

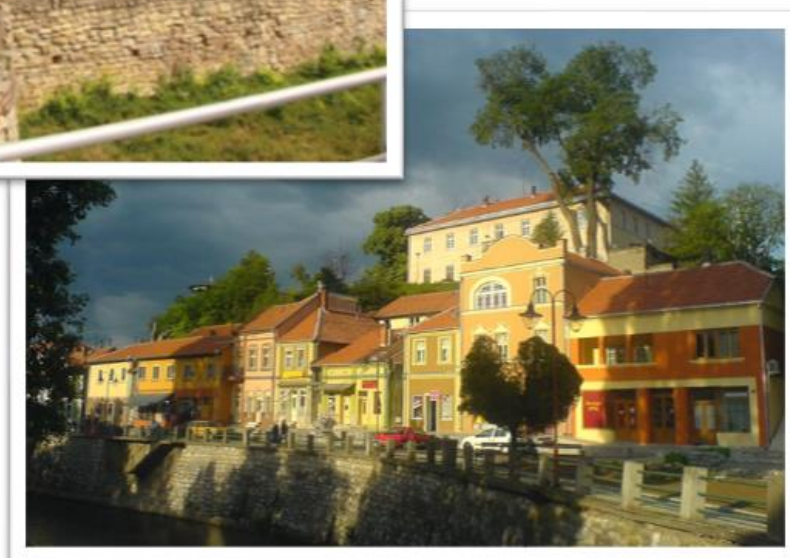


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## **JOINT ACTION PLAN FOR WASTE MANAGEMENT**

### **in the region of Kula Municipality, Republic of Bulgaria and Knjaževac Municipality, Republic of Serbia**

### **for the 2018 – 2020 period**



*Elaborated in implementation of project CB007.1.32.224 “Clean and Green Life”, co-funded by the EU through the Interreg-IPA CBC Bulgaria–Serbia Programme*

May 2018

*Prepared by: B S Project Ltd.*



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## CONTRACT SUMMARY

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<b>Contractor</b>	B S Project Ltd.
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<b>Contract activity</b>	1.5 “Development of Joint action plan for waste management in Kula-Knjazevac region”



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## ABBREVIATIONS

DDMP	Detailed Development Master Plan
DG	Directorate General
EC	European Commission
EIA	Environmental Impact Assessment
ELV	End of Life Vehicles
EPA	Environment protection act
EU	European Union
HDW	Hard Domestic Waste
LLTF	Law on Local Taxes and Fees
MOEW	Ministry of Environment and Water
MPEP	Municipal Programme for Environmental Protection
NPO	Non Profit Organisation
PCTs	Polychlorinated terphenyls
PHBs	Polychlorinated biphenyls
SDMP	Strategic Development Master Plan
WEEE	Waste electrical and electronic equipment
WFD	Waste Framework Directive
WM	Waste Management
WMA	Waste Management Act
WMP	Waste Management Programme
WWTW	Waste Water Treatment Plant



## 1 Introduction

This Joint action plan for waste management in Kula Municipality, Vidin District, Republic of Bulgaria and Knjaževac Municipality, Timok region, Republic of Serbia (2018-2020) is based on the cross-border summary assessment of the current state of the waste management sector in both cross-border municipalities, focusing on the state of the separate waste collection, reuse and recycling, as well as biodegradable waste collection and treatment, the developed summarized SWOT analysis, activities, measures and indicators for the sector.

The project is designed to stimulate nature protection in the Kula-Knjaževac area through joint initiatives for removal of unregulated dumpsites and building an eco-mindset in the cross-border population. Both mitigative and preventive measures will be employed to:

- increase waste collection capacity and frequency of service,
- decrease municipal waste transported to landfills, - trigger a behavioral change in the cross-border society with respect to waste disposal.

The project aims at removing the root causes for unregulated landfill sites and improving municipal waste management through:

- provision of modern equipment to increase waste collection capacity,
- exchange of know-how and implementation of EU best practices into a joint action plan for waste management in the Kula-Knjaževac region, round table discussions and public debates;
- awareness raising on all levels on the importance of individual and community contribution for protecting the environment in the Kula-Knjaževac region.

The present Joint Action Plan is elaborated in implementation of Activity 4 “Joint action plan for waste management in the Kula-Knjazevac region” from project CB007.1.32.224 „Clean and green life” and is based on the findings from Activity 3 “Research on current situation and EU best practices” and its results, as follows:

- 1) A morphological analysis of the waste in Kula municipality, elaborated in May 2018;
- 2) A morphological analysis of the waste in Knjazevac municipality, elaborated in April 2018;
- 3) A report on EU best practices in waste management and prevention of unregulated waste disposal, elaborated in September 2017;
- 4) A round table in Knjazevac for discussion of the above documents, held on 24<sup>th</sup> April 2018.



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A draft of the Joint Action Plan is elaborated and presented to the Contracting authority on 10<sup>th</sup> May 2018 and is discussed with the interested stakeholders from both municipalities in the following public debates:

- Public debate in Knjazevac, held on 11<sup>th</sup> May 2018;
- Public debate in Kula, held on 14<sup>th</sup> May 2018.

All relevant comments and recommendations of the interested stakeholders, received during the public debates, have been taken into account and included in the Joint Action Plan.



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## **2 SCOPE OF THE ACTION PLAN**

### **Geographic scope**

Kula Municipality that consists of one town and eight villages and Knjaževac Municipality that consists of one town and 85 villages.

### **Time frame**

The action plan is developed for the period 2018 – 2020.

### **Subject of the action plan**

The Joint action plan for waste management in Kula Municipality, Vidin District, Republic of Bulgaria and Knjaževac Municipality, Timok Region, Republic of Serbia for the period 2018 - 2020 concerns issues relating to waste treatment and recycling, including those of domestic and trade origin in the cross-border territory.





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### **3 GENERAL CHARACTERISTICS OF KULA AND KNJAŽEVAC MUNICIPALITIES**

#### **3.1 Kula Municipality**

The Kula municipality is located in the Northeast of Bulgaria, at the western reaches of the Dunav Plane, 32 kilometres from the town of Vidin. It covers an area of 280.07 km<sup>2</sup>. It borders with the municipalities of Vidin, Boynitsa, Gramada and Makresh. To the West it borders with The Republic of Serbia. The “Vrushka Chuka” border checkpoint is located on the territory of Kula municipality. This border checkpoint connects Kula with the Serbian town of Zajecar. The municipality consists of nine settlements (towns and villages). Administrative centre is the town of Kula.

The municipality is located at the western part of the Dunav Plain. The municipality of Kula has a mixed flat to hilly relief sloping slightly to the north and northeast. A number of small ditches cut the terrain and there are two significant rivers including River Topolovets and River Chichilska.

There are nine settlements on the municipal territory (a town and eight villages) with the town of Kula being the administrative centre. The municipality comprises of the following settlements: Kula, Staropatitsa, Tsar Petrovo, Topolovets, Chichil, Golemanovo, Izvor mahala, Kosta Pechovo, Poletkovtsi. The population of the municipality according to the National Statistical Institute census of 2011 is 4,615. This figure shows the continuing trend of decline of the population in this region.

#### **3.2 Knjaževac Municipality**

The Municipality of Knjaževac is located in the eastern part of Serbia, along the border with the Republic of Bulgaria, and it is a part of the Timočka Krajina region as its southernmost municipality. According to the statistical data from 2011, the Municipality covers an area of 1.202 km<sup>2</sup> and is the fourth largest municipality in the Republic of Serbia. The greater part of the Municipality of Knjaževac is the highland area. The municipality has 31 491 inhabitants, out of which 18 404 live in Knjaževac (2011 Census), which represents the administrative, economic and cultural centre of the Municipality. According to the 2011 Census, the number of households in the municipality is 11 572, and the average number of members per household is 2.7. The average population density is 26 inhabitants per km<sup>2</sup>, which classifies it as a less populated municipality. The population index for the entire municipality is only 84.7 for the period 2011/2001. In addition to Knjaževac, the Municipality of Knjaževac includes 85 villages with 13 087 inhabitants (2011 Census).

The highest point on the territory of the Municipality is Midžor on Stara Planina with the elevation of 2.169m, which is also the highest peak in Serbia. The lowest point is at the elevation of 176m and it is located in the Knjaževac basin. The city of Knjaževac is located at the mouth of the Trgovški Timok and the Svrlijski Timok, which together form the Beli Timok. The climate is moderate and continental. The hottest month is July with the average temperature of 21,3C, while the coldest is January with the average temperature of -0,8C. The average rainfall is 590.8 mm/m<sup>2</sup>. On average, there are 306 sunny days and 30 snowy days during the year.



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Knjaževac is known as the fruit and vineyard region due to the predominantly highland configuration. Nowadays, grapevines, cherries, plums and blackberries are cultivated the most. The most well-known sectors of the economy, according to which the city is known, are the machine industry, the furniture industry, the textile industry, the food industry and the leather and footwear industry. The level of employment of the population is decreasing. The private sector has the dominant place and role in the structure of the municipality's economy. Around 80% of the agricultural land is private property. The percentage of catering and tourism related to the structure of employment and generation of national income is just around 1.6%. Knjaževac has significant advantages and qualities in the development of infrastructure. It has sufficient quantities of healthy and quality drinking water. Organized water supply from the PUC system is also provided in the city and in 15 villages. Other settlements have their own water supply systems. Knjaževac is one of the few towns that have a separate system of wastewater collection, but it lacks the capacity of wastewater treatment, and it is directly released into the recipient (the Timok River).



## 4 SYSTEM FOR WASTE MANAGEMENT IN KULA AND KNJAŽEVAC MUNICIPALITY. ANALYSIS OF THE CURRENT STATE OF SEPARATE WASTE COLLECTION AND TREATMENT

### 4.1 Kula Municipality

#### 4.1.1 Introduction

The ever-increasing amount of waste generated by human activities, production and trade necessitates measures to reduce the total amount of waste, reuse and increase of recycling and recovery of waste. With the development of new technologies for treatment of waste, the opportunities expand for utilisation of waste as an alternative source of raw materials and energy, and for reduction of waste disposed at landfill.

Based on the administrative, geographic and socio-economic characteristics of the Kula municipality, the main origins of waste are:

- Households;
- Industrial sites;
- Trade and service facilities.

Waste collected on the Kula municipal territory are transported and disposed of at the Regional Landfill Site at the village of Jeglitsa in the Vidin region. The amount of collected waste is weighed by electronic scales at the landfill entrance. The municipality receives a monthly report of the date and time of arrival of the transport vehicle at the depot and the amount of disposed waste.

Table 1 presents the generated waste quantities in the Kula municipality:

Year	2012	2013	2014	2015
Domestic Waste, tons	1439	666	560	580

**Table 1:** Domestic waste generated in the Kula Municipality in 2012-2015

A morphological analysis has been carried out in the Municipality of Kula. It has been done in two zones: the first one is multi-storey buildings (more than 3 floors) and the second one is single-family houses with gardens and small retail objects. The analysis results show the following categories of waste exist in the Kula Municipality waste stream: (table 2)

Waste Category	High-rise buildings, %	Single housing, %	Average, %
Food - biodegradable	21.7	14.6	18.2
Paper and cardboard	19.2	9.1	14.1



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Waste Category	High-rise buildings, %	Single housing, %	Average, %
Plastics	14.1	12.8	13.5
Textiles	4.5	1.9	3.2
Rubber	1.3	1.0	1.2
Leather	2.5	4.9	3.7
Garden waste - biodegradable	6.4	10.1	8.3
Tree waste - biodegradable	2.0	5.3	3.7
Glass	2.1	3.4	2.8
Metal	2.5	5.5	4.0
Construction and demolition materials	5.7	10.1	7.9
Electronic equipment	0.3	0.9	0.6
Hazardous waste	0.6	0.3	0.5
Others	18.4	20.0	19.2

**Table 2:** Morphological contents of the waste Kula Municipality

The analysis of the morphological contents show that in the two zones the largest proportion is the biodegradable waste – 30% in the high-rise buildings and about 30% in the single housing areas. Second place is held by the plastic waste – 14% and 13%. Third place is the paper and cardboard waste with 19.2% and 9.1%. The next biggest category is “Other” waste between 18% and 20% for the two zones. Then construction and demolition waste with 10% and 6% respectively.

Comparison of the two zones shows no big differences, except for paper (within 4%) and garden waste (also within 4%). These small differences mean that when determining the system of waste management the Municipality can apply a single approach for all settlements within the municipality territory. An integrated system needs to be introduced for the entire municipality (and an integrated approach). It is recommended that the biodegradable waste is treated through domestic composting.

The morphological analysis shows high percentage of packaging waste in the bins for general waste, which is a sign of inefficiency of the system of separate waste collection of packaging.

A number of goods that are used long term in the households get in the waste stream several years after their purchase. There is a trend for long-term usage and storage of domestic objects within the homes for periods longer than 5 years. Because of these long-term goods that were not destroyed in the year they were bought (unlike food or newspapers for example) the relationship between household expenditure and waste generation is complicated.



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The entire municipal territory is served by an organised system of waste collection and transport. The activities relating to waste collection and transport include collection of all domestic and trade waste to the regional depot Kozia Garbina.

The frequency of waste collection is presented in the table below:

Order number	Type of vessels	Number of vessels	Frequency of collection
1	Containers “Beaver” – 1.1m <sup>3</sup> – within Kula	78	twice a month
2	Containers “Beaver” – 1.1m <sup>3</sup> – in the villages	112	twice a month
3	Buckets “Meva” – 0.111m <sup>3</sup> – within Kula	1110	twice a month

**Table 3:** Frequency of domestic waste collection in the Kula Municipality

The vessels are served by two waste transportation trucks with added capacity of 10m<sup>3</sup>. The main treatment method of waste is landfill. Until 01/09/2015 the waste collected from the territory of the Kula municipality were landfilled at the municipal depot in the area “Deri Magare” in the town of Kula. This depot did not meet the legal and regulatory requirements as outlined in Regulation No5/27.08.2013. Following Order No RD-204/14.08.2015 of the director of the Regional Inspection of Environment and Waters – Montana, the depot has been decommissioned as of 01/09/2015.

Kula municipality has been included in the Regional system of waste management in Vidin Region. A regional depot for non-hazardous waste has been constructed and set in operation. This covers the municipalities of Vidin, Belogradchik, Boynitsa, Bregovo, Gramada, Kula, Makresh, Novo selo, Ruzhintsi and Chuprene.

As the population in the Municipality is less than 10 000, the municipality is not legally obliged to provide free service for collection of separately collected domestic waste.

Resolution No 155/23.12.2014 by the Vidin council, the Municipal company “Regional depot for domestic waste – Vidin” (RDDW) was founded. This regional depot receives non-hazardous waste collected from all municipalities with the Vidin region. According to current legislation, this depot is of “non-hazardous waste depots” type. The design of this depot complies with the “non-hazardous waste depots” type and provides an underlying insulating layer. This ensures that the following waste categories can be landfilled at the regional depot:

- Domestic waste;
- Production non-hazardous waste with morphological contents close to the general domestic waste;

The depot houses the following installations that fall within the scope of the Environment Protection Act:

1. Regional depot for non-hazardous waste for the municipalities Vidin, Belogradchik, Boynitsa, Bregovo, Gramada, Dimovo, Kula, Makresh, Novo selo, Ruhintsi and Chuprene, that consists of two cells with total capacity of 516 000 tons.



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- Cell No.1 (completed) with 309 600 t capacity/ landfilled waste of 422 000m<sup>3</sup> and
- Cell No.2 (planned for a second stage) with capacity of 206 400 t/landfilled waste of 278 000 m<sup>3</sup>

The depot houses the following installations outside of the scope of the Environment Protection Act:

2. Composting installation – with maximum annual capacity for collection and treatment of 10 000 t of biodegradable waste.
3. Installation for fragmentation and sifting – with maximum annual capacity for collection and treatment of 80 000t of construction and demolition waste.

#### 4.1.2 Non-hazardous waste depot

This depot includes two cells: No.1 and No.2 for landfilling of non-hazardous waste. Of these, Cell No.1 is operational and No.2 is still in investment design phase. Cells No.1 and No.2 will be operated consecutively with Cell No.2 currently being planned for construction. In proximity to Cell No.1, there is a mound with soil, which will be used for mounding of the cells.

The depot can only receive waste fractions that are included in the list of permitted waste categories for landfilling in accordance with the Complex Permit No.389-H0/2010.

All landfilled waste is controlled. The control process includes:

- Registration of the vehicle transporting the municipal or private company waste;
- Weighing and registering of the waste;
- Direct visual control of the fractions of waste for their type and contents.

All this information is recorded and kept in a digital system for data registering – software that is linked to the control weighs at the entrance.

The unloading of the waste transport vehicles is done in accordance with the technological methods. Control is exercised over the unloaded waste. After leaving the storage site, the empty vehicles pass through disinfection trap for wheel washing.

The method of landfilling includes:

- Unloading waste into the cell;
- Spreading of the waste within the cell;
- Mounding with soil.

#### System for high-temperature biogas extraction

New gas wells are going to be constructed on the ground of Cell No.1 when the necessary technological height is reached. This is after the deposition of the first working horizon at 2.0m above the cell bottom.

There are gas wells installed at the depot on the site of a previously recultivated landfill. These are equipped with a system of conduits that transfer the biogas to incineration plants



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of the “Torch” type. Constant monitoring of the technical reliability of the installation is ensured. The methane gas critical concentration has not been reached yet, so automatic start of the incineration process can happen.

### Composting installation

The composting installation includes treatment of the biodegradable green and domestic waste, currently only from Vidin and Belogradchik with a maximum capacity of 10 000 tons/year.

The composting installation and the installation for treatment of biodegradable waste are located in the southern part of the site of the regional depot in Vidin, close to the future Cell No.2. The total area of the composting installation is 8412 m<sup>2</sup>. It is equipped with a high fence and a lockable door.

Composting is carried out by technology of controlled biological maturing in aerobic conditions of plant and food waste through their depositions in open mounds with mechanical mixing.

The composting installation includes:

- “Preparatory” section where a shredder is installed. Fragmentation and mixing of the food, plant and tree waste;
- “Fermentation” section, equipped with a mechanical stir of compost mounds – with an area of 4000 m<sup>2</sup>;
- “Ready compost” section equipped with rotation sifts where sifting and storage of the ready compost is completed.

The compost production is served by a tractor and a front loader truck.

The installation includes storage facility for raw materials with an area of 1865m<sup>2</sup> and a covered site for keeping of equipment and the ready compost with an area of 350 m<sup>2</sup> and technical roads.

### Installation for fragmentation and sifting of construction and demolition waste

The fragmentation and sifting of construction and demolition waste is located at the southernmost part of the regional depot in vicinity of the composting installation. Its total area is 4000m<sup>2</sup>.

#### 4.1.3 Schemes and forms of waste management: planning, financing and formation of fees and taxes for the services.

The collection of domestic waste on the territory of Kula municipality and its transport to the regional depot is realised by the municipal company “Eco-Titan”EOOD. The company contract includes collection of all waste from households, collection of biodegradable waste on the municipal territory and collection of waste from all public and private companies in the municipality. The operator of the municipal regional depot in the Kozia Garbina is the municipal company RDDW – Vidin.

Financing of the activities of waste management on the territory of the municipality includes the following costs:



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- Collection of domestic waste and its transport to the depots or other installations for treatment;
- Investigation, design, construction, maintenance, operation, decommissioning and monitoring of the landfill sites and other installations for waste deposition, recycling and utilisation of domestic waste, including refunds outlined by art.60 and art.64 of the Waste Management Act;
- Cleaning of the streets, squares, alleys, parks and other places for public amenity in the municipal territory.

The analysis shows increase of the domestic waste collection and transportation costs.

The reasons for this are:

1. Increase in transportation costs;
2. Increased size of payments under art.64 of the WMA.

The analysis brings the following conclusions:

1. The waste collection and waste transportation service covers 100% of the Kula Municipality;
2. Income from the “Domestic waste” fees is absolutely insufficient for covering the cost of waste collection and transportation;
3. The method of determination of the size of the fee is standard for the country – based on the tax-evaluation of the properties.

#### **4.1.4 Analysis of the public awareness on waste management**

The public awareness of the need and benefits of reducing the generated waste and waste reuse and recycling is key for the success of the system of waste management.

There is a “green” telephone line in the municipality web site where residents can submit signals and be informed on all matters related to environment protection, including those of waste management.

The municipality does not have a communication strategy related to informing the public about the waste management matters. There are annual campaigns carried out for cleaning of public spaces, which are combined with educational campaigns.

#### **4.1.5 Analysis of the provision of information**

The national legislation determining the collection of information includes the WMA and Regulation No.1/04.06.2014. The municipalities are responsible for collecting information of the organisations involved in waste activities.

The provision of information should cover the main activities on waste management, which can be grouped as follows:

- Preliminary planning;
- Secondary planning;





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- Contracts and control of contracts;
- Collection and transport of waste;
- Cleaning on the territory of the municipality;
- Deposition and treatment of waste;
- Separate collection of common types of waste;
- Control of the activities;
- Investigation, planning and construction of new facilities;
- Recultivation of old depots.

## 4.2 Knjaževac Municipality

PUC Standard Knjaževac has been operating as a public utility company since 1970. One of the main activities of the company is the collection and transport of waste in the territory of the Municipality of Knjaževac. PUC Standard provides waste collection services for people in Knjaževac and 40 villages belonging to the territory of the Municipality of Knjaževac, as well as for business companies in the Municipality of Knjaževac. Waste is collected from households, shops, catering facilities, business facilities, streets, industrial facilities, public areas of the city, from institutions that work with organic materials, and others. Waste is disposed of once a week according to the weekly waste collection plan, for all inhabitants covered by the waste collection service. PUC Standard's working hours are five days a week, 260 days a year. Waste is collected and disposed of from 40 villages, out of a total of 85, by collecting it at collection points where 120 containers of 1.1m<sup>3</sup> are placed and collected once a week. Waste is collected in 40 containers of 1.1m<sup>3</sup> and disposed of once a week from the nature park "Stara Planina", particularly from the hotel and ski resort, and during the peak seasons twice a week. PUC Standard has two lifter trucks and four dumpster trucks, 1 combined dumpster truck that can collect individual housing waste through an 80-liter waste container and that can empty containers of 1.1m<sup>3</sup> and 5m<sup>3</sup>, as well as 1 multi-cultivator machine for the collection and disposal of waste. The waste is deposited on the city's unregulated dumpsite, located near the banks of the Beli Timok. Unfortunately, there are also many unregulated landfills, which are used to dispose of various types of waste. The project for sanitation and closure of the main landfill in Knjaževac was made in 2006, but to date it has not been implemented.

In addition to the collection of the municipal waste, the collection of PET packaging is carried out in the Municipality of Knjaževac as well. There are also PET packaging containers in locations where they are needed, next to the waste containers. In 2015, 11.20 tons of PET packaging were collected and handed over, 7.36 tons were collected and handed over in 2016, and 8.20 tons of PET packaging were collected and handed over in 2017. The secondary raw materials market in the Municipality of Knjaževac has not been developed. There are no economic and other incentive mechanisms for the use of waste materials. There is no separation of waste at the place of its formation neither by PUC



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Standard nor by the private sector. There is no established and developed training and awareness-raising system for waste management.

The city landfill in Knjaževac is located about 1 km away from the city centre, and as such is in an unacceptable location because it is in the immediate vicinity of the city. The landfill has almost a square shape, with a surface of more than 3ha.

The development of the project for the transshipment station is in progress. The Municipality of Knjaževac belongs to the Timočka krajina region and is therefore included in the project for the Regional Landfill in Halovo. Considering the fact that the capacity of the city dump site in Knjaževac has been filled, and that the Regional Landfill in Halovo has not been realized yet, in the shortest amount of time, and after the construction of a transshipment station, PUC Standard Knjaževac will be forced to transport the waste to one of the nearest landfills in Niš or Pirot.

Table 1 shows the data on the amount of generated municipal waste measured in the period from the 18th of September to the 22nd of September 2017

Order number	Vehicle	Net weight of waste, t
1	Dumpster truck (license plate KŽ 004-ZŠ)	27.48
2	Dumpster truck (license plate KŽ 004-DŠ)	27.30
3	Dumpster truck (license plate KŽ 007-XB)	29.86
4	Lifter truck (license plate KŽ 001-MN)	25.14
	TOTAL:	109.78

**Table 4:** Amount of municipal waste 18th to 22nd of September 2017

Bearing in mind that the number of inhabitants encompassed by the service is 27004, the obtained data on the generation of waste per inhabitant of the Municipality of Knjaževac per day is 0,58 kg per inhabitant per day.

Table 5 below outlines the percentage of different categories of waste per sector of housing.

Waste category	SECTOR OF HOUSING		
	Individual-City %	Collective-City %	Rural %
Food waste	37.37	59.26	30.14
Paper and cardboard	9.34	5.66	6.58
Plastics	13.65	16.56	11.33



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Waste category	SECTOR OF HOUSING		
	Individual-City %	Collective-City %	Rural %
Textiles	11.86	4.36	10.60
Rubber	0.43	1.44	0.22
Leather	0.00	0.44	0.37
Garden waste	9.56	0.74	13.85
Wood	0.07	0.65	0.44
Glass	0.29	2.31	1.75
Metal	2.77	2.22	2.34
Aggregates	1.08	1.09	0.00
Hazardous waste	0.83	1.00	1.02
Rest (Ash)	12.76	4.27	21.37
TOTAL:	100.00	100.00	100.00

**Table 5:** Morphological analysis results in the Knjaževac Municipality

The table below shows the amount of collected waste in the Municipality of Knjaževac for all four periods, and in total. The average amount of waste in kilograms per capita per day and year is also given.

Period	Waste generation, t/year.	Waste generation per capita	
		kg/cpt. day	kg/cpt. year
Summer	1431.1	0.581	212.0
Autumn	1667.3	0.677	247.1
Winter	1622.9	0.659	240.5
Spring	1442.1	0.585	213.5
	<b>6163.4</b>	<b>0.625</b>	<b>228.1</b>

**Table 6:** Amount of generated municipal waste in Knjaževac Municipality

The total amount of generated municipal waste in the Municipality of Knjaževac amounts to 6163.4 tons of solid waste per year. Comparing this data with data from 2010, when the total amount of waste amounted to 5800 tons, there is a slight increase in the amount of waste. Based on the results of the measurements it can be noticed that the population of the Municipality of Knjaževac generates an average of 0.625 kg of municipal waste per day (228.1 kg / year), which is significantly below the average of the population of the Republic of Serbia generating 0,87 kg of municipal waste / day (318 kg / year ).

Based on the results of the analysis of the amount and composition of municipal waste in the Municipality of Knjaževac, it can be concluded:



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- An average of 0.625 kg of municipal waste per day is generated in the Municipality of Knjaževac, which is significantly below the average of the population of the Republic of Serbia generating 0.87 kg of municipal waste per day.
- The average morphological composition for the entire Municipality of Knjaževac is at the level of the average morphological composition for the entire Republic of Serbia.
- The share of biodegradable waste of about 50% indicates the possibility and justification for the introduction of treatment of this type of waste in the following period.
- The amount of recyclable waste materials (paper, plastic, metal and glass) is about 25%, which is not negligible considering the fact that part of the recyclables is separately classified and not registered by recording the morphological composition of municipal waste.
- When analyzing the morphological composition of municipal waste by sectors and the average numbers for all three sectors, almost identical data was observed in all records for the individual-city sector and the average numbers. This observation is very interesting from the point of view of a quick analysis of waste composition by sampling and analysis of waste only from the individual-city housing sector, which also represents the morphological composition for the entire Municipality of Knjaževac.

Based on the analysis of waste composition, it is concluded that a pilot project should be done for the introduction of the Waste Disposal System "Two Bins and Bags" for organic, other and recyclable waste, respectively.



## 5 STRATEGIC OBJECTIVES, ACTIVITIES AND INDICATORS

When developing strategic objectives, activities and indicators of the action plan into account are taken the fundamental tenets of a number of policy and planning documents of Republic of Bulgaria and Republic of Serbia. Among them is the National Strategic Plan for a phased reduction of biodegradable waste going to depots 2010 - 2020, the National Strategic Plan for management of waste from construction and demolition of Republic of Bulgaria for the period 2011 - 2020 and the draft National Plan for Management of sewage sludge.

NPWM is developed in close coordination with the Third National Plan on Climate Change, 2013-2020, and in particular in the part relating to greenhouse gas emissions by "Waste" Sector. The provisions of the National Reform Programme of Republic of Bulgaria in the implementation of the "Europe 2020" Strategy, the National Development Programme: Bulgaria 2020, the National Strategy for Regional Development 2012-2022 and the National Action Plan for Management of Persistent Organic Pollutants 2012-2020, are considered.

### 5.1 Kula Municipality

In order to assess whether the objectives have been achieved within the set timeframe, specific objectives are formulated to ensure that the general objective of the programme is attained. The municipal program is being developed and adopted for a period that should coincide with the period of operation of the National Waste Management Plan 2014-2020. The municipal programme has been developed in accordance with the structure, objectives and projections of the National Waste Management Plan (NWMP) in line with the European Sustainable Development Strategy and the Zero Waste Approach:

**OBJECTIVE 1: Reduce the harmful impact of waste by preventing its formation and encouraging its reuse.**

**OBJECTIVE 2: Increase the quantities of recycled and recovered waste by construction of a network of installations to treat the entire amount of generated waste so to reduce the risk to the population and the environment.**

**OBJECTIVE 3: Waste management that ensures a clean and safe environment.**

**OBJECTIVE 4: Making the public a key player in implementing the waste management hierarchy.**

The municipal program sets *nine specific waste management objectives* for the period 2016-2020:

1. Reduction of generated waste;
2. Achieving all pre-determined regulatory targets for the preparation of household waste for recycling by 2020;
3. Achieving pre-determined regulatory targets to reduce biodegradable and construction waste streams to landfill;



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4. Management of specific waste streams in accordance with the requirements of national legislation.
5. Sustainable financial budget of the system at affordable prices for the population;
6. Environment-friendly disposal of waste.
7. Preventing and reducing the risk of old waste pollution.
8. Establish an effective legal framework for waste management at the local level.
9. Participation of the public.

#### Quantitative dimensions of the strategic objectives

The legally defined objectives to be attained at the end of the implementation period of this program are:

<b>Domestic waste</b>	Preparation for reuse and recycling of waste materials generated by the population of paper, plastic, glass and metals as a minimum	Increase to at least 50% of their weight by 2020
<b>Construction and demolition waste</b>	Preparation for reuse, recycling and other recovery	Increase to at least 70% of their weight by 2020
<b>Domestic biodegradable waste</b>	Separate collection and recovery  Reducing the amount deposited compared to 1995	Not less than 50% of the quantity set up in 2014  Not less than 35% by 2020

**Table 7:** Quantitative dimensions of the strategic objectives in the Kula Municipality WMP

The existing recycling targets for specific waste streams - packaging waste, ELVs, WEEE are the responsibility of the respective recovery organizations, whilst the municipality is committed to cooperate and support.

### **ALTERNATIVE SCENARIOS FOR ACHIEVEMENT OF THE OBJECTIVES**

#### **Scenario 1:** „Zero scenario“.

It is assumed that:

- (1) The regional landfill operates regardless of the contribution of the pre-treatment and recycling of waste to the achievement of the objectives;
- (2) the current waste collection and waste disposal situation as well as the existing level of separate waste collection will be preserved.

#### **Scenario 2:** „Dynamic approach to waste management“



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The scenario assures the achievement of goals related to:

- Recycling of household waste from paper, metals, plastics and glass by implementing effective measures for separate collection of household waste at the source managed by the packaging recovery organisation and the municipality, separate collection of waste from other sources, use of the existing technology for the pre-treatment (separation) of mixed municipal waste and the upgrade of the same if proven necessary.
- Recultivation of the non-hazardous waste landfill in the town of Kula. - this objective was achieved and the landfill was reclaimed in 2016.
- Separate collection of waste from maintenance of green areas and transport to the regional landfill.
- Introduction of home green waste composting to reduce the amount of green waste.
- Achieving the objectives of separate collection and recycling of demolition waste and demolition of buildings through the control of construction companies provided by the municipality collecting and transporting small quantities of construction waste from repair works in households; use of RD waste recycling technology for construction waste.

Scenario 1 has the lowest current value. It is likely that the goals will not be achieved.

The costs for Scenario 2 are significantly higher and they include investments for:

- Upgrade of the existing regional landfill technologies for more efficient domestic waste recovery and prevention of greenhouse gas emissions (if the need for this is confirmed);
- Purchase of composting bins for home composting;
- Purchase of containers for separate collection of household bio-waste.

The scenarios to be formulated should only be considered in the context of choosing the optimal solution for development of the waste treatment technical infrastructure and assessing the cost of implementing the plan.

The municipal program sets nine specific waste management objectives for the period 2016-2020:

1. Reduction of generated waste.
2. Achieving all predetermined regulatory targets for the preparation of household waste for recycling by 2020.
3. Achieving predetermined regulatory targets to reduce biodegradable and construction waste streams to landfill.



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4. Management of specific waste streams in accordance with the requirements of national legislation.
5. Sustainable financial budget of the system at affordable prices for the population;
6. Environment-friendly disposal of waste.
7. Preventing and reducing the risk of old waste pollution.
8. Establish an effective legal framework for waste management at the local level.
9. Participation of the public.

## **5.2 Knjaževac Municipality**

Proper waste management, which, among other things, involves the collection of waste from at least 80% of the population, adequate transport, recycling and final disposal of the remaining waste is expensive even for large municipalities. As a rational solution to the problem, the waste management in Knjaževac municipality implicates communication with other municipalities or the establishment of regional waste management. This has been fulfilled by the establishment of a joint waste management of the Knjaževac municipality and the Bor and Zajechar districts.

From the analysis of the quantities and morphological composition of the Knjaževac municipality waste, it is evident that the quantities of waste are small, which is favourable for transportation costs and the most of the waste is biodegradable, which necessitates the consideration of options for separately collected and recycled /composted waste.

The municipal plan provides for the construction of a reloading station on the territory of Knjaževac Municipality, where the municipal collection company will deposit the waste. From that the waste will be transported by large vehicles to the regional landfill site. The plan does not provide for a waste separation facility at the reloading station due to its small quantity.

### **5.2.1 Regional landfill site**

The selected site for the landfill covers an area of about 15 ha. It is situated on a junction on the road Veliki izvor - Halovo. Although most of the new sanitary landfills are designed for 20 years operation, based on the calculation of the total amount of waste to be produced in the municipalities of the region, it can be concluded that the landfill can be operated for 30 years if reprocessing measures are in place throughout the period of use of the landfill. The landfill will consist of several trenches, each of which will be filled for approximately five years, after which it has to be closed down and regenerated. After closing a trench, a new one will start filling. The site is large enough to accommodate the necessary service buildings and facilities.

### **5.2.2 Reloading stations**





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Reloading (transfer) stations are places where waste from local waste collection vehicles is temporarily stored and transferred to larger vehicles that take them to the regional sanitary landfill. They also provide a place where non-standard vehicles (smaller vehicles, tractors, lifters, containers) and even vehicles will be brought by the citizens at a certain time for recycling or disposal. This will help local waste collection and ensure more economical and efficient transportation of waste to remote sanitary landfills. It will also help to prevent the emergence of unregulated landfills.

A reloading station will be built in Knjaževac municipality due to the great distance to the regional landfill. It will also collect non-hazardous industrial waste, bulk waste, waste oils, batteries and more.

The operating principle of the reloading station is easy: trash is unloaded from the vehicle onto a conveyor belt where the separation occurs, usually manual. Then it goes into containers where it is compacted. After filling the containers with compacted waste, they are loaded and transported to the regional landfill.

### 5.2.3 Short term objectives in the WMP of Knjaževac municipality

**The main objective** in the Waste Management Plan in Knjazewac municipality is to build a new regional landfill for the disposal of mixed municipal waste to meet EU requirements aimed at protecting the environment and human health.

**Secondly**, the objective is to clean up or close down and recultivate all identified unregulated landfills on the territory of the municipality.

### 5.2.4 Opportunities for waste management aimed at protecting the environment

Developed countries - the United States and the EU have a range of options for handling household waste. All options are related to the amount and composition of waste, but also with national strategies in the form of supporting one of the options for waste treatment, through subsidies, legal arrangements other taxes or exemptions.

For the purposes of the Plan for Waste Management in the Knjaževac municipality in accordance with the legal provisions in the Republic of Serbia, the highest priority is to build a regional landfill depot. Following that or during the construction of the regional landfill depot, some of the relevant options for waste management need to be introduced. Listed here are the best opportunities for the region of Zajecar which are based on the amount of waste, composition of waste and EU directives, as the Republic of Serbia aims at EU accession.

#### 5.2.4.1 Quantities of household waste

Quantities depend on:

- Population growth - a decrease in population in the municipality is observed;
- Economic growth (GDP);



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- Increased coverage of waste collection;
- Reduce waste by pre-sorting and preparation for recycling.

Based on an analysis of the quantities of waste and in view of the general economic conditions it is considered that the small amounts of waste currently produced in the municipality would only slightly be affected by an initial separation (as proposed in the plan for waste management in the municipality of Knjaževac ).

#### **5.2.4.2 Prevention of waste**

This measure is on top of the hierarchy of waste management. The positive results it would have would affect all areas of waste management - less waste leads to less spending on their management.

Prevention can be achieved in several ways:

- promotion of re-utilization of waste, especially packaging waste,
- promotion of clean technologies, which include recycling and recycling within their own production systems,
- development of the market of secondary raw materials,
- changing the behaviour of the population.

#### **5.2.4.3 Recycling**

Recycling is separation of specific components from the waste, such as paper, glass, plastic, metal, organic compounds and others and their preparation them for reuse. Recycling may be applied in two ways: by separating the components at the locations of the formation of waste or by subsequent (secondary) separation. Because of the small amount of waste generated in Knjaževac , a system of waste separation in households would be less efficient, compared to a set up of public waste separation facilities.



#### 5.2.4.4 Composting

Composting is a process of recycling of part of the organic waste and converting it into useful material. It is also a way to meet the requirement to reduce organic waste to be landfilled.

There are different systems for waste collection for composting – either garden waste only, or garden waste mixed with municipal solid waste.

Currently Knjaževac municipality does not envisage the construction of composting systems.

#### 5.2.4.5 Other technologies for waste recovery

In order to maximise the utilisation of resources and to reduce waste and the negative impact on the environment and human health, it is necessary to examine a maximum number of possible technologies for achieving these goals. Such technologies are: incineration, converting waste into fuel, gasification, pyrolysis and many others.

In the construction of the landfill depot, a system should be provided for the recovery of landfill gas.

#### 5.2.5 Summary of the priorities in the plan for waste management of Knjaževac municipality

The municipal plan for waste management is a document that organizes the process of waste management at the municipal level. The municipal plan must comply with the regional plan or plan that regulates the area of joint management of several municipalities. The Knjaževac municipality will form a regional waste management system together with the municipalities of Zajecar, Kladovo, Majdanpek, Boljevac, Bor and Sokobanja. The municipal plan will be coordinated with the Regional plan for waste management for the Timok region.

The municipal plan for waste management presents the current situation in the region as quantities, type of waste, methods of collection, treatment and disposal. It also determines the direction and priorities, as well as the dynamics and way of solving problems in accordance with applicable national and EU legislation on waste management in the field of environmental protection.

The plan aims to create a sustainable system for long-term waste management, especially at the municipality level, but also for the region. Given that this is a municipality with a relatively small number of people, the system of waste management should be built in a way that has minimal adverse impact on the environment and health of present and future generations, with the rational use of resources and modern principles of waste management. Also, coordinated participation of all stakeholders of waste management - state authorities, local authorities participating municipalities, households, industrial and commercial organisations, NGO structures, the businesses and of course, every individual is needed. This includes determining the most appropriate model to achieve full control over the entire flow of waste, separation, collection, transportation, treatment and disposal. System management should ensure:

- Reduction of generated waste,



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- Separation of useful components of waste,
- Rational collection and disposal of waste.

This will require investments, dynamic activities and financial and technological readiness for transition to the new operating system.

The Regional Plan for Waste Management (RWMP) in the municipalities of Zajecar, Boljevac, Bor, Kladovo, Majdanpek, Negotin and Knjaževac outlined the priority tasks (section 11. Conclusion)

1. Provision of conditions for separate collection by a system of two containers (container for recycling of waste and containers for other mixed waste);
2. Construction of a regional landfill depot at the Regional Centre in Zajecar.
3. Selection of one of the options offered by this regional plan and its timely assessment to meet all the requirements proposed by a optional solution;
4. Remediation and reclamation of illegal landfill sites in the region in accordance with the relevant acts and regulations.
5. Provision of continuous education of the public, experts and decision makers from local authorities in order to raise awareness in waste management as soon as possible.
6. As described in chapter "7.2.3 Methods of planning and financial management" the Regional plan suggests a particular step in the preparation and active work of all municipalities along with the procedure to create a new system that is durable, before building of a new regional landfill and recycling centre has started. Interaction of municipalities will be more beneficial to all parts, compared to the current situation where each municipality works for themselves each using a different approach, more or less successfully, sometimes confronted with its own problems.



## 6 SWOT ANALYSIS

The existing state of waste management has been assessed in the APC of Kula through SWOT ANALYSIS.

SWOT analysis is based on the idea of separating the subject of the strategic analysis from the environment in which it operates. The subject of strategic analysis is examined for its "strengths" and "weaknesses". The environment in which the subject of strategic analysis functions is differentiated into "opportunities" and "threats".

**Strengths.** Strengths are a resource, skill or other advantage the sector has. The strong side is a distinctive competence that gives a comparative advantage.

**Weaknesses.** Weaknesses represent the limitations or scarcity of resources, skills and abilities that seriously impede the development of the sector.

**Opportunities.** Opportunities represent the most beneficial elements of the external environment. These are optimal external factors from which the sector benefits or could benefit.

**Threats.** Threats are the most unfavourable segments of the external environment. They place the greatest barriers to the current or future (desired) state.

### 6.1.1 Strengths

- The entire territory of the Municipality of Kula is served by waste collection and disposal.
- About 50% of the Municipality of Knjaževac is served by waste collection and disposal.
- 100% of the needs of household waste containers are met in Kula and 50% in Knjaževac.
- Participation in the Regional System for Waste Management of the town of Vidin.
- Participation of Knjaževac municipality in the Regional Plan for Waste Management in the Timok Region
- Kula municipality has developed a municipal regulation regarding local waste management.

### 6.1.2 Weaknesses

- Low efficiency of the applied systems for separate waste collection of widespread waste.
- Suspended but still unrecultured landfill on the land of Kula, Deri magare area.



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- There are no projects applied, aiming at minimising biodegradable waste through household composting.
- High level of landfilling of different types of waste.
- There are no measures and incentives to reduce the amount of waste generated at local level.

### 6.1.3 Opportunities

- Use of EU financial instruments to tackle issues related to effective waste management at the local level.
- Change of public attitudes in favour of reducing the amount of waste generated and their effective management.
- High percentage of separately collected widespread waste on the territory of the municipality.
- High efficiency of the preliminary treatment of waste delivered at the regional landfill.
- Improved administrative capacity with regard to waste management activities.
- Ensuring transparency in setting a municipal waste tax for citizens and businesses and introducing the "pay as per the amount of waste generated" principle.

### 6.1.4 Threats

- Impoverishment of the population - failure to pay the fee due to cover the costs of services of waste management.
- Significant increase in the cost of household waste management and the need to raise the "Household waste" tax.
- Change in legislation at European and/or national level.
- Low efficiency of the preliminary treatment of waste delivered at the regional landfill.
- Unsuccessful collection and recycling targets for the respective reference years set in the WMA.



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## **7 STRATEGIC OBJECTIVES**

Strategic objective of the Joint action plan for waste management in Kula and Knjaževac Municipality 2018 - 2020 is to achieve regional and national targets for reducing the quantities of waste produced and increase the share of recycled organic waste, including bio-degradable waste.

### **Strategic Objective 1:**

Reducing the harmful effects of domestic and trade waste by preventing their generating and promoting their reuse.

### **Strategic Objective 2:**

Increasing the quantities of recycled and recovered waste by creating conditions for building a network of treatment facilities of all waste generated, which to reduce the risk to human health and the environment.

### **Strategic Objective 3:**

Making the public a key factor in applying the hierarchy of waste management.



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## **8 ACTION PLAN**

The Joint action plan for waste management in Kula and Knjaževac Municipalities 2018 - 2020 contains 20 specific actions/measures and related indicators that contribute to achieving the strategic objectives of the local, regional and national level on sustainable planning and waste management. The activities have been formulated on the basis of field studies in both cross-border municipalities in 2017 and a summarized cross-border assessment of the needs of the residents identified in Kula and Knjaževac Municipalities of dealing with domestic and industrial waste generated conducted within this project.





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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO1:	Specific Objective 1: Prevention of waste and encouragement of its reuse	Pilot introduction of a reduced (discounted) waste collection fee for households who apply domestic composting	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2020	Reduced waste collection fee for households who apply domestic composting	Number of households to apply domestic composting of biowaste	Kula Municipality,  Knjaževac Municipality	Ministry of Environment and Water (MOEW), Bulgaria, Ministry of Environmental Protection (MEP), Serbia, private business
SO1:	Specific Objective 1: Prevention of waste and encouragement of its reuse	Reduction of paper and other stationery waste through introduction of “electronic office”	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2020	Realised electronic administration	Number of state institutions to apply digital service that lead to reduction of paper waste;  Up to 10% reduction of paper waste from offices.	Kula Municipality,  Knjaževac Municipality	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO1:	Specific Objective 1: Prevention of waste and encouragement of its reuse	Integration of EMAS licensed or ISO certified organisations as criteria for participation in public procurement tenders	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2020	Increased number of organisations utilising systems of management	Number of certified organisations, number of public procurement tenders with such criteria	Kula Municipality,  Knjaževac Municipality	MOEW, Bulgaria, MEP, Serbia
SO1:	Specific Objective 1: Prevention of waste and encouragement of its reuse	The domestic waste collection fee is calculated based on actual amount of waste	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2020	Reduced amount of waste as a consequence of engagement of the households who pay on the basis of actual amount of waste	In 2020 the domestic waste collection fee corresponds to the actually landfilled waste	Kula Municipality,  Knjaževac Municipality  Households	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO1:	Specific Objective 1: Prevention of waste and encouragement of its reuse	Charity events for donation of second hand clothes, shoes and textiles	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Less textile waste	Reduced quantity of waste textiles annually	Kula Municipality,  Knjaževac Municipality  residents	MOEW, Bulgaria, MEP, Serbia
SO2:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Introduction of the system of separate waste collection for paper and cardboard, plastic, metal and glass.	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Increased amounts of separately collected paper and cardboard, metal, plastic and glass waste.	2020 – at least 50% of the total amount of paper, cardboard, metal, plastic and glass are prepared for reuse and recycling;	Kula Municipality,  Knjaževac Municipality  Waste utilisation organisation	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO2:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Introduction of the system of separate collection and re-use of waste electric and electronic equipment WEEE	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Increased amounts of separately collected WEEE.	At least 80% of the EEE purchased in the previous three years should be collected and prepared for reuse.	Kula Municipality,  Knjaževac Municipality  Waste utilisation organisation	MOEW, Bulgaria, MEP, Serbia
SO2:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Introduction of the system of collection and utilisation of obsolete vehicles	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	At least 95% of the weight of each obsolete vehicle that has been deposited at sites for storage and disassembly is reused or recycled.	Number of utilised vehicles	Kula Municipality,  Knjaževac Municipality  Waste vehicles utilisation organisation	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO2:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Introduction of the system of safe disposal of waste oils	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	At least 40% of the motor oils sold in the year are safely disposed of.	Amount of safely disposed of oil.	Kula Municipality,  Knjaževac Municipality  Waste vehicles utilisation organisation	MOEW, Bulgaria, MEP, Serbia
SO2:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Introduction of the system of collection and recycling of rubbers (car tyres)	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Regeneration/recycling of at least 65% of the tyres purchased each year.	Amount of regenerated/recycled tyres.	Kula Municipality,  Knjaževac Municipality  Waste vehicles utilisation organisation	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO2:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Introduction of the system of collection and recycling of batteries and accumulators	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Regeneration/recycling of at least 50% of the accumulators and batteries purchased each year	Number of collected batteries/accumulators	Kula Municipality,  Knjaževac Municipality  Waste utilisation organisation	MOEW, Bulgaria, MEP, Serbia
SO2: SO3:	Specific objective1: Achievement of the targets for reuse and recycling of at least paper and cardboard, metal, plastic and glass from households as well as similar waste from other sources.	Awareness and educational campaigns	Municipal budget	2018-2020	The population is aware of the need of separate waste collection;	Number of leaflets handed out;  Number of households who apply separate waste collection;  Number of educational initiatives conducted.	Municipality  School  Kindergarten	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO2:	Specific Objective 2:  Achievement of the required targets for biodegradable waste  Annual amount of landfilled biodegradable waste is less than 50% of the total amount of bio-waste in R. Bulgaria in 1995:	Plan the construction of composting installation on the municipal territory	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Amount of biodegradable waste delivered at the composting facility.	Reduced amount of biodegradable waste delivered at landfill.	Kula Municipality,  Knjaževac Municipality	MOEW, Bulgaria, MEP, Serbia



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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO2: SO3:	Specific Objective 2:  Achievement of the required targets for biodegradable waste  Annual amount of landfilled biodegradable waste is less than 50% of the total amount of bio-waste in R. Bulgaria in 1995:	Awareness and educational campaigns	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	The population is aware of the need of separate biodegradable waste collection;	Number of leaflets handed out;  Number of households who apply separate waste collection;  Number of educational campaigns conducted.	Kula Municipality,  Knjaževac Municipality  Households	MOEW, Bulgaria, MEP, Serbia





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Strategic Objective (SO)	Specific Objective	Activities/measures	Sources of financing	Implementation period	Expected results	Target Implementation Indicators	Responsible institutions	
							Leading	Partner
SO2:	Achievement of the targets for re-use of construction and demolition waste materials	Supervision of the compliance to the requirements for construction and demolition waste of the WMA and the Construction and demolition waste Regulations	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Actual control on the compliance to the WMA and the Construction and demolition waste Regulations	Compliance to all requirements of the WMA and the Construction and demolition waste Regulations	Kula Municipality,  Knjaževac Municipality  Construction control authority	MOEW, Bulgaria, MEP, Serbia, Ministry of regional development, Bulgaria, Ministry of construction, transport and infrastructure, Serbia
SO2:	Achievement of the targets for re-use of construction and demolition waste materials	Update of the building, other constructions (technical infrastructure) and construction mounds tender documentation templates with the requirement that recycled building materials are implemented.	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Recycled building materials are implemented in construction of buildings	2020 - 2% for buildings  2020 - 8% for technical infrastructure  2020 – 12% for mounds	Kula Municipality,  Knjaževac Municipality	MOEW, Bulgaria, MEP, Serbia, Ministry of regional development, Bulgaria, Ministry of construction, transport and infrastructure, Serbia



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							Leading	Partner
SO3:	Specific objective 1: Public agreement for the application of the waste management policy in order to successfully realise it	Introduction and maintenance of a “green telephone line” and email account where residents could log signals for rule violations as well as suggest improvements on the waste policies	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2018-2020	Residents and stakeholders are equipped with tools for logging signals and suggesting improvements	Setting the public as the key factor in waste management	Kula Municipality,  Knjaževac Municipality	MOEW, Bulgaria, MEP, Serbia,
SO3:	Specific objective 1: Public agreement for the application of the waste management policy in order to successfully realise it	Completion of the measures of the National Waste Management Communication Strategy	Municipal and state budget R. Bulgaria;  Municipal and state budget by sectors R. Serbia;  European programmes and projects.	2020	Increased public awareness on the matter of waste management	Setting the public as the key factor in waste management	Kula Municipality,  Knjaževac Municipality	MOEW, Bulgaria, MEP, Serbia,  NGOs  Media



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## 9 MONITORING AND ASSESSMENT

The main task of monitoring is to note deviations from the action plan action early enough to allow for timely correction. The monitoring will be carried out by checking the quantitative variation of indicators, which reflect the degree of progress in the implementation of measures outlined in the action plan. Coordinating bodies in monitoring and assessing the implementation of the action plan are Kula and Knjaževac Municipality. Operational units of the coordinating authorities are the departments responsible for waste management in the two municipalities.

Functions of the coordinating body:

- analyzes and assesses information about the degree of implementation of the measures in the action plan, according to the indicators;
- Assesses public importance and commitment of society to the implementation of the action plan.

The other institutions and stakeholders responsible for the implementation of the Action Plan are the relevant ministries of the Republic of Bulgaria and the Republic of Serbia - Ministry of Environment and Water, Ministry of Environment and Urban Planning and its regional divisions, business, branch organizations, research institutes and NGOs within its jurisdiction which should take action and make the necessary arrangements for implementation of the measures in the action plan, in the relevant periods, and to facilitate the coordination body in collecting and compiling information required for reporting on the implementation of the action plan.

Based on the monitoring carried out, periodic assessment of the degree of implementation of the measures in the action plan and the results of its implementation is made. The assessment of the action plan is the basis for preparation of the annual reports of municipal and cross-border level, for the results regarding the sustainable waste management. Upon finding no progress or insufficient implementation of the measures in the action plan to reduce the amount of biodegradable waste, the coordinating body for their implementation will analyze and implement the necessary changes and updates to ensure that the objectives of reducing the amount of biodegradable waste will be achieved.



## 10 RECOMMENDATIONS

In the framework of this project, a public debate was carried out with the local population in May 2018 in Kula and Knjaževac Municipalities. As a result of studies conducted local stakeholders from both target municipalities got united around common problems in the local waste management. The main recommendations are included in this action plan, but some of them require the participation of municipal structures and other stakeholders, to be promptly implemented in practice and to reduce the negative human impact on the environment:

- In both target municipalities to create Council on the Environment Protection, including representatives of local public administration, the competent state bodies, professional organizations, NGOs and other stakeholders. Structures created should meet at least once a quarter-year to discuss pressing problems.
- To nominate representatives of local residents in the two target regions to be included in the Environmental Protection Council at local level by presenting the needs of local residents and protect their interests in policy and decision making.
- To seek the cooperation and support of local and state authorities to improve relevant policies, especially those related to domestic waste treatment and recovery.
- To acquaint farmers with the damage that is inflicted on the environment and natural resources in the non-use of agricultural land for its intended purpose and inappropriate use of chemical fertilizers and pesticides.
- To encourage generation of less waste and the treatment of already generated waste in environmentally friendly way.
- Seek opportunities to supply free composting platforms to farmers in the two target regions.
- Provide opportunities for composting of agricultural and garden waste without special containers for composting - the principle of "do it yourself" using old stuff or compost pile.
- Conduct information and awareness campaigns among residents for the benefits of composting, basic principles and rules in composting.
- Conduct information campaigns presenting potential harms to the environment and threats to humanity from climate change, carbon dioxide emissions, methane and other greenhouse gases and quantities of waste accumulated in the depot. Presentation of the steps that each resident can take to help limit climate change.
- Work with children and young people to get acquainted with the basic principles of composting and its benefits - conducting workshops and information sessions with children and adolescents to build ecological thinking and behaviour.



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- Organization of joint practical measures "on the spot" with the inclusion of farmers and children - joint agricultural activities jointly, organized collection of agriculture waste, joint activities in the treatment of biodegradable waste generated by agriculture activity.
- Organization of joint seminars, trainings, workshops to share experiences, good practices and innovative approaches, as well as current developments in the application of good practices and processing of domestic and agricultural waste generated.
- Building and maintaining an online database of industries and farms in the border region, creating opportunities for cross-border partnership in the fields of agriculture and industry, good waste management practices, sustainable waste management and environmentally friendly treatment of industrial and agricultural waste.
- Promoting the principles of sustainable development and the promotion of environmentally friendly behaviour, natural resources and directed to future generations.
- Reducing pollution and resource use and minimising waste, promoting resource efficiency of businesses and farming at cross-border level.
- Sustainable use of resources, efficiency and clean technologies to help transform both trans-border states in low-carbon economies.