:

- arable - 293,711 ha
- pastures, hayfields - 38,593 ha
- vii - 24,680 ha
- orchards - 2,279 ha
- forest lands - 36,223 ha
- waters, ponds - 12,384 ha
- other areas - 34,630 ha

The surface of urban areas (including agriculture) is 31,515 ha of which;

- municipalities and cities - 6,063 ha
- rural localities - 25,452 ha

Oancea commune is located in the eastern extremity of Galati county, on the terrace of the Prut river.

The loessoid lithological character of the terrace roof creates a crustal appearance, very high compared to the major riverbed, with a sudden transition from the elevation of the meadow to + 60 m, an approximate elevation at which the commune is located.

The terrace develops at the end of the Covurlui Hills, with heights over 150 m west, which dominates the commune and which descends steeply towards the built area, developed on the manure cones of some valleys or torrents that porousize the terrace.

As a dominant relief are the very high hills that constitute the interfluve between the Prut Valley and the China Valley.

Geologically, the commune area is formed in the Quaternary, in very thick deposits of dusty clay loess up to about 16 m. Below them is the sand and gravel deposit of the Prut terrace, developing up to 24 m. sandy developed up to over 24 m.

The commune is located in the river basin of the Prut river, without being crossed by any important tributary.

The village of Oancea is located at the intersection of the torrential valleys Valea Bisericii and Valea Oancea which join in the west of the village and finally flow into the Prut.

The village of Slobozia Oancea is bordered to the south by a torrential course that crosses the county road.

Tectonic, Oancea commune is part of the southern area of the Bârlad Depression, framed by the Târgu Plopana - Crasna Fault and the Trotuşului Fault.

According to the Norm P100 / 1992, the commune area falls within the seismicity zone C with a value of the coefficient  $K_a = 0.20$  and a corner period  $T_c$  (sec) = 1.5

The freezing depth according to STAS 6054/1977 is 100 m.

From the point of view of the geotechnical conditions, the following can be concluded:

- downstream of Slobozia Oancea, at the foot of the slope of Dealca Seaca it can be seen

strong slope manifestations with torrential valleys produced by water runoff. Also, in the south and north of Oancea village, the slope of the land, very pronounced in the existing lithological conditions, makes the area unsuitable for new constructions.

**c) proposed orientations towards cardinal points and towards natural or constructed points of interest;**

Oancea commune is located in the eastern extremity of Galați county, at the administrative limit of the county and, respectively, at the border with the Republic of Moldova.

The component localities are Oancea (commune residence) and Slobozia Oancea.

The surface in the administrative territory is 5,214 ha. The connection with the municipality of Galați is ensured on the north-south direction by DN 26. On a derivation from DN 26 the connection with the crossing point of the Oancea - Kahul border is also ensured. .

Oancea commune borders to the north with Suceava commune, to the west with Băneasa commune and to the south with Vlădești commune.

Morphological typology of gathered type villages, partially linear along the main road DN 26.

As the villages are located next to each other, the conditions of genesis, morphology, and construction are similar.

**d) existing sources of pollution in the area;**

Not the case.

**e) climatic data and relief features;**

*Relieful*

Galați County is located in the East of the country and the South of Moldova, between the lower reaches of the Prut and Siret rivers, and the city of Tecuci is morphologically located at the contact between the Covurlui Plateau (represented by the Balanbănești and Chinajești hills) and Câmpia G well, at the intersection of three different geographical basins: Covurlui Plain, Brateș Meadow and Covurlui Plateau.

Covurluiului plain continues to the south with the higher plateaus of the plateau. Between the rivers Geru and Prut, with altitudes of 80-200 m, C. Covurlui

consists of an association of plains that descend in steps to the Siret valley. Some of them are alluvial terraces of Siret. The fragmentation of the plain, more accentuated to the south, is given by the valleys of Suhurlui, Lozova, Mâlina and Covurlui. Their slopes, as well as the steep bank that dominates the Siret meadow, are shaped by torrential processes.

The characteristic of the relief in this area is the presence of interfluves with flat surfaces and consistent valleys having the N-S course, with very turbulent slopes and exposed to the erosion phenomenon, which caused unevenness of approx. 80-100 m between the interfluves and the valley line, and the friable character of the deposits from the constitution of this region, favors the development of the deluvial processes on slopes (landslides).

Thus, from a morphological point of view, 3 areas were delimited, as follows:

- upper terrace,
- lower terrace,
- meadow.

A. The upper terrace is developed between the altitude of 35 m and 120 m, generally having a NS direction, is covered by dusty clay formations such as loess and is subject to erosion phenomena that have manifested themselves by the appearance of gullies, wagons and, in some areas, even landslides.

The lower terrace is developed between an altitude of 15 m and 35 m, with variable widths between 200 m and 700 m, crossed by temporary streams that drain from the upper terrace to the meadow where they have the greatest development. On this terrace the villages of Măstăcani and Chiraftei developed, lined up on both the left and the right of the Chineja river.

The meadow has the highest development and an altitude that varies from 14 m, in the West to 4-5 km, in the East, and the general direction of this formation is VE, reaching the exit of the commune, at a width of 1.5 km - 2.0 km. The surface of the meadow is furrowed by the old meanders, some deserted, of the Chineja River, as well as by a series of clogged valleys.

*Current geomorphological processes and land degradation*



The composition of the territory of Galați County, predominantly from hilly peaks, Piedmont interfluvial fields and terraces, with generally low slopes, makes the activity of the current modeling processes more active and more frequent on the valleys and in the torrential basins. The differentiations from N to S, determined by the arrangement in steps with lower and higher altitudes, slopes and relief energy, from Col.Tutovei and Pod. From the carpet to the Siret meadow, they also created some differences both in the frequency of certain types of processes and in their intensity.

The hilly area, located in the N part of the county, where the slopes of the valleys and torrential basins have a much higher weight than in the S part, contains a relatively high modeling potential. It is imposed by the predominance of less resistant formations (sands, clays), intersected by slopes with high inclinations.

The area of the piedmont plains and terraces, which includes C.Tecuciului and C.Covurlui is characterized by the decrease of the share of slopes and the increase of the surfaces of the interfluvial plains with smaller and smaller slopes towards S and S-V. For this reason, the area of current geomorphological processes is much smaller.

Land degradation is particularly noticeable along valley slopes, where surface erosion, ravaging, and sometimes landslide processes range from moderate to high intensities.

The lower Siret plain and the meadows of the Prut and Bârlad are under the periodic action of floods, the predominant being the processes of clogging the minor riverbeds and meadows, highlighted by the instability of watercourses (on the undisturbed sectors). To these is added the erosion of the shore, especially in the meanders of the meanders. The degradation of the lands from the lowest surfaces of the county is mainly due to the floods and the excess of humidity, reason for which complex works of damming and draining are still required.

### *Geology*

From a geological point of view, the area belongs to the Upper Proterozoic-Paleozoic period.

The oldest formations in the area are made up of metamorphic rocks associated

with intrusions as well as with mesozoic formations, with micacists, which appear between the Prut and the Frumușita-Cuca locality.

Between the two areas with mesozoic formations, there are episonal formations of chloritic crystalline schists, quartzites, porphyroid schists and tuff rocks.

To know the foundation of the region between the Prut and Siret contributed to the drilling inventoried in time which indicated a representation of it by clayey, black, coal shale with finely spread, quartz and sandstone shale with diaclasses filled with anhydrite, which sometimes are associated with altered crystalline shales, red, interspersed in gray and blackish-green clays.

All these rocks show an incipient metamorphism.

The pre-Paleozoic-Paleozoic foundation has a Mesozoic cover made up of Triassic and Jurassic formations.

The Triassic was intercepted by boreholes on a thickness of 200-775 m, without touching the base represented by a detrital formation composed of clay schists, fine sandstones, weak micaceous and calcareous, quartzite and rarely sandstones, small conglomerates.

Towards the top, this suite comprises ferruginous shale marls with thin intercalations of reddish-brown limestone, sometimes associated with anhydrides. The whole series is reddish brown or greenish with green spots.

The air was reported at a thickness of 92 m, being represented by crumbly yellowish limestones and gray marls that stand on lower carboniferous formations and support the Eocene.

The Neozoic forms a blanket in which the Eocene, Miocene (Sarmatian), Pliocene and Quaternary participate, each with facies extension and very varied thicknesses in relation to the tectonic evolution. The Neozoic cover is known for drilling, and the Pontian-Quaternary deposits and for the afioniments that appear to date.

The Eocene is present in this area and is composed of green clays with a thickness of 20-33 m, based on conglomerates with calcareous-glaucconitic cement. In

this area the Eocene is part of the thin deposit cover that covers the entire sector between Siret and Prut as a result of Eocene transgression.

The Bessanabian consists of friable limestones and hard marl-limestone, with a thickness of about 100 m, in the drilling at Frumușița and Oancea.

The Kenonian is transgressively arranged in the area and is made up of sandy marls and gray-green micaceous sands, with intercalations of fine sandstones that, in the perimeter of Măstăcani and Frumușița commune, reach 70 m thickness.

The Meotian is known only from the research provided by the drilled holes, being made of green or gray clays, sometimes compact, with calcareous concretions and brown spots, alternating with gray sands.

The Meotian has large variations in thickness from 100 m to 170 m, in the south, at 500 m on the banks of the Prut (Oancea).

Pontian-Dacian forms the first deposits of the Neogene blanket that emerge in the area on the edge of the Prut.

The Pontian-Dacian series emerges along the Prut valley between Oancea and Foltești, as well as on the Chineja valley (Măstăcani).

Extremely interesting outcrops are those on the right side of the Prut River, between Oancea and Vlădești, where, at the base of the slopes, there appear on a thickness of 40 m clayey and sandy marls, followed by yellowish white sands.

Over the fossiliferous sands follow 60 m of reddish-yellow sandstones with sandstone lenses, which belong to the upper part of the Middle Pleistocene, including the Daoian.

In the boreholes, between Meotian and Levantine, there is a series of sandy loam, with gray or green clays, stained, alternating with gray sands in thicker packs. The Pontian - Dacian deposits have a thickness of 150-170 m, along the Prut.

The Levantine is present in the eastern part of the region, along the Prut between Rogojeni and Foltești and in the Chineja valley, where the upper part of the Pliocene sands belongs to Levantin, starting from the horizon with calcareous-marly concretions with pseudo-conglomerate aspect.

*Lower Pleistocene*

To the east of the Bârlad valley and up to the Prut, there is a change in the lithology of Villafranchian as well as of Levantine in the sense that the facies of Levantine clays is invaded by sand intercalations, and Nicorești sands pass into sands with gravel level at the base and are called Bălăbănești gravels. These gravel deposits form the basis of loessoid deposits in the area.

*Middle Pleistocene-Upper Pleistocene*

*Loessoid deposits*

In the following we will refer only to the loessoid deposits that cover the upper terrace. In the central part of the Moldavian plateau, the loess deposits have the highest thickness near Foltești and Măstăcani localities on the Prut bank, reaching thicknesses between 50 and 60 m.

The loessoid deposits consist of yellowish sandy powders and sandy clay powders with calcareous concretions. In the mass of loessoid deposits there are 3 more clayey, reddish levels, in the form of continuous bands, which were generally considered to be caused by climate change.

The Upper Holocene appears in the valley of the river Chineja and Covurlui and is represented by current alluviums of meadows, represented by sands and gravels.

The structural elements of the area are characterized by a foundation made up of two distinct units, over which two depressions of different ages partially overlap, so that between Siret and Prut a Hercynian-Ohimerian block was formed, an extension of the northern Dobrogean chains.

The foundation is affected in the area by a fault with the E-V direction (Oancea-Blânzi fault) that delimits to the North, the N-Dobrogean foundation.

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of chloritic crystalline schists, quartzites, porphyroid schists and tuff rocks.

The drilling at Frumușita, Crăiești, Cuca, Oancea, etc. also contributed to the knowledge of the foundation of the region between Prut and Siret. which indicated a representation of it by clayey, black, carbonaceous schists with finely diffused, quartzite peaks, and sandstone schists with diaclasses filled with anhydrite, which are sometimes associated with altered, red crystalline schists interspersed in gray and blackish-green clays .

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The foundation is affected in the area by a fault with the E-V direction (Oancea-Blânzi fault) that delimits to the North, the N-Dobrogean foundation.

The Covurluiului platform runs from the asymmetrical valleys, with opposite directions, Jaravăț and Horincea, to Galați. It separates from the Romanian Plain through the Gerului Valley, then the base of the slopes on the left side of the Siret and the Danube. The platform of the Carpet is made up of wide monoclinic peaks that descend from north to south. In this sense, the energy of the relief decreases, from 130 - 150 m to 40 - 50 m. The horizontal fragmentation is more accentuated in the north giving the appearance of hills and less pronounced in the south, where the interfluvial plains that have formed have 1,2 km and over 2 km wide.

Land degradation is represented by mixed washings and landslides. The

development of loessoid deposits has led to the emergence of microforms such as crows, vertical cliffs, pyramidal landslides and miniature canyons.

The cumulative relief is represented by the terraces of the main rivers.

***Geomorphologically, the county belongs to two large units as follows:***

a - Buzău Plain - Siret - located in the southern part and limited to 150 m is characterized by a more uniform relief with platforms with widths of 10 - 15 km (Cuca Plains, Lozovei, Eastern Tecuci and Western Tecuci).

The depression colors of the Siret, Bârlad and Prut rivers as well as of the more important valleys have specific meadow formations with ridges and abandoned riverbeds with disturbed relief with coarser variable deposits.

On the first terrace of the Siret river from H. Conachi to Ungureni there is a relief of sand dunes formed by hill transport north of Tecuci. These were fixed partly by afforestation and partly by vineyards.

The rest of the plain consists of loess loamy and loamy - sandy deposits interrupted in places by the action of vineyards and is presented as a terrace relief with uniform slopes and well - defined soils.

b - Bârlad Plateau - comprising the northern area with elevations over 150 m is characterized by a more turbulent relief with narrower platforms due to the branching of the hydrological network.

The interfluves present convex shapes, often with steep slopes, the energy of which triggered erosion phenomena (the Chinese Hills (Bălăbănești and Zeletin). The hilly appearance is given by these curved interfluves that narrow to the north.

c - The hydrographic network - of the county has a relatively high density (0.6 - 1.1 km / km<sup>2</sup>) due to the lithological constitution (clay - sandy or sandy - clayey, loessoid) which favors the formation of ogas. As already mentioned, the valleys generally have a north-south orientation with two exceptions (Hobana and Bârzota) which have an east-west orientation. .

### *Soil*

In the western part there are very good lands from the point of view of agricultural production, classified in the first class of suitability for arable uses, with



location fitting with the south, west and to the northwest of the city. This area offers very good conditions for the cultivation of agricultural plants, without the need for special improvement measures.

In the north-west to the north there are degraded lands of class IV and V of suitability, unsuitable for arable use, with clayey meadow soils, often salinized, siliceous, transformed into swamps, salt marshes and lakes.

Also, in the eastern part and up to the south of the city, there are the same types of soils. These lands of inferior classes of quality III and IV of arable suitability, can be used only for the production of fodder and only those that support the excessive basicity of these lands. These lands can support woody vegetation, being suitable for afforestation. In the north-east and south-west, there are several islands with quality second-class land.

### *Climate*

The territory of Galati county belongs entirely to the sector with continental climate. The general climate consists of very hot and dry summers, the winters being frosty marked by strong blizzards, but also by the frequent weather caused by the advections of hot and humid air from the S and SV, which determine longer or shorter intervals of warming and melting. snow layer.

Global solar radiation amounts to 117.5 kcal / cmp.an and 125.0 kcal / cmp.an.

### *Temperature*

The annual averages in the region are higher than 10 degrees C. The averages of the warmest month - July are + 21.7OC. January is the coldest month, with temperatures averaging - 3.5OC.

The average annual number of frost days is 112.1 days in Tecuci.

### *Atmospheric precipitation*

For this region, the highest monthly average quantities are recorded in June and are 72.2 mm in Tecuci, 58.1 mm in Tudor Vladiminescu, 62.1 mm in Galați. The lowest average monthly quantities are recorded in February, being 23.8 mm in Tecuci and 23.1 mm in Galați. The highest amounts of precipitation fall during the warm semester and are very often a downpour.

### *Winds*

At Tecuci, the channeling of the air currents in Iungul Bârladului and Siretului valleys causes the maximum frequencies to return to the winds from N (25.1%) and S (11.6%), followed by those from NW (8.3%) and SE (6.3%). The average annual frequency of calm is high in Tecuci (35.6%). The average annual speeds are lower in Tecuci (between 1.6 and 4.0 m / s) than in the rest of the region.

### *Vegetation*

Hygrophilous grassy associations (*Agrostis stolonifera*, *Agropyron ripens*, *Alopecurus pratensis*) and willow and poplar streams appear in river meadows. The presence of saline lands in the lower course of Bârlad impresses a floristic component with *Salicornia europeaea* and *Suaeda maritima*.

There are also species characteristic of silvo-steppe (secondary meadows with *Poa angustifoila* and *Festuca valesiaca*), otherwise the agricultural crops are expanding. There are also oak forests mixed with lime and hornbeam, as well as oak forests, tartar maple or acacia plantations.

### *Fauna*

The fauna belongs to the biotope of steppe and forest-steppe as well as to the biotope of meadows and ponds. Spontaneous fauna is represented by both sedentary and migratory animals.

The faunal elements that populate the forest-steppe area are adapted to agrobiocenoses and we can mention the woodpecker, the woodpecker, the steppe ferret, and among the birds ducks, geese, starlings, crows, bustards.

The fauna that populates the meadows and the ponds consists of: fox, otter, and among the birds the duck, the goose, the seagull, the sitar, the lizard.

The changes that took place in the biotope also resulted in the reduction of Ior in number and area of spread.

The rivers that have a permanent flow regime belong to the carp area.

### *Hydrological data*

Although the hydrographic network is well developed - the steppe climate of the county determines the frequent occurrence of the drying phenomenon - the

permanent watercourses being very low.

The specific flow of surface water is on average 0.60 l / s and km<sup>2</sup>. Except for the bordering rivers (Siret and Prut) which originate in the mountainous areas of the Carpathians all the other rivers and valleys train the waters only from the Moldavian Plateau characterized as a very dry area.

The maximum runoff of all the valleys in the county is registered in the spring season and the beginning of the summer being generally of mixed genesis - the melting of the snows accompanied by torrential rains. About 50% of the annual volume is recorded in spring while in autumn (September - December) it is only 10%. The maximum monthly volume flows in March and the minimum in October.

The table below shows the hydrological data of the main valleys in the county and the surrounding rivers:

**Among the most important valleys whose length exceeds 20 30 Km, it is mentioned:**

Nr crt	VALLEY	RECIPIENT	LENGTH Km	AREA OF THE BASIN Km <sup>2</sup>
0	1	2	3	4
1	TECUCEL	Râul BÂRLAD	24,00	112,00
2	BERHECI	Râul BÂRLAD	88,00	1040,00
3	PERESCHIV	Râul BÂRLAD	41,00	236,00
4	HOBANA	Râul BÂRLAD	18,00	90,00
5	BÂRZATA	Râul BÂRLAD	18,00	66,00
6	COROZEL	Râul BÂRLAD	42,00	221,00
7	CĂLMAȚUI	Râul SIRET	16,00	154,00
8	GERULUI	Râul SIRET	46,00	350,00
9	SUHURLUI	Râul SIRET	61,00	378,00
10	LOZOVA	Râul SIRET	32,00	212,00
11	MĂLINA	Râul SIRET	21,00	176,00
12	CHINEJA	Râul PRUT	73,00	766,00
13	HORINCEA	Râul PRUT	32,00	205,00

**The table below shows the hydrological data of the main valleys in the**

### county and the surrounding rivers:

Nr crt	THE RIVER/ THE SMALL RIVER	Point / Section Area	Area m2	AVERAGE LEAK		MAXIMUM LEAK			
				Volum mil.mc	Flow Q (mc/s)	Flow (mc/s) cu asig. de :		Volume (mil.mc) cu asigurarea de :	
						1 %	5 %	1 %	5 %
0	1	2	3	4	5	6	7	8	9
1	SIRET	LUNGOCI	34070	4920	156.0	4500	2800	1795	1117
2	SIRET	ȘENDRENI	42465	5920	187.7	4500	2800	1198	1198
3	PRUT	OANCEA	9879	2890	91.6	960	730	-	-
9	CĂLMĂȚUI	VĂRSARE	154	30	0.095	171	96	81	46
10	GERULUI	VĂRSARE	350	45	0.143	250	140	144	81
11	SUHURLUI	Conf.GERU	374	50	0.158	280	155	162	92
12	LOZOVA	VĂRSARE	212	20	0.063	190	108	108	57
13	MĂLINA	VĂRSARE	976	160	0.507	132	75	53	30

It can be seen from the above tables that although the average multiannual flows are small, the flood flows are high, subjecting the territories to extensive destructive actions of the waters (floods, soil erosion) on which they intervene with expensive works.

It also shows from the analysis of surface waters that they cannot be safe sources for drinking water supply of populated centers or specialized farms both due to the drying of most streams and their poor quality due to infestation with residual substances from chemical fertilizers used. in agriculture.

At the surface waters, the irrigation network from the “Carpet Terrace” system should be mentioned, which brings in the territory of the county, during the vegetation period, important quantities of water that can be used for some industrial needs with seasonal activity. Of this, an important source for drinking water and industrial water with continuous use is in the conditions of water treatment, the Suhurlui accumulation lake.

### *Hydrogeological characterization*

Like the entire Moldavian Plateau and Galati County, it is generally poor in groundwater resources, although the area of the Pliocene deposits and gravels from the Siret meadow make it richer than the rest.

### *Hydrographic characterization*

The Covurluiului platform is drained by the rivers Suhurlui with Geru and Lozova, then by Mălina and Cătușa from the Siret basin and by China with the tributaries of the Covurlui Sec, Covurluiul cu acqua, Rădiciul and Valea Părului.

The average slope of the rivers in the Carpet Platform is 4 - 15 ‰.

The average density of the hydrographic network varies between 0.2 and 0.7, the lowest values being in the south of the platform.

The rivers in the north are of the moderate pluvial - snow type, and the southern ones of the level - moderate pluvial type.

The average runoff of the main rivers in the Carpet Platform is illustrated by the generally low values: Geru 0.095 m<sup>3</sup> / s, Suhurlui 0.158 m<sup>3</sup> / s, Lozova 0.063 m<sup>3</sup> / s, Carpet 0.158 m<sup>3</sup> / s and China 0.697 m<sup>3</sup> / s.

The relief of the river basin has the following units: IanțuI mountains of the Eastern Carpathians, Subcarpathians, Moldavian plateau and Iunca Siretului.

The climate of the basin differs according to the relief from the cold and humid mountain climate to the excessive continental one, from the plain.

Like the climate, the precipitation differs depending on the relief, from abundant areas (over 2,000 mm / year) to poor ones (400 mm / year) in the plain areas.

Groundwater is the main source of water and is found in abundance in the Siret and Bârlad meadows at depths of 10-20 m or even further.

In the terraces of Siret and Bârlad, characterized by the presence of aquifers at the base at 10 - 15 m formed by gravels and sands with a thickness of 5 - 12 m, the water is frequently encountered, being able to capture flows of 3–10 l / s and well at 2 - 4 m.

In the high plain that occupies the largest area, being intensely fragmented by

valleys whose depths reach 50 - 70 m the groundwater is found in meadows at 5 - 10 m with low flows below 0.5 - 2.00 l / s and well. The groundwater in this area is found in the alluvial deposits of the terraces, in the manure cones of the tributary valleys and in the areas of morphological contact the water appears in the form of springs. The springs from the north of the county within the communes of Bălăşeşti, Bălăbăneşti, Bereşti, Cavadineşti are frequent.

Deep water indicates as its main source the Pliocene aquifers that were deposited in a freshwater lake.

From the analysis of the deep drillings executed in the county, both those with study character and those in operation at different economic units, important data are given regarding the succession of aquifers, the captured flows, the water quality from where it results.

- The aquifers are found at very different depths, having instead in all cases the same granulometry in which fine and medium sands predominate in variable succession so that average values cannot be given.

- The water level is generally ascending, varying in very wide limits 10.00 - 85.00 and over 100 m depth from the ground depending on the morphology, the captured aquifer horizon and its depth. In some boreholes - in the meadow of the Bârlad river or of the Chineja brook, deep aquifers (lower Pleistocene) with artesian waters were intercepted.

- From a chemical point of view, water is most often drinkable within exceptional limits.

- The flow rates measured at the experimental pumps varied between 0.2– 28.0 l / s (generally 1 - 8 l / s) with unevenness between 0.5 - 21.30 m (often 1-6 m).

#### *Conclusions on drinking water resources*

The natural conditions of Galaţi County highlight important freshwater resources that can be taken into account when supplying drinking water to localities.

- Surface sources consisting of adjacent rivers can only be used with treatment plants that are expensive for low flows. It can be considered fl. The Danube for the city of Galaţi.

Regarding the quality of surface waters, it is found that in the part of Galați County only the Prut River can be embedded in category III, the other rivers (Siretul and Bârlad) have degraded waters and can only be used in certain industries or intermittently.

- The groundwater layers in the Siret and Bârlad meadows are rich in water with appreciable flows between 4 - 6 l / s and km<sup>2</sup> and are used to supply water to the municipalities of Tecuci and Galați. In the Prut meadow, due to the clogging with fine materials, the phreatic contribution is lower at 1.5 - 2.0 l / s and km<sup>2</sup>.

With important flows and corresponding qualities, there are groundwater and springs from the Bălășești - Berești - Cavadinești area, which represent a cheap source of water supply.

In terms of groundwater mineralization, it is weak, medium or strongly saline depending on the depth at which it is found and the sources of enrichment in salts. Thus, in the area of the high plateaus where the groundwater is located at depths of over 10 m, the mineralization is poor and the water is of good quality. In the area of the upper meadows, it also has satisfactory qualities that make it drinkable. In the large areas of the Prut and Siret rivers where the groundwater is in front, confined to fine materials and is constantly subject to evaporation, the salt content is concentrated within limits that make it unbearable.

- The deep waters that are found in almost all the territory of the county, in the aquifer deposits of the Pliocene are safe sources in all areas where there are no other sources. The numerous drillings executed in the county indicate in all cases, at different depths, the existence of rich aquifers with appreciable flows that can be relatively easily exploited.

Regarding the chemical composition of the deep waters, they are considered to be appropriate, except for hydrogen sulfide and iron, which are slightly exceeded in some cases (Bârlad meadow). For these reasons, deep water can be used without restrictions in almost all cases.

The following major catchments for drinking water are currently in operation.

From the groundwater from the Siret meadow through the catchments from

Suraia - Vadul Roșca and Salcia - Liești, an important part of the water of Galati municipality is ensured and from the catchment from Cosmești for Tecuci Municipality, a flow of up to 2,500 m<sup>3</sup> / s.

From the deep water in the Bârlad meadow are located the catchments for the municipality of Tecuci (Munteni) and Bârlad (Negrileşti) which exploits the water from a depth of 70 - 140 m with flows varying between 6 - 12 l / s and well.

Also important economic units use their own water sources capturing either groundwater or deep water and in all cases where the operation is correct with good results.

The cadastral atlas of waters establishes for Moldova the possible flow to be captured from underground resources at 30 m<sup>3</sup> / s, of which from groundwater 25 m<sup>3</sup> / s and from deep waters 5.00 m<sup>3</sup> / s. The study on “Contributions to the knowledge of the deep waters of the land between Siret and Prut is estimated that in the south of the Moldavian plateau in the Pliocene deposits there is at least a third of the entire underground flow of Moldova.

The hydrogeological study on “The forecast of the development of water supplies in Galati county prepared by ISPIF establishes the water resources of Galati county at 3,700 m<sup>3</sup> / s, of which 1,000 m<sup>3</sup> / s from deep waters.

The current data are more optimistic about deep flow and we can conclude that throughout the county, where there are no other less expensive sources, deep water becomes the safest source.

**f) the existence of:**

- on-site municipal networks that would require relocation / protection, insofar as they can be identified;**
- possible interference with historical / architectural monuments or archeological sites on the site or in the immediate vicinity; the existence of specific conditions in case of the existence of protected or protection areas;**
- lands belonging to institutions that are part of the system of defense, public order and national security;**



Does not exist :

- on-site municipal networks that would require relocation / protection, insofar as they can be identified.
- possible interference with historical / architectural monuments or archeological sites on the site or in the immediate vicinity; the existence of specific conditions in case of the existence of protected or protection areas;
- lands belonging to institutions that are part of the system of defense, public order and national security.

### **g) geophysical characteristics of the site terrain**

#### *Geotechnical study*

According to STAS 1242/1 - 89, the geotechnical study aims at:

- identifying the succession of the type of state and the physical-mechanical characteristics of the structures that make up the foundation ground on the active area of the foundations and depending on its lift and compressibility, finalizing the system and the depth of foundation for construction;
- finalizing the possible effects in time of the groundwater on the foundation land, the foundation and the construction;
- signaling special conditions of the site and of the foundation land that may influence the normal development of the foundation works or the operation of the construction;
- framing the location in terms of seismicity and frost depth;
- sloping or potentially slippery terrain;
- land accidents - cellars, pits, bags, mud;
- contractible lands.

It was established according to the norm P10 - 2004 the way in which the infrastructures will be composed, designed and executed taking into account the characteristics of the construction - land system:

- importance class;
- operating restrictions and sensitivity to settlements;
- difficult terrain with high compressibility;

- height regime;
- seismic zone.

The freezing depth of the area, according to STAS 6054 / '77 is 1.00 m.

The given snow loads, according to CR 1-1-3 / 2012, frame the researched area in the calculation area of the characteristic value given by the snow loads on the ground  $s_k = 2.5 \text{ kN / m}^2$ .

The wind loads according to CR 1-1-4 / 2012 refer to the reference values of the dynamic wind pressure, with an average recurrence interval of 50 years, for the studied area is  $q_b = 0.60 \text{ kPa}$ .

### **3.2. Description from a technical, constructive, functional-architectural and technological point of view**

The project proposes the acquisition of the following types of equipment necessary to meet the specific objectives of the project "Cleaner Rivers - Cleaner Seas BSB-784":

No. crt	PRODUCT NAME	MU	Quantity
1.	Wood choppers / vegetable waste	Piece	2
2.	Blower for collecting dried leaves	Piece	1
3.	Manual press for plastic bottles	Piece	16
4.	Test containers for collecting plastics	Piece	6
5.	Composter with plastic barrel and rotating drum	Piece	1
6.	Garbage container with wheels	Piece	10
7.	Barrels / compost boxes	Piece	10

1. Wood choppers / vegetable waste

#### **Technical specifications:**

Fuel type: petrol / diesel

Engine type: thermal

Engine power: minimum 13 hp

Functions: Branch cutting capacity up to 60mm

Production capacity: min. 2 m<sup>3</sup> / hour

Consumption: max. 500 g / hour

Maximum cutting diameter: 120mm

**Description:**

The wood / vegetable waste shredder with fuel is a professional shredder recommended for cutting outdoors without the need to connect it to electricity. With a powerful fuel engine of at least 13 hp, it is able to provide sufficient power for smooth and precise cutting of branches.

**How to use:**

The shredder is used to chop the branches but also the foliage. The shredder has a large capacity for cutting branches, with thicknesses up to 120 mm. It is equipped with a metal chassis, resistant to shocks, while maintaining a low weight for easy movement and maneuverability. It has wheels for transport, so it will be easy to get around.

**Benefits:**

- Increased comfort at start-up, thanks to the shock-resistant heat engine
- Continuous use for a long time due to the design of the engine
- Wide running system for high stability, wheels for easy transport.

**Advantage:**

- Safe start without engine disturbances
- Protective housing for all mechanical components
- Cutting mechanism: crushing rollers
- Powerful fuel engine

2. Blower for collecting dried leaves

**Description:**

The blower for collecting dried leaves is intended for maintenance work in parks, paving, pedestrian alleys, stadiums, as well as for collecting leaves. The

blower is a multifunctional product, with 2 functions: a function for vacuuming the leaves and one for cleaning the alleys, etc., with the help of the strong air flow that the turbine releases. When the suction function is used, the leaves are shredded before reaching the collecting bag, in order to create more space inside it and allow the user to use the product for a longer time. Easy to operate, the blower can be used throughout the day, regardless of the function chosen.

The blower can also be used to clean agricultural equipment laden with dust or dry straw debris, which has many hard-to-reach areas.

Low fuel consumption and high maneuverability allow any user without technical knowledge to use this product.

### 3. Manual press for plastic bottles

#### **Description:**

The manual PET press is ideal for quickly compressing used plastic bottles after consuming the contents. It can be mounted on the wall or any fixed vertical base.

Quality metal frame made of steel pipes, painted with silver paint. The plastic parts are made of solid plastic.

This press will save a lot of space in the plastic waste storage container.

Includes masonry mounting accessories for PET bottles up to 2.5 liters, quickly reduces the volume of plastic bottles by up to 5 times.

### 4. Test containers for collecting plastics

#### **Description:**

Capacity 1100l, polypropylene material resistant to UV and external temperatures, provided with special slots for selective collection, rubber wheels.

### 5. Composter with plastic barrel and rotating drum

#### **Properties:**

Drum composter with a capacity of 160 liters mixes easily and efficiently

Black plastic drum for optimal heat development with ventilation

Stable tubular frame - resistant to back and safe for rodents

Ecological and compact

**Product description:**

With the drum composter it is very easy to turn kitchen and garden waste into compost. Bacteria, fungi and other microorganisms break down organic waste so that we can return nutrient-rich compost to nature's cycle after a short period of time.

The sturdy plastic composter rotates the large 160-liter container on a central axis that rests on a sturdy tubular frame. The drum rotates effortlessly, and the comfortable working height is also light on the back and keeps the composter free of rodents. Regular rotation ensures a lot of oxygen and, together with the black walls of the drum, accelerates the rotting process.

With the 2-chamber system, compost is made particularly efficiently: waste is collected in one "active" chamber, while the compost rests and can mature in the other chamber. For a very good compost, rich in nutrients, we recommend a mixture of 2 parts "green" (for example, household waste and lawn mowing) and 2 parts "brown" (for example, dry leaves and straw). A bright and warm location also favors the composting process.

6. Garbage can with wheels

**Description:**

The 240 l Europubels are made of pure high density polyethylene (HDPE) by injection system. They are resistant to the action of ultraviolet radiation, to very low or very high temperatures (-40 + 80 degrees C), as well as to chemical corrosion and to the action of biological agents.

The Europubel has 2 rubber wheels with a diameter of 200 mm fixed on a hot-dip galvanized steel shaft, resistant to tension and the lid is fastened to the body of the bin with two plastic screws and has two handles for easier handling.

Europubela is intended for the collection of household waste (bio - degradable, mixed) or recyclable waste (paper, glass, PET, metal).

## 7. Compost barrels / boxes

### **Description:**

The compost bin is perfect for making quick compost. The special construction and dark color create a higher temperature inside than other conventional composters. Heat, in turn, promotes faster bacterial decomposition and you get better and faster results. The structure consists of panels connected together and form a single body. The biocompost is easy to assemble, does not require tools and is simple to use, being at the same time very resistant to weather and solvents. Each wall has vents that provide the necessary oxygenation. The compost resulting from the remains of plants, grass, leaves, flowers, stored in the composter is transformed in a few weeks into organic fertilizer.

### **Technical specifications:**

Capacity: 1600 L - 4 compartments

Material: plastic

Black color

The compost bin consists of: 4 compartments with a total capacity of 1600 L.

### **3.3. Estimated investment costs**

The total value of the project according to the attached general estimate for the proposed variant is:

#### **Total value (INV), including VAT:**

*The value of the investment, including VAT, is RON 103,459.97.*

### **3.4. Specialized studies, depending on the category and importance class of constructions**

Not the case!

### **3.5. Indicative charts for making the investment**

The duration of the investment is 12 months.

## **4. ANALYSIS OF EACH PROPOSED TECHNICAL-ECONOMIC SCENARIO**

### **4.1. Presentation of the analysis framework, including specification of the reference period and presentation of the reference scenario**

The project proposes the acquisition of the following types of equipment necessary to meet the specific objectives of the project "Cleaner Rivers - Cleaner Seas BSB-784":

No. crt	PRODUCT NAME	MU	Quantity
1.	Wood choppers / vegetable waste	Piece	2
2.	Blower for collecting dried leaves	Piece	1
3.	Manual press for plastic bottles	Piece	16
4.	Test containers for collecting plastics	Piece	6
5.	Composter with plastic barrel and rotating drum	Piece	1
6.	Garbage container with wheels	Piece	10
7.	Barrels / compost boxes	Piece	10

The investment contributes to the administration's efforts to grow the area, to improve the health conditions of the inhabitants.

It should be appreciated that a social and cultural development is based on a well-defined medical education. The theme proposed in this project contributes to the social development of the locality.

#### **General objective**

The general objectives of this investment project are: to make new investments that will contribute to improving the protection of the population's health and comfort.

### **Specific objectives**

The specific objectives of this investment project are: to protect human health, reduce the risk of human disease and protect all environmental factors. Also, promoting this type of investment objective leads to improving the quality of the environment and reducing pollution sources.

The beneficiaries of this investment are the inhabitants of Oancea commune, respectively all “consumers”, grouped as follows:

- Household sector;
- Sectors of public institutions;
- Private sector.

We mention the fact that the way in which the project was conceived creates obvious, real premises for the development of the infrastructure, the target area of the project.

The reference period for the investment analysis is 15 years.

Possible alternatives are evaluated based on the design data in this study.

In correspondence with the geographical, economic, social, legal and environmental particularities of Oancea commune, the following alternatives were analyzed:

#### **S 1:**

##### **Version with project - Equipment purchase:**

The Local Council of Oancea commune wants to meet the request of the inhabitants of Oancea commune the purchase of equipment necessary for the disposal of plastic and organic waste.

The equipment proposed for purchase is:

No. crt	PRODUCT NAME	MU	Quantity
1.	Wood choppers / vegetable waste	Piece	2



2.	Blower for collecting dried leaves	Piece	1
3.	Manual press for plastic bottles	Piece	16
4.	Test containers for collecting plastics	Piece	6
5.	Composter with plastic barrel and rotating drum	Piece	1
6.	Garbage container with wheels	Piece	10
7.	Barrels / compost boxes	Piece	10

## S 2:

### "Zero" variant - No project

In this version, the current situation continues, namely the combined collection of waste and its disposal in contradiction with the European rules of waste management.

Factors analyzed	Var. 1	Var. 2
- low impact on protection environment	10	1
- minimum operating risks	10	10
- low realization price	5	10
- resistance over time	10	1
- investment costs	5	10
<b>TOTAL</b>	<b>40</b>	<b>32</b>

The analysis of alternatives takes into account the problems facing the target area, a number of objective external factors and anticipates a coherent evaluation of the project.

### **4.2. Analysis of vulnerabilities caused by risk factors, anthropogenic and natural, including climate change, which may affect investment**

The petrography and pedology of an area have important influences on the infrastructure, so there are areas that involve minimal consolidation works and areas

that involve major interventions. Consolidation work is needed in this case.

Freezing is a major obstacle for all types of investment, as it is combated by maintenance work throughout the year.

#### **4.3. Utilities situation and consumption analysis:**

##### **- the necessary utilities and relocation / protection, as the case may be;**

Does not exist :

- on-site municipal networks that would require relocation / protection, insofar as they can be identified.

- possible interference with historical / architectural monuments or archeological sites on the site or in the immediate vicinity; the existence of specific conditions in case of the existence of protected or protection areas;

- lands belonging to institutions that are part of the system of defense, public order and national security.

##### **- solutions to ensure the necessary utilities.**

The mayor's office of Oancea commune, as beneficiary, will take care of bringing the necessary utilities.

#### **4.4. Sustainability of achieving the investment objective:**

##### **a) social and cultural impact, equal opportunities;**

The project ensures the access of the inhabitants to a more pleasant area in terms of living conditions, thus increasing their production and standard of living.

Ensuring access to the above-mentioned objectives gives equal opportunities to all residents to benefit from ensuring a higher standard of living than the current one by facilitating access to a waste-free area and increasing the level of health of the population.

**b) estimates regarding the labor force employed by making the investment: in the realization phase, in the operation phase;**

Number of jobs created in the supply phase –0;

Number of jobs created in the operation phase - 5.

**c) the impact on environmental factors, including the impact on biodiversity and protected sites, as appropriate;**

*Water quality protection*

Due to the fact that the water resulting from the objective surface is not wastewater, no water treatment plants or installations are required.

The water used for various technological processes (surface cleaning, surface watering, etc.) will be clean water according to SR EN 1008: 2003 "Concrete preparation water" and is not a source of pollution after its use in those works.

*Air protection*

The objective, in itself, when put into use, will not produce noxious substances that could pollute the air. No special measures are required to protect the air quality.

The noxious substances that can pollute the air are produced during the execution works: those resulting from the asphalt mixture during the installation, from the excavation and pouring of the concrete. It is recommended to use asphalt and concrete mixing plants whose emissions fall within the values established in Order no. 592/2002. The stations must be equipped with filters from textile bags, and the limit values for particulate concentrations at emission will be checked periodically. When transporting and storing granular materials that may release fine particles, measures shall be taken to cover them.

*Noise and vibration protection*

Noise and vibration will occur during operation, due to the equipment, but their duration is limited to the working day. These noises can be within the maximum limits of STAS 10009/88.

*Soil and subsoil protection*

During operation, the sources of pollution are only accidental. No special soil protection measures are required.

### *Conclusions on environmental impact*

The objective itself does not affect the quality of water, air, soil, subsoil. The objective is not to produce noise, vibration or damage to human settlements and other objects of public interest. The impact of the investment is positive, with favorable influences on the environment.

#### **d) the impact of the investment objective in relation to the natural and anthropic context in which it is integrated, as the case may be.**

The project aims to improve the living and working conditions of the population of Oancea commune, the quality of the environment and the elimination of potential sources of pollution.

#### **4.5. Analysis of the demand for goods and services, which justifies the sizing of the investment objective**

Not the case.

#### **4.6. Financial analysis, including calculation of financial performance indicators: cumulative flow, net present value, internal rate of return; financial sustainability**

The main objective of the financial analysis is to calculate the indicators of the financial performance of the project (its profitability). This analysis is usually developed from the point of view of the owner (or legal administrator) of the infrastructure.

The financial analysis was carried out from the point of view of the beneficiary of the investment, Oancea commune, and was carried out for a period of operation of 15 years, in accordance with the recommendations of the European Commission for investments in small infrastructure. The discount rate used in the financial analysis is 5%. The incremental method was used in the analysis.

According to the general estimate of the project, the total cost of the

investment amounts to 103,459.97 lei, an amount that includes VAT - for scenario 1, the only one considered viable following the technical analysis.

The residual value of the project, representing the "resale value" of the objective, in the last year of analysis is 25% of the investment cost considered in the Cost-Benefit Analysis.

### **Presumed evolution of tariffs**

In calculating the evolution of tariffs, the following variations were taken into account:

- demographic growth rate (area average) of 0.5% per year;
- An average annual increase of 0.05% per year was applied to tariffs

### **Presumed evolution of operating costs**

Operating costs are additional costs generated by the use of the investment after the completion of the project. In the case presented, these operating costs consist of:

- maintenance costs
- staff costs
- other operating costs of the project (eg administrative).

The unit prices adopted coincide with the "market prices" corresponding to the time of writing of the present paper, respectively 2021. The proposed annual maintenance will reduce the danger of degradation of the objective during the year. Over the economic life of the project, this value will increase according to the scenario adopted by the evolution of the inflation rate or the increase of consumer prices.

In estimating the discount rate used, it was taken into account that this should reflect the remuneration requirement of the financier, at the level of the risk perceived and assumed by him by carrying out the project. In the cost-effectiveness analysis, the concept of residual value does not exist. In the cost-effectiveness analysis, the discount rate does not express the efficiency or cost of capital, so the actual standard discount rate for ACE is set at 5%.

The cumulative cash flow is positive in each period, showing that the beneficiary has the capacity to ensure financial sustainability after the completion of the project. Administrative costs were calculated on the assumption that they represent 10% of maintenance costs; all annual costs determined for the first year of analysis were indexed to the inflation rate, according to the scenario adopted by the evolution of this macroeconomic indicator.

#### **Calculation of financial performance indicators:**

- cumulative cash flow;
  - net present value;
  - internal rate of return;
  - cost-benefit ratio.
- cumulative cash flow;
  - net present value;
  - internal rate of return;
  - cost-benefit ratio.

**The net cash flow** represents a difference between the receipts (the amounts allocated from the local budget) and the payments generated by the analyzed investment project and expresses the gain or loss from the efficient or inefficient use of the financing funds of the investment projects.

The cash flow was determined by the relation:

$$F_t = V_t - (C_t + I_t)$$

where:  $F_t$  = cash flow

$V_t$  = income from year t

$C_t$  = expenses in year t

$I_t$  = investment in year t

It is noted that there is a gap between the time of spending the funds for the investment and the period when the financial effects of the investment are obtained. Thus, in order to make a real comparison between the effects and the efforts, it is necessary that they be brought to the same reference moment, by the method of

updating.

In practice, if you want to bring the amounts from the future to the present, the discount factor is used.

$$a = \frac{1}{(1+i)^t}$$

The main input variables in the financial analysis are:

- Reference period;
- The value of the investment;
- Discount rate;
- Operating costs;
- Revenues (financial resources allocated from the local budget to cover operating costs generated by road maintenance costs over the entire area);

The construction of cash flow, which includes all these elements, leads to the determination of financial sustainability (it is verified by a positive cumulative balance each year of the time horizon).

**Net present value (NPV)** is considered the most eloquent indicator of investment project selection. The indicator shows the actual gain in u.m. comparable to the current ones, which will benefit from the adoption of the investment project under analysis.

Net present value is defined as:

$$VANF = \sum \left( \frac{CF_t}{(1+k)^t} \right) + \frac{VR_m}{(1+k)^t} - I_0$$

where:

CF<sub>t</sub> - cash flow generated by the project in year t - the difference between revenues and related expenses;

VR<sub>n</sub> - the residual value of the investment in the last year of the analysis (25% of the investment value);

I<sub>0</sub> - the necessary investment for the implementation of the project;

**Net present financial** value is also calculated as the difference between the present value of income and the present value of expenditure.

$$VANF = VTA - CTA$$

where:

VANF = Net present financial value

ATV = Total Revenue Revenue

CTA = Updated total expenses

According to the Guide to the Cost-Benefit Analysis of Investment Projects, in the case of goods with a very long life, a residual value can be added at the end of the estimated period to reflect their potential sales value or value for further use.

### ***Internal rate of return (IRR)***

IRR represents the discount rate at which the NPV is zero. In other words, that minimum internal rate of return accepted for the project, a lower rate indicating that revenues will not cover expenses.

However, the negative IRR value can be accepted for certain projects under the financing programs, due to the fact that this type of investment is an urgent need, but without the ability to generate income: roads, sewage treatment plants, sewerage networks, water supply networks, etc.

$$VANF = \sum_{t=0}^n \frac{F_t}{(1+IRR)^t} = 0$$

### ***Cost / Benefit Ratio (RCB)***

The cost-benefit ratio is a complementary indicator of NVP, comparing the current value of future benefits with that of future costs, including the value of the investment:

$$RCB = \frac{VP(O)_0}{VP(I)_0}$$

where:

VP (O) 0 - present value of the cash outflows generated by the project during the



analyzed period (including investment costs);

VP (I) 0 - the present value of the cash flow inflows generated by the project during the analyzed period (including the residual value);

The recommended discount rate in the financial analysis is 5%.

The values entered in the financial analysis are calculated in lei and do not include VAT.

The results were centralized in the attached tables.

## **CONCLUSIONS ON THE PERFORMANCE INDICATORS OF THE INVESTMENT**

The financial profitability of the investment in the project is determined by the indicators NPV (net present value) and IRR (internal rate of return). The indicators calculated in the financial analysis must be within the following limits:

- *Net present value (NPV = - 82800) must be < 0*
- *Internal rate of return (IRR = -26.52%) must be < discount rate (5%)*
- *The cumulative cash flow being 0 every year indicates that from a financial point of view the investment requires non-reimbursable financing*
- *Cost / benefit ratio (0.05) < 1, where the costs refer to the operating costs for the reference period, and the benefits refer to the revenues obtained from the exploitation of the investment.*

Tabel pentru analiza financiară - RON

	Anii														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Venituri de la buget</b>		<b>143500</b>	<b>143919</b>	<b>144339</b>	<b>144761</b>	<b>145183</b>	<b>145607</b>	<b>146033</b>	<b>146459</b>	<b>146887</b>	<b>147316</b>	<b>147746</b>	<b>148177</b>	<b>148610</b>	<b>149044</b>
<b>Valoare reziduală</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Personal		132000	132396	132793	133192	133591	133992	134394	134797	135201	135607	136014	136422	136831	137242
Combustibil		10000	10020	10040	10060	10080	10100	10121	10141	10161	10181	10202	10222	10243	10263
Intreținere		1500	1503	1506	1509	1512	1515	1518	1521	1524	1527	1530	1533	1536	1539
<b>Total costuri operare</b>		<b>143500</b>	<b>143919</b>	<b>144339</b>	<b>144761</b>	<b>145183</b>	<b>145607</b>	<b>146033</b>	<b>146459</b>	<b>146887</b>	<b>147316</b>	<b>147746</b>	<b>148177</b>	<b>148610</b>	<b>149044</b>
Cheltuieli pentru obtinerea si amenajarea terenului	0														
Cheltuieli pentru proiectare si asistenta tehnica	40000														
Constructii si instalatii	0														
Dotari	46941														
Echipamente fara montaj si de transport	0														
Alte cheltuieli	0														
<b>Total cost investiții</b>	<b>86940</b>														
Cost de înlocuire pentru componentele cu viață scurtă															
<b>Total cheltuieli</b>	<b>86940</b>	<b>143500</b>	<b>143919</b>	<b>144339</b>	<b>144761</b>	<b>145183</b>	<b>145607</b>	<b>146033</b>	<b>146459</b>	<b>146887</b>	<b>147316</b>	<b>147746</b>	<b>148177</b>	<b>148610</b>	<b>149044</b>
<b>Flux de numerar net</b>	<b>-86940</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Rata rentabilității interne financiare (IRR) a investiției</b>	<b>-26,52% - (pentru toata perioada de 15 ani)</b>														
<b>Valoarea actuală netă financiară (NPV) a investiției</b>	<b>-82800 - (pentru toata perioada de 15 ani)</b>														

#### **4.7. Economic analysis, including calculation of economic performance indicators: net present value, internal rate of return and cost-benefit ratio**

Specific conversion factors and a standard conversion factor (SCF) were used to transform prices in the financial analysis.

Conversion factors allow the correction of market prices for distortions that deviate from long-term equilibrium value (transfers, state aid, etc.).

Conversion factors allow the calculation of social costs due to investment, operating costs and renewal of "short" life equipment. Negative externalities are added to them.

The benefits due to the purchase of the equipment were assimilated in the social value of the avoided diseases.

The price dynamics was calculated as a weighted average between the inflation coefficient and the wage coefficient.

- *Net present value (NPV = - 70957) < 0*
- *Internal rate of return (ERR = -23.39%) must be < discount rate (5%)*
- *The positive cumulative cash flow each year of the reference period indicates a partial amortization of the investment*
- *Cost / benefit ratio (0.025) < 1, where the costs refer to the operating costs for the reference period, and the benefits refer to the revenues obtained from the exploitation of the investment.*

### Factori de conversie pentru analiza economică

Tipul costului	cf	Notă
Forța de muncă și personalul	1,00	Pentru completare și conservare
Materiale	4053,00	55% echipamente și bunuri prelucrate, 45% materiale de construcții
Chirii	0,88	40% personal, 30% energie, 20% întreținere, 10%profit (cf=0)
Transport	0,88	40% personal, 30% energie, 20% întreținere, 10%profit (cf=0)
Expropriere	75,00	100% teren
Studii, inginerie de șantier, probe și alte cheltuieli gener	75,00	Absorbit de personal
Teren	1,25	Coeficientul standard x preț local (cu 30% mai mare decât prețurile pentru expropri
Echipamente	0,82	50% producție locală (SCF), 40% importuri (cf=0,85), 10% profit (cf=0)
Materiale de construcție	0,85	75% producție locală (SCF), 15% importuri (cf=0,85), 10% profit (cf=0)
Electricitate, combustibil, alte costuri energetice	0,96	SCF
Întreținere	0,97	80% personal, 20% materiale
Reactivi și alte materiale speciale	0,80	30% producție locală (SCF), 60% importuri (cf=0,85), 10% profit (cf=0)
Bunuri intermediare și servicii tehnice	0,95	70% personal, 30% bunuri prelucrate
Servicii administrative, financiare și economice	1,00	100% personal
Valoarea rezultată a costurilor de investiții	0,91	Ponderată în funcție de tipurile de costuri ale proiectului

Tabel pentru analiza economică - RON

		Anii														
	Fc(3)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Venituri de la buget</b>			143500	143919	144339	144761	145183	145607	146033	146459	146887	147316	147746	148177	148610	149044
<b>Valoarea reziduală a infrastructurii</b>	<b>0,91</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Personal	1,00		132000	132396	132793	133192	133591	133992	134394	134797	135201	135607	136014	136422	136831	137242
Combustibil	0,96		9600	9619	9638	9658	9677	9696	9716	9735	9755	9774	9794	9813	9833	9853
Intretinere	0,97		1455	1458	1461	1464	1467	1470	1473	1475	1478	1481	1484	1487	1490	1493
<b>Total costuri operare</b>			<b>143055</b>	<b>143473</b>	<b>143892</b>	<b>144313</b>	<b>144735</b>	<b>145158</b>	<b>145582</b>	<b>146008</b>	<b>146435</b>	<b>146863</b>	<b>147292</b>	<b>147723</b>	<b>148154</b>	<b>148588</b>
Forța de muncă	1,00															
Materiale de construcție	0,85															
Materiale	0,83	38961														
Studii, inginerie de șantier, probe	1,00	40000														
<b>Total cost investiții</b>		<b>78961</b>														
Costuri de înlocuire	0,91															
<b>Total cheltuieli</b>		<b>78961</b>	<b>143055</b>	<b>143473</b>	<b>143892</b>	<b>144313</b>	<b>144735</b>	<b>145158</b>	<b>145582</b>	<b>146008</b>	<b>146435</b>	<b>146863</b>	<b>147292</b>	<b>147723</b>	<b>148154</b>	<b>148588</b>
<b>Flux de numerar net</b>		<b>-78961</b>	<b>445</b>	<b>446</b>	<b>447</b>	<b>448</b>	<b>449</b>	<b>449</b>	<b>450</b>	<b>451</b>	<b>452</b>	<b>453</b>	<b>454</b>	<b>455</b>	<b>456</b>	<b>457</b>
<b>Rata rentabilității interne economice (ERR)</b>		<b>-23,39% - (pentru toata perioada de 15 ani)</b>														
<b>Valoarea actuală netă economice (ENPV)</b>		<b>-70957 - (pentru toata perioada de 15 ani)</b>														

#### 4.8. Sensitivity analysis

The sensitivity analysis consists in studying the probability that a project will obtain a satisfactory performance (in the form of the internal rate of return or net present value) as well as the variability of the result compared to the best estimate made.

The recommended risk assessment procedure is based on:

- As a first step, a sensitivity analysis, which represents the impact that the supposed changes of the variables that determine costs and benefits have on the calculated economic indices (internal rate of return and net present value);
- A second step will be to study the probable distributions of the selected variables and calculate the expected value of the project performance indicators.

The purpose of the sensitivity analysis is to select the “critical variables” of the model parameters, which are those whose variations, positive or negative, compared to the value used as the best estimate in the base case, have the greatest effect on the internal rate of return. or on the net present value. The criteria that will be adopted for the choice of critical variables differ depending on the specific project and must be correctly evaluated on a case-by-case basis. As a general criterion, it is recommended to take into account those parameters for which a variation (positive or negative) of 1% causes an increase by 1% of the internal rate of return or by 5% of the net present value.

The following points illustrate the procedure to be followed for performing a sensitivity analysis.

- a) Identifying all the variables used to calculate the outputs and inputs of economic and financial analyzes, grouping them into homogeneous categories.

##### *Identifying critical variables*

Categories	Examples of variables
Model parameters	Update rate (discount)

Price dynamics	Inflation rate, real wage growth rate, energy prices, changes in the prices of goods and services.
Application data	Population, population growth index, specific consumption, disease rate, demand formation, traffic volume, the size of the area to be irrigated, market volumes for a given commodity.
Investment costs	Construction duration (construction delays), hourly labor cost, hourly productivity, land cost, transportation cost, etc.
Operating prices	The price of used goods and services, staff costs, the price of electricity, gas and other fuels.
Quantitative parameters for operating costs	Specific consumption of energy and other goods and services, number of employees.
Income prices	Tariffs, selling prices of products or services
Quantitative parameters for income	Volume of services provided, productivity, number of users, etc
Registration prices (costs and benefits)	Coefficients for preparing market prices, time value, cost of hospitalization, cost of avoided deaths, marginal prices of goods and services, etc.
Quantitative parameters for costs and benefits	The rate of illnesses avoided, the size of the area served, etc.

b) Identification of possible deterministic dependent variables, which can lead to increased distortion of results and double recordings. It is necessary to eliminate redundant variables by choosing the most significant one or to change the model to eliminate internal dependencies. In conclusion, the variables taken into account must be as independent as possible.

c) It is advisable to perform a qualitative analysis of the impact of the variables in order to choose those that have a low or marginal elasticity. Subsequent quantitative analysis may be limited to more significant variables, checking them in case of doubt. In addition, the most important parameters for risk analysis are indicated in the sector profiles.

*Analysis of the impact of critical variables*

Parameter categories		Elasticity		
		High	Doubtful	Low
Model parameters	Update rate		X	
Price dynamics	Inflation rate	X		
	Real salary index		X	
	Changing the price of energy			X
	Changes in the price of goods and services			X
Application data	Specific consumption	X		
	Population growth rate			X
	Traffic volume	X		
Investment costs	Hourly labor cost	X		

d) Having chosen the most significant variables, we can then evaluate their elasticity by performing calculations, which are easier if we have a simple computer program to calculate the indices of the internal rate of return and / or the net present value. Each time it is necessary to assign a new value (higher or lower) for each variable or to recalculate the internal rate of return or net present value, thus noting the differences (absolute or percentage) compared to the base case.



**Tabel pentru analiza senzitivității**

<b>Schimbări ale parametrului</b>	<b>% schimbare a FNPV</b>	<b>% schimbare a ENPV</b>
<b>Dinamica prețurilor</b>		
Rata inflației de 3% și 2%	-0,8%/+0,8%	-1,2%/+2,5%
Dinamica salariilor reale la +1% și 0%	-37%/+35%	-58%/+65%
Dinamica prețului energiei egal cu inflația	-28%	12%
<b>Venituri și beneficii</b>		
Tarife pentru servicii +10% și -10%	+98%/-125%	+87%/-58%

#### **4.9. Risk analysis, risk prevention / mitigation measures**

The conditions that must exist in order to be able to implement the planned activities are:

- Favorable weather conditions for the use of equipment;
- Proper supervision of equipment;
- Framing the implementation of the project in the proposed budget.

The risks addressed at this level are:

- Low interest in jobs;
- Delays in procurement procedures for equipment supply contracts.

Adherence to the schedule of organization of procurement procedures is a hypothesis that can be checked by the project by the implementation team, but at the same time, there may be external factors that cause delays compared to the deadlines initially set. These external conditions, uncontrollable by the project, may be determined, for example, by the lack of interest of the suppliers for the type of actions to be tendered, their refusal to accept the financial conditions imposed by the procedures or the non-conformity of the submitted bids. tenders and exceeding the estimated contract period.

Achieving the specific objectives of the project is conditioned by:

- Appropriate quality level of the services that will be offered;
- The receptivity of the target group to the awareness, promotion and education campaign.

The contribution to the achievement of the general objective of the project can also be ensured by fulfilling the following conditions:

- Success in promoting and implementing the project in the target area;
- Harmonization with regional and national waste requirements.

#### **Risk management measures**

The risk management process takes place during four main stages:

- Identification;
- Evaluation;

- Treatment;
- Planning.

### **Identifying risks**

The main risks that could affect the project can be classified as follows:

- internal risks:
- delays in the procurement procedures for contracts for the provision of services and goods;
- external risks:
- Inadequate quality level of supply equipment in the target area;

### **Risk assessment**

This step is useful in determining priorities in allocating resources for risk control and financing. Risk estimation involves the design of methods for measuring the significance of risks and their application to identified risks.

Risk assessment involves quantifying the dimensions of potential risks, by delimiting the risks depending on the severity of the consequences of their occurrence - ordinal approach.

### **The ordinal approach**

The ordinal approach to the probability of occurrence of the project risks was based on the frequency (probability of occurrence of the event) and the severity of the consequences (the impact that the targeted phenomenon may have on the project). In this case, the positioning of the risks in the risk diagram is subjective and is based only on the expertise of the project team.

The most important risks identified were:

Delays in procurement procedures for product supply contracts - low frequency, medium risk;

### **Risk treatment (management)**

Risk control techniques recognized in the literature fall into two broad categories:

- techniques that reduce the probability of occurrence of the risk (frequency);
- techniques that reduce the impact of risk (severity).

The category of techniques that reduce the probability of occurrence of risks include:

- risk avoidance;
- loss prevention.

The category of techniques that reduce the impact of risks include:

- loss reduction;
- dispersion of losses exposures;
- contractual transfer of risk.

These risk control techniques can be adapted to the risks identified in the project, as follows:

No . crt.	Risk	Techniques of control	Risk management measures
1	Delays in procurement procedures for contracts for the supply of goods and services	Risk avoidance  Contractual transfer of risk	The legal person in charge of the project will be responsible for monitoring and managing the risks, so that the activities within the project will be adapted as soon as there are changes in circumstances or a risk occurs.  The essential element in avoiding this risk consists in the quality of the tender documents that will be made by the members of the evaluation commission within the beneficiary. In order to control this factor, any co-opted external experts will be called upon to supervise and verify the preparation of these documents, before being submitted to the approval of the financing authority.

## **5. OPTIMUM TECHNICAL-ECONOMIC SCENARIO, RECOMMENDED**

## 5.1. Comparison of proposed scenarios / options, from a technical, economic, financial, sustainability and risk point of view

In correspondence with the geographical, economic, social, legal and environmental particularities of Oancea commune, the following alternatives were analyzed:

### S 1:

#### Version with project - Equipment purchase:

The Local Council of Oancea commune wants to meet the request of the inhabitants of Oancea commune the purchase of equipment necessary for the disposal of plastic and organic waste.

The equipment proposed for purchase is:

No. crt	PRODUCT NAME	MU	Quantity
1.	Wood choppers / vegetable waste	Piece	2
2.	Blower for collecting dried leaves	Piece	1
3.	Manual press for plastic bottles	Piece	16
4.	Test containers for collecting plastics	Piece	6
5.	Composter with plastic barrel and rotating drum	Piece	1
6.	Garbage container with wheels	Piece	10
7.	Barrels / compost boxes	Piece	10

### S 2:

#### "Zero" variant - No project

In this version, the current situation continues, namely the combined collection of waste and its disposal in contradiction with the European rules of waste management.

Factors analyzed	Var. 1	Var. 2
- low impact on protection environment	10	1
- minimum operating risks	10	10

<b>Factors analyzed</b>	<b>Var. 1</b>	<b>Var. 2</b>
- low realization price	5	10
- resistance over time	10	1
- investment costs	5	10
<b>TOTAL</b>	<b>40</b>	<b>32</b>

The analysis of alternatives takes into account the problems facing the target area, a number of objective external factors and anticipates a coherent evaluation of the project.

## **5.2. Selection and justification of the optimal recommended scenario**

Taking into account the advantages and disadvantages presented in the table above, the implementation scenario - S1 is recommended.

## **5.3. Description of the optimal recommended scenario for:**

### **a) obtaining and arranging the land;**

The investment that is the object of the present documentation falls within the urban perimeter of Oancea commune.

### **b) ensuring the utilities necessary for the operation of the objective;**

#### *External water network*

The water supply is made from the street network.

#### *Sewerage*

Sewer connection is made in the commune network.

#### *Power supply*

The power supply is made from the street distribution network.

**c) the technical solution, including the description, from a technological, constructive, technical, functional-architectural and economic point of view, of the main works for the basic investment, correlated with the qualitative, technical and performance level resulting from the proposed technical-economic indicators;**

The project proposes the acquisition of the following types of equipment necessary to meet the specific objectives of the project "Cleaner Rivers - Cleaner Seas BSB-784":

No. crt	PRODUCT NAME	MU	Quantity
1.	Wood choppers / vegetable waste	Piece	2
2.	Blower for collecting dried leaves	Piece	1
3.	Manual press for plastic bottles	Piece	16
4.	Test containers for collecting plastics	Piece	6
5.	Composter with plastic barrel and rotating drum	Piece	1
6.	Garbage container with wheels	Piece	10
7.	Barrels / compost boxes	Piece	10

#### 1. Wood choppers / vegetable waste

Technical data: OHV engine type, 4 stroke, petrol, one cylinder, engine power 13HP, cylinder capacity 389cm<sup>3</sup>, branch cutting capacity 5cm, production capacity 3mc / h, cutting diameter 89mm

#### 2. Blower for collecting dried leaves

Technical data: 4 strokes, petrol, 3CP engine power, 140cm cylinder capacity, 105db noise level,, goggles, earphones

#### 3. Manual press for plastic bottles

Technical data: Manual press for pets with a maximum volume of 2.5 l, metal frame, wall mounting

#### 4. Test containers for collecting plastics

Technical data: Capacity 1100l, polypropylene material resistant to UV and external temperatures, size 137x107x135cm, provided with slots especially for selective collection, rubber wheels with Ø 200mm, own weight 47kg

#### 5. Composter with plastic barrel and rotating drum

Technical data: polypropylene material, black color, metal frame material, painted

black, capacity 160l, size approximately 72x69x93cm, drum size 60x64cm

#### 6. Garbage can with wheels

Technical data: Volume 240l, weight 11.4 kg, payload 96kg, overall size 70x58x105cm, for selective collection, UV resistance, low / high temperatures, chemicals, according to EN 840

#### 7. Compost barrels / boxes

Technical data: Volume 1600l, 4 compartments, 100% polypropylene material, weight 19kg, overall size 2610x791x826mm, weather resistant and provided with padlock hole

#### **d) technological tests and trials.**

Not the case. .

#### **5.4. The main technical-economic indicators related to the investment objective:**

**a) maximum indicators, respectively the total value of the investment object, expressed in lei, with VAT and, respectively, without VAT, of which constructions-assembly (C + M), in accordance with the general estimate;**

*The value of the investment, including VAT, is RON 103,459.97, of which C + M 0 RON.*

**b) indicatori minimali, respectiv indicatori de performanță - elemente fizice/capacități fizice care să indice atingerea țintei obiectivului de investiții - și, după caz, calitativi, în conformitate cu standardele, normativele și reglementările tehnice în vigoare;**

Nr. crt	DENUMIRE PRODUS	UM- bucata	Cantitate
1.	Tocătoare de lemne/resturi vegetale cu combustibil	bucata	2
2.	Suflanta pentru colectarea frunzelor uscate	bucata	1
3.	Presă manuală pentru sticle de plastic	bucata	16



4.	Recipiente de testare pentru colectarea materialelor plastice	bucata	6
5.	Compostor cu butoi de plastic si tambur rotativ	bucata	1
6.	Container gunoi cu roti	bucata	10
7.	Butoaie / cutii de compost	bucata	10

**c) financial, socio-economic, impact, result / operation indicators, established according to the specifics and target of each investment objective;**

- net present value (NPV) = -82800 Lei;
- internal rate of return (IRR) = -26.52%;
- cost / benefit ratio = 0.05.

**d) estimated duration of execution of the investment objective, expressed in months.**

Total: 12 months.

**5.5. Presentation of the way in which compliance with the regulations specific to the intended function is ensured from the point of view of ensuring all the fundamental requirements applicable to the construction, according to the degree of detail of the technical proposals**

Not the case.

**5.6. Nominalization of public investment financing sources, as a result of financial and economic analysis: own funds, bank loans, allocations from the state budget / local budget, external loans guaranteed or contracted by the state, non-reimbursable external funds, other legally constituted sources.**

The sources of financing for the proposed acquisition are constituted in accordance with the legislation in force and consist of funds granted from the own budget and the non-reimbursable financing contract for the project "Cleaner Rivers -

Cleaner Seas BSB-784”.

## **6. URBANISM, AGREEMENTS AND COMPLIANCE OPINIONS**

### **6.1. The town planning certificate issued in order to obtain the building permit**

Not the case

### **6.2. Land book extract, except in special cases, expressly provided by law**

Not the case.

### **6.3. Administrative act of the competent authority for environmental protection, measures to reduce the impact, compensation measures, the way of integrating the provisions of the environmental agreement in the technical- economic documentation**

Not the case.

### **6.4. Conformity advice on utility insurance**

Not the case.

### **6.5. Topographic study, endorsed by the Office of Cadastre and Real Estate Advertising**

Not the case.

### **6.6. Specific opinions, agreements and studies, as appropriate, depending on the specifics of the investment objective and which may condition the technical solutions**

Not the case.

## **7. IMPLEMENTATION OF THE INVESTMENT**

### **7.1. Information about the entity responsible for implementing the investment**

#### **PROJECT IMPLEMENTATION UNIT:**

- a. project manager
- b. technical managers

Responsibilities of the implementation unit in the implementation of the project:

- responsibilities for monitoring and verifying the activity of the contractor who will provide project management services, namely:

- monitoring and verifying the manner of conducting the procedures for the acquisition of goods and services, according to the legal terms and procedures;
- monitoring and verifying the way of receiving the goods
- monitoring and verifying the way of publicizing the project
- monitoring and verifying the manner of accomplishing the audit report
- monitoring and verifying the way of accomplishing the evaluation report

### **7.2. Implementation strategy, including: duration of implementation of the investment objective (in calendar months), duration of execution, investment implementation schedule, staggered investment by years, necessary resources**

Total: 12 months.

For the proper functioning of the proposed works it is necessary to ensure a qualified labor force for maintenance and operation (5 employees).

### **7.3. Operation / maintenance and maintenance strategy: steps, methods and resources required**

For the good storage of the supplied goods, it is necessary to carry out periodic controls and perform checks on them and their behavior over time.

The control also consists in checking for any deficiencies that may occur and also the need for repairs.

#### **7.4. Recommendations on ensuring managerial and institutional capacity**

The specialized IPU department within the beneficiary is responsible for both the good management of the procurement contracts necessary to achieve the investment objective, and for monitoring its behavior during operation.

### **8. CONCLUSIONS AND RECOMMENDATIONS**

This documentation is developed in order to make the purchase of equipment necessary for the disposal of plastic and organic waste.

The general objectives of this investment project are: to make new investments that will contribute to improving the protection of the population's health and comfort.

The specific objectives of this investment project are: to protect human health, reduce the risk of human disease and protect all environmental factors. Also, promoting this type of investment objective leads to improving the quality of the environment and reducing pollution sources.

General estimates, financial estimates and estimates of investment objects are attached to this project.

Supporting and developing existing actions on individual composting of bio-waste

Targeted waste: bio-waste from private households

The purpose of individual composting is to reduce the amount of biowaste generated by private households by treating and capitalizing on their own premises (yards, gardens). Taking into account the conditions for the application of this measure, primarily in terms of the space required, the related actions are aimed at rural households.

The compost resulting from biological treatment can be used as topsoil in public areas where green spaces are arranged or in agriculture. The resulting amount of compost is at least 95% of the input.

According to the data available on the APM Galați website in Galați County, there are 6 operators who hold an environmental permit for the recovery of packaging

waste in accordance with the provisions of Law 249/2015 on how to manage packaging and packaging waste.

The table below shows the economic operators authorized to recover separately recyclable waste collected separately.

Operator name	Operations performed	Designed recycling capacity (t / year)
BANGSONIC SRL, com.Vanatori	Manufacture of textile fibers by shredding, carding, textile briquetting	Textile briquetting plant
Eco-Metal Production, Com. Smârdan,	Grinding and granulation of plastic waste and manufacture of hoses, tubes, strips, foils, bags / pouches, crates / boxes / containers	Granulation plant 100 kg / h, washing plant, injection plant
FURTUNTEC SRL, Mun. Tecuci,	Manufacture of PVC furniture or products using PVC waste granules	34 t / month plastic granules

Operator name	Operations performed	Designed recycling capacity (t / year)
FURTUNTEC SRL Mun. Tecuci	Grinding and granulation of plastic waste and extrusion of PVC pipes	Machine extruded PVC pipes 437 t / y Shredder type shredder 285 kg / h
GALTEXMED, Galați	Dismantling and processing of textile waste	1800 t/y
MATT ECOINVEST SRL, Galați,	Plastic grinding / granulation, dismantling of wood waste, chopping	Grinding mill 300 kg / h plastic metal / wood shredder 1000 -2000 kg / h baling press washing line plastic waste 500 kg / h plastic granulation line
Veltav SRL, Tecuci	Grinding / granulation of plastic waste, PVC hose manufacturing	PVC hose extrusion lines with a capacity of 300 t / year.

Thus, in Galați County there are capacities for plastic waste recycling of approximately 4,400 t / year, considering the plastic waste granulation facilities. However, both for plastic and for paper, cardboard, plastic, glass and metal, there are recycling capacities at the level of region 2 SE, of which Galati county is part or in the rest of the regions.

For the recycling of plastic and metal waste, according to PNGD, the number of nationally authorized economic operators is very high, ensuring a recycling capacity of approx. 284,000 tons / year for plastic waste and 2,700,000 tons / year for metal waste, respectively. As previously mentioned, including in Galati County there are operators who ensure the recycling of plastic.

The establishment of any objectives regarding separate recycling, recovery of plastic waste, composting will be done only in compliance with national environmental regulations:

*Waste framework legislation*

At national level, the main regulatory acts in the field of waste management are the following:

- *Waste framework legislation:*

- o Law no. 211/2011 on the waste regime, republished in 2014, with subsequent amendments and completions;

- o GD no. 1061/2008 on the transport of hazardous and non-hazardous waste on Romania's territory;

- *Waste treatment legislation:*

- o GD no. 349/2005 on waste storage, with amendments and subsequent additions;

- o Law no. 278/2013 on industrial emissions;

- *Legislation on sanitation services:*

- o Law no. 51/2006 on Community utility services, republished, with subsequent amendments;

- o Law no. 101/2006 of the sanitation service of the localities, republished, with subsequent amendments;

- *Legislation on special waste streams:*

- o Law no. 249/2015 on the management of packaging and packaging waste, as subsequently amended and supplemented;

- o GEO no. 5 / 02.04.2015 on waste electrical equipment and electronic;

- o GD no. 1132/2008 on the regime of batteries and accumulators and waste of

batteries and accumulators, with subsequent amendments and completions;

o Order no. 344/2004 for the approval of the Technical Norms regarding the protection environment and especially soils, when sewage sludge is used in agriculture.

Emergency Ordinance 74/2018, published on July 19, 2018 and approved by Law 31/2019 brings fundamental amendments to Law no. 211/2011 on the waste regime, to Law no. 249/2015 on the management of packaging and packaging waste and the Government Emergency Ordinance no. 196/2005 on the Environmental Fund.

Emergency Ordinance 74/2018, approved by Law 31/2019, is a first step in ensuring an optimal legal framework for fulfilling the obligations set out in the Circular Economy package.

National legislation transposes the provisions of Community legislation in the field of waste management.

The National Waste Management Plan, approved by GD no. 942 / 20.12.2017, was published in the Official Gazette of Romania, Part I, no. 11 bis. This Plan also contains the National Waste Prevention Program. In addition to environmental legislation on waste (mainly Community legislation transposed into national law), there are a number of national regulations that impose measures and obligations on waste management.



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**Earth Forever**



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