ОБЩИНА КУЛА
OBSCHTINA KULA

Interreg - IPA CBC
Bulgaria - Serbia

ГР. КУЛА – 3 800, УЛ. "ВЪЗРАЖДАНЕ" № 38, ТЕЛ : КМЕТ : 0938/3-20-20, ЗАМ. КМЕТ : 0938/3-22-24, e-mail : obshtinakula@abv.bg

GRAD KULA–3800, ULITSA "VAZRAZHDANE"38, TEL: KMET: 0938/3-20-20, ZAM. KMET: 0938/3-22-24, e-mail: obshtinakula@abv.bg

FINAL REPORT

FOR MORPHOLOGICAL ANALYSIS

MADE IN FAVOR OF KULA MUNICIPALITY

Developed by: Dipl. Eng. T. Chakalov

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1. INTRODUCTION

The present report is a summary of the conducted studies to determine the quantities and morphological composition of the generated waste in the municipality of Kula. The studies were carried out according to the valid "Methodology for Determining the Morphological Composition of Municipal Waste" of the Bulgarian Ministry of Environment and waters from 2012. The objective of the study is:

1. To apply the approved unified approach for determining and forecasting the quantity and the composition of municipal waste for the municipality,

2. To serve as the baseline data for the Municipality of Kula for the preparation of the Municipal Waste Management Program for the period 2015-2020.

3. To formulate quantitative measures for the achievement of the normative objectives for the municipality.

This report serves as the basis for the municipal administration to determine the optimal technical and economic activities that will ensure the implementation of the regulatory objectives for 2020 transposed from the Waste Directive 2008/98 / EC to the Bulgarian Waste Management Act, namely:

Final Objective 1 - till 1 January 2020, the preparation for re-use and recycling of waste materials at least such as paper, metal, plastic and glass from

households and possibly from other sources, as long as these waste streams resemble household waste, should be increased to at least up to 50 percent of their total weight;

The introduced intermediate objectives are:

Till 1 January 2016 - at least 25% of their total weight

Until 1 January 2018 - at least 40% of their total weight

Final Objective 2 - by 2020 the preparation for re-use, recycling and other utilization of materials, including waste balking operations with exploaration of the waste for the replacement other materials, non-hazardous construction and demolition waste, with the exception of materials in the natural state, should be increased to at least 70 % of their weight.

Final Objective 3 – Limitation of quantity of landfilled biodegradable municipal waste to 35 % of the total waste generated in the Republic Bulgaria in 1995 in term to 2020 / extended for Bulgaria from 2016 /.

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2. GENERAL INFORMATION FOR KULA MUNICIPALITY

LOCATION AND DATA FOR MUNICIPAL WASTES GENERATORS – POPULATION, SETTLEMENTS AND ECONOMIC UNITS

Kula Municipality is located in the western part of Vidin District. With its area of 279.37 km2, it occupies 5th place among the 11 municipalities of the area, which accounts for 9.15% of the territory of the district. The boundaries are as follows:

- to the north - Boynitsa municipality
- to the east - Vidin municipality;

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- to the southeast - Gramada municipality;
- to the south - Makresh municipality;
- to the west - Republic of Serbia.

The municipality unites 9 settlements with a total population of 4 717 inhabitants according to the census of 1 February 2011.

Settlement	Census (February, 2011)[1]	At current address (CRAS from 2015-03-15)[2]	Area (km²)	Density (p/km²)
Golemanovo	126	115	44,211	2.6
Izvor Mahala	98	90	25,716	3.5
Kosta Perchevo	90	80	17,263	4.63
Kula	3226	3134	63,738	49.17
Poletkovtsi	68	52	7,42	7.01
Staropatitsa	383	323	41,529	7.78
Topolovets	355	325	15,879	20.47
Tsar Petrovo	297	267	44,019	6.07
Chichil	74	68	19,595	3.47
Total for the Municipality:	**4717**	**4454**	**279,37**	**15.94**

Population reference by permanent address from GD CRAS - Municipality of Kula

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STATE OF THE SYSTEM FOR WASTE COLLECTION - MIXED HOUSEHOLD WASTE AND SEPARATED WASTE

Reported data for generated quantities of waste

Generated quantities of solid waste in the municipality of Kula (tones per year)

2012	2013	2014	2015	2016	2017
1 439 tons	666 tons	560 tons	580 tons	720 tons	887 tons

Source: Municipality of Kula

Transport schemes (transport logistics), location of the treatment installations);

In the system of waste collection and its disposal are included all settlements in the municipality. Waste transportation is carried out on a scheduled basis by specialized transport vehicles. During the spring and autumn cleaning, and during the cleaning of large-scale waste, the waste disposal is carried out more often and if it is necessary.

Separate waste collection;

On the territory of the municipality companies with a license for waste activities implementaion are operating, which collect separately waste materials from household waste generated by the population.

There are defined places for exchange of used oils; the community is informed; the activities are implememhnted by licensed companies.

Hazardous waste

On the territory of the municipality widespread hazardous waste from households and production activities is generated. Such are: rechargeable batteries, waste oils, fluorescent lamps, packaging of paints and solvents.

The data on production and hazardous waste can not fully present the actual status as they are incomplete. There is no established practice, the companies operating on the territory of the municipality to provide a copy of the completed information cards for industrial or hazardous waste, which they prepare annually and submit to RIEW and MoEW. There are no information campaigns on hazardous waste. Also a large part of the small companies, mainly in the field of footwear and tailoring industries, are serviced by the company, which carries out the activities of waste collection, transportation, and disposal of solid household waste on the territory of the municipality / without any contracts for servicing their production waste. These ompanies are served mixed with solid household waste, which is at the expense of the taxation "Household waste".

The main problems, faced by the waste management organization is the stealing of raw materials from the placed containers and their delivery to the available checkpoints for scrab, as well as the disposal of unburnt materials from the solid fuel used for heating during winter.

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3. DETERMINATION OF THE QUANTITY OF GENERATED WASTE

REPORTED DATA FROM MUNICIPAL DEPOT OF VIDIN DISTRICT FOR KULA MUNICIPALITY

The collection of municipal waste from the territory of the municipality and its transportation to the regional depot is carried out by the company "ECO-TITAN" Ltd. The subject of the contract is the collection of all waste from households, collection of municipal waste on the territory of the whole municipality, collection of waste from administrative, commercial, cultural and other public buildings.

Operator of the regional depot, located on the territory of Kozya Garbina is the municipal enterprise RDSW (Regional Depot for Solid Waste) - Vidin.

A basic prerequisite for adequate determination of the composition of municipal waste is the proper definition and assessment of the different waste streams within the three municipalities, and also the proper determination of their perentage of the total amount of waste generated.

According to the way of collection the municipal waste is defined by the following streams:

• mixed municipal waste:

- collected through containers for waste;

- waste from street bins and street cleaning.

• separately collected waste:

- separately collected recyclable waste through containers and / or sacks;

- recyclable waste delivered to waste reception centers and secondary raw material purchasing sites.

By Decision No 389-N0-I0-A0 from 23.03.2010 of the Executive Director of the Executive Environment Agency (EEA) of the Ministry of Environment and Water (MoEW), on the grounds of art. 120 of the Environmental Protection Act (EPA) and Article 11 (1) of the Ordinance on Terms and Procedure for Issuing Complex Permits to the Municipality of Vidin was issued a Complex License (CL) No 389-N0 / 2010 for construction and operation of an installation and facilities for the following category of industrial activity under Annex 4 of the EPA:

"Regional depot for non-hazardous waste for the municipalities of Vidin, Belogradchik, Boynitsa, Bregovo, Gramada, Dimovo, Kula, Makresh, Novo Selo, Ruzhintsi and Chuprene".

By decision No 155 / 23.12.2014, the Vidin Municipal Council established the municipal enterprise "Regional Depot for Solid Waste -Vidin" (RDSW). The Regional Depot accepts non-hazardous waste from the municipalities of the Vidin distrit. According to the legislation in force, the landfill refers to the "landfills for non-hazardous waste". The project is in compliance with the required "landfill for non-hazardous waste" and the corresponding bottom insulating screen is provided. This allows the landfill to dispose of the following waste:

- Mixed household waste
- Other waste from machanical treatment of waste
- Bio-degredable waste

The landfill includes two cells: No 1 and No 2 for landfilling of non-hazardous waste, of which cell No 1 is completely finished and No 2 is part from an investment project. Cells 1 and 2 of the landfill will be operated sequentially, as cell No 2

is about to be built. Close to cell No 1 there is an embankment with soil for soil - covering.

In the landfill are accepted only waste, included in the list of types of waste allowed for landfill disposal under the conditions of the complex permit under art. 117, para. 1 of the EPA (CL No 389-H0 / 2010).

All waste delivered to the landfill is controlled, the control includes:

- registration of the vehicle, carrying the waste from the municipality or from the company generating the waste;
- weighing and registration of waste;
- direct visual inspection of the waste for compliance per the type and composition of the waste;

All information is recorded and stored in the data logging system - a software system linked to the scales.

REPORTED DATA FROM BODIES WORKING FOR SEPARATE WASTE COLLECTION

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The entire territory of the municipality is covered by an organized waste collection and disposal system. The service is provided by ECO-TITAN Ltd. on the basis of a contract under the Public Procurement Law, with a deadline to 01.10.2016.

The waste collection and disposal activities include the collection and transport of solid household waste generated from residential and non-residential properties in the Municipality of Kula to the Regional Depot at Kozia Garbina.

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

No	Type of pots	Number	Frequency of collection
1.	Containers large type – 1,1 м^3 – in the city of Kula	78	2 times per month
2.	Containers large & small type in the rest of the settlements	112	2 times per month
3.	Containers small type / waste bins – 0,111 м^3 – in the city of Kula	1110	2 times per month

The containers and bins are serviced by two waste transporting trucks with a superstructure of 10 m^3.

The main method of disposal of the waste is landfilling. Until 01.09.2015 the waste collected from the territory of the municipality of Kula is deposited at the municipal depot on the territory of the city of Kula, located on the territory of "Deri magare" area, which does comply to the legal regulatory requirements, laid down in Ordinance

No 5 / 27.08.2013. By Decree No RD - 204 / 14.08.2015 of the Director of RIEW Montana, the landfill was ceased for operation, as of September 1, 2015.

Municipality of Kula is included in the Regional Waste Management System of Vidin district. A Regional depot for non-hazardous waste was built and set in operation for the municipalities of Vidin, Belogradchik, Boynitsa, Bregovo, Gramada, Dimovo, Kula, Makresh, Novo Selo, Ruzhintsi and Chuprene.

As the population of the municipality is less than 10 000 inhabitants, the municipality has no obligation to provide a free-of-charge landfill for separately collected household waste.

4. PLANNING THE MORPHOLOGIAL ANALYSIS OF MIXED MUNICIPAL WASTE

ZONING

According to the methodological requirements, the generators of waste, produced by the population can defined in accordance with:

- Division of the population from the area, covered by the survey according to the type of the settlement. Most of the conducted morphological studies prove that the size of the settlement has an impact both on the amount / rate of accumulation of waste and as well as on its composition;

- Division of the population according to the type of building – e.g. central city zone, multi-family or single-family residential zones, central heating areas and other areas with predominant usage of solid fuel, etc.

When zoning should observe the following rules:

- It is not allowed to overcover groups of waste, i.e. waste formed by the population with the same characteristics, to be classified into two separate groups;

- The flows and the groups of waste should be clearly defined so that when sampling implements, the collected test sample to originate only from the relevant group;

- When it is not possible to separate certain generators into a separate stream or group, an estimate of their share in the total amount of waste generated should be made. For an example, the waste from business entities in small settlements - shops, hotels, markets, etc. can be indicated. In case, they do not represent a significant proportion, for example 10% from the total amount of waste generated in the settlement, they can be combined with the other stream or group of waste, e.g. with the household waste for the purposes of the investigation.

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According to the methodology for conducting a morphological analysis of waste generated by municipalities, approved in 2012, the following groups of settlements differentiated:

Group I - highly urbanized settlements with a population of over 150 000 inhabitants. At present there can be included the large cities in Bulgaria - Sofia, Varna, Plovdiv and Burgas.

Group II - urbanized settlements - cities with population from 50 to 150 thousand;

Group III - 25 - 50 000 cities of intermediate type;

Group IV - settlements of 3 - 25 000 - most small towns, sometimes villages;

Group V - settlements of 0 to 3 000 inhabitants - the usual livelihood - the livestock breeding and agricultural production, determines the low consumer capacity in these regions.

Table 1 **– Breakdown of settlements by groups for the purpose of determining the morphological composition of the waste according to the Methodology of MoEW / 2012.**

Residents	**over 150 thousands**	**50-150 thousands**	**25-50 thousands**	**3-25 thousands**	**below 3 thousands**
Construction type	Mostly high, low to 10%	Mostly high, low to 20%	Mostly high, low to 40%	balanced, high and low, varying in limits 40-60%	Mostly low, high to 10%
Rural / Urban	Urban, to 10% rural in incorporated	Urban, to 15% rural in	Urban, to 20% rural in	Mostly Urban type to 40%	Rural type

	villages/ quarters	incorporated villages/ quarters	incorporated villages/ quarters	rural in incorporated villages/ quarters	
Central heating/ Gasification	Services for central heating is used by 30%-50%, solid fuel to 25%	Central heating users are small number 40 % solid fuel	No central heating, 50 % solid fuel	No central heating, 65 % solid fuel	No central heating,, 80% solid fuel
Life standards	Higher than the average	Around and above the average	Average	Around and below the average	Below the average
Unemployment and commuting workers	Below average level, commiting workers	Around and above the average	Average	Around and below the average	Higher
Tourism	Below 10 realized overnights per inhabitant	Below 10 realized overnights per inhabitant	Below 10 realized overnights per inhabitant	Below 10 realized overnights per inhabitant	Below 10 realized overnights per inhabitant
University, students flow	None	There are	Individuall y	None	None

Kula municipality gets into the IV group.

There is no distinct resort complex within the municipality of Kula..

The generators of waste from the business explore the municipal waste collection system.

The division of zones should be justified by different waste generation conditions. For example: in the central part there are more offices, shops, hotels; in the low-construction and yards areas, an increased amount of garden waste is expected; quarters without central heating generate more inert waste.

According to the MoEW Methodology from 2012, in order to prevent unnecessary detailed zoning, the following is recommended:

For municipalities with generated waste up to 1500 tons per year - zoning is not applied;

For municipalities with generated waste up to 7500 tonnes per year - the zoning includes up to 2, or when exceptional cases - up to 3 zones;

When the amounts of waste generated are larger - zoning is allowed in accordance with the capacity and the disposition of the assignor.

For the municipality of Kula, where the expected annual amount of generated waste is 6, 200 tons / year, we have zoned 2 separate sectors, which cover the main waste generators.

Guided by the above regulations and principles, the following zoning was implemented to conduct the survey in the municipality of Kula:

- Waste generated by high-constructions areas (collective housing);
- Waste from low-constructions areas (individual housing).

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SAMPLE-COLLECTING SCHEME

The investigated waste was separated into the following fractions:

- Food waste;
- Paper and cardboard;
- Plastics;

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- Textiles;
- Rubber;
- Leather;
- Garden waste;
- Wood;
- Glass;
- Metals;
- Aggregates;
- Hazardous waste;
- Others – non-determinable.

Following the methodology regulations, the analysis is done at least once per every 3 seasons. During years with no analysis done, the results from the latter one are used for the calculations.

Determined is the minimal number of samples for the sample – collection process, according to the attached table:

Table 2 – Required minimum number of samples to determine the morphological composition according to the population of the municipality

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Generated mixed municipal waste in tons per year	*number of samples per season*	*number of samples per year*
5 000	1	4
8 000	2	8
12 000	3	12
18 000	4	16
28 000	5	20
40 000	6	24
52 000	7	28
65 000	8	32
80 000	9	36
100 000	10	40
130 000	11	44
170 000	12	48
220 000	13	52
280 000	14	56
350 000	15	60
430 000	16	64
500 000	17	68

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over 500 000	**18**	**72**

For Kula municipality, the applicable minimum number of samples is 1, i.e. at least 4 samples.

Considering the necessity a vivid plan for the achievement of the targets for recycling by the end of 2017, an immediate investigation was launched at the conclusion of the contract - at the end of August / early September 2017, when was a predominantly summer weather.

We conclude, that the following seasonal factors will affect the conducted investigation:

- Seasonal increase of green waste in spring;
- Consumption of various types of foods (for the summer food consumption is typical the large amounts of waste generation);
- Seasonal commuting citizens who may visit the region for touristic or other purpose (e.g. training in local eduational facilities).

We can not precisely conclude about the seasonal factor - the accumulation of ashes and sinders during the cold months, for which will rely on the observations of the municipal enterprise operating the activities. It is certain that an increase of the inert fraction will be observed during the winter, due to the predominant heating based on solid fuel in the municipality.

5. PRACTICAL CONDUCTING OF MORPHOLOGICAL ANALYSIS OF MIXED MUNICIPAL WASTE

SELECTED METHODOLOGY

The method of collecting mixed waste does not, in principle, affect the composition and the quantities of the waste. The collection and the transportation of the waste is important for the subsequent processing of the sample and the obtaining of adequate and accurate results from the analyses. In general, we can define them as:

- Uncompact waste collected by removable containers - This waste has the

same bulk density, as loaded in the container. The distinct fractions are not mixed and are relatively easy to separate.

- Compact waste collected with garbage trucks - including:

  - compaction with roto - press;

  - compaction with vario - press.

Depending on the method of collection, there are also minor differences in field waste sampling, which have an impact on the analysis. For example, the amount of undetectable waste is increasing.

Inadmissible for testing are the samples, for which is defined the presence of different types generators, e.g. established presence of more than 50% constructional or other waste in the sample tested.

PLACE AND DESCRIPTION OF THE EQUIPMENT USED

To weigh the distinct fractions, which were separated into sacks, we used a scales - industrial electronic appliance - 600 kg capacity, measurement capabilities with an tolerance of up to 20 kg; electronic reporting, installed at the platform.

Large container 1100 м^3, individualy delivered with the garbage truck, serving the respective area.

Sieve - wooden, manual, with holes size - 40 by 40 mm.

Plastic sacks for collection and weighing of distinct components of waste for determining their morphological composition;

Shovels, pitchfork, work clothes and personal protective appliances for the workers participating.

A complete investigation of the content of the seleted as representive for the route, full large container - 1100 m^3 was implemented. This volume was spread over the designated platform and was sorted according to the fractions determined in the sampling scheme. All fractions were loaded into plastic sacks and then were weighted.

After initial sorting of the large fractions was completed, the remainings were sifted through clean 4 cm holes sieve, the weight of the coarse and the fine fraction were determined and the fine fraction was described and classified as others.

6. DETERMINATION OF THE MORPHOLOGIAL STRUCTURE

CALCULATION OF THE VOLUME WEIGHT OF GENE-RATED MUNICIPLAT WASTE IN THE MUNICIPALITY OF KULA

In the containers the average density is 103 kg/m3.

In order to determine the expected quantity of transported waste on a truck's course, we have also defined the volume weight of the waste analyzed by zones in the garbage truck – vario press - with recognized compaction of 2.5 times during loading.

Table 3 - Determination of the morphological structure of the waste for the entire municipality of Kula

Morphological Structure	Total municipal waste for the Municipality	
Generated total quantity in tons / year		887
	Average weighted results for city Kula %	tons/ year
o Food waste;	13.36%	118.50
o Paper and cardboard;	4.83%	42.84
o Plastics;	10.18%	90.30
o Textiles;	3.80%	33.71
o Rubber;	0.50%	4.44
o Lather;	0.55%	4.88
o Garden waste;	28.21%	250.22
o Wood;	7.55%	66.97
o Glass;	4.89%	43.47
o Metal	1.27%	11.26
o Aggregates – large & medium;	22.76%	201.88
o Hazardous waste;	0.42%	3.73

o Others – non-determinable	**1.68%**	14.90
Total:	**100.00%**	887.00
Weight of the fine fraction less 40 mm	**35.43%**	314.26
Weight of the coarse fraction bigger 40 mm	**64.57%**	572.74
Total:		**887.00**
Assumed humidity - %		**20.00%**
Annual dry quantity waste in dry ton / year		**709.60**

REASSESMENT OF THE FRUCTION "OTHERS"

Considering that waste collection is mixed and that garbage trucks are used to compact to some extent the waste, the "Others" fraction,

o Others - indeterminable	**1.68%**	**14.90 t/year**

and since municipalities do not have their own researches and analysis to provide information on the content of the "Others" fraction, for their reassesment and determination – an redistribution is conducted according to the principle laid down in the Methodology for Determining the Morphological Structure of Municipal Waste:

Table 4 - Reassesment and distribution of the other fraction following the Methodology of the Ministry of Environment and Waters

Food waste	**12.00%**
Paper and cardboard	**4.00%**
Plastics	**2.00%**
Textiles	**1.00%**
Rubber	**0.00%**
Lather	**0.00%**
Garden waste	**8.00%**
Wood	**0.80%**
Glass	**6.20%**
Metal	**2.00%**
Aggregates	**64.00%**
Huzardous waste	**0.00%**
	100.00%

The results obtained are presented in the following Table 5:

Table 5. Recalculated structure of mixed municipal waste per fraction after the reassesmet of "Others" fruction, Municipality Kula

o Food waste;	13.38%
o Paper and cardboard;	4.84%
o Plastics;	10.18%
o Textiles;	3.80%
o Rubber;	0.50%
o Lather;	0.55%
o Garden waste;	28.22%
o Wood;	7.55%
o Glass;	4.90%
o Metal	1.27%
o Aggregates – large & medium;	22.86%
o Hazardous waste;	0.42%
Total:	100.00%

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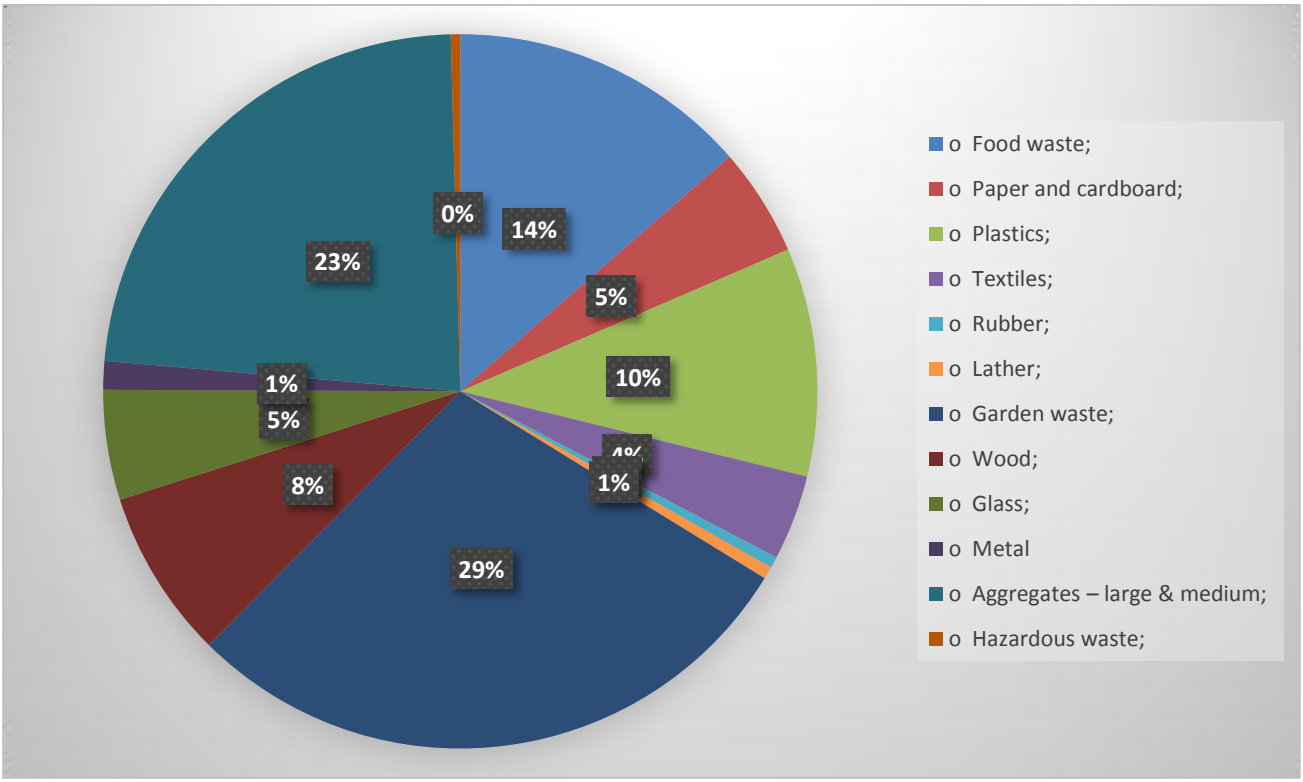

Fig. 1 Morphological Structure of waste at Municipalty Kula

CALCULATION OF THE GENERATED QUANTITIES MUNICIPAL WASTE PER FRACTIONS

The calculated fractions of all analysed municipal waste in the municipality are presented in the following table.

Направено е изчисление на масата по фракции за 2015 година, както и към 2020 година – предвид очакваното намаление на генерираното количество отпадъци съгласно демографската тенденция на отрицателен прираст на населението. A mass fraction is calculated for 2015 as well as for 2020, taking into consideration the expected decrease in the amount of waste generated in accordance with the the demographic trend of negative population growth.

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Table 6 - The municipal waste generated in the municipality of Kula by fractions

% Structure	Type Fraction	TONS/YEAR During 2017	TONS/YEAR During 2020
13.38%	o *Food waste;*	118.66	106.56
4.84%	o *Paper and cardboard;*	42.89	38.52
10.18%	o *Plastics;*	90.32	81.11
3.80%	o *Textiles;*	33.72	30.28
0.50%	o *Rubber;*	4.44	3.98
0.55%	o *Lather;*	4.88	4.38
28.22%	o *Garden waste;*	250.33	224.79
7.55%	o *Wood;*	66.98	60.15
4.90%	o *Glass;*	43.46	39.02
1.27%	o *Metal*	11.29	10.14
22.86%	o *Aggregates – large & medium;*	202.73	182.05
0.42%	o *Hazardous waste;*	3.73	3.35
100 %	Total:	887.00	784.33

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7. FINAL NOTES

THE PURPOSE OF THE PRESENT REPORT

1. To present to the management of Kula municipality clear quantitative measures for the achievement of the legal objectives defined in the Waste Management Law.
2. To create a basis for longer-term predictability for investments and change in waste management activities.

3. To assess the content of the recyclable materials - paper, plastic, glass, metals, for which the municipality has legal requirements to undertake actions and measures for the achievement of the recycling of 50% of them.

4. To acomplish an evaluation of the the biodegradable waste substances for which the municipality has legal requirement to reduce by 35%, and subsequently by 50% the quantity, which is transferred for landfilling.

THE ACCUMULATION RATE OF THE WASTE

Type of Settlements (population)	above 150 thous.	50-150 thous.	25-50 thous.	3-25 thous.	below 3 thous.
Accumulation Rate	410.3	349.6	334.9	295.5	241.7

In the methodology for determining the morphological structure of the municipsl waste as a norm of accumulation, 5 groups of settlements are evolved, as for Kula municipality it varies between 295, 5 and 241, 7 kg / resident / day. On the basis of the conduted analyzes and applying the existing methodologies of the Ministry of

Environment and Waters, and the exemplary rates for the accumulation of the waste, an prognosis of the quantity of waste is completed.

The results of the analyses of the morphological structure show that in both residential areas the largest amount is the biodegradable waste – 51,84% for individual housing (low constructions areas) and 46,46% for collective housing (high constructions areas). Follow the aggregates (inert) - large and medium sized with minor variations for the two zones - from 23,31 to 22,41%. Third pace is occupied by the plastics - products and packagings from 10,51 to 9,85%. Then comes the glass waste - from 5,10 to 4,70%, tracked by the groups of paper and cardboard from 4,95 to 4,72%, of textiles from 4,15 to 3,45% and of metals from 1,42 to 1,12%.

The differences in waste morphology of the two residential areas do not show great differences. These small differences mean that when defining the waste management system, in the municipality an unified approach can be applied for all settlements included in the municipality. For the whole municipality, an unified waste management system (single approach) needs to be introduced.

It is recommended that biodegradable waste be handled by the owners through home composting units.

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QUANTATIVE MEASURES FOR ACCTIVITIES PLANNING BY THE MUNICIPALTY FOR TARGETS ACHIEVEMENT FOR THE PREPARATION OF WASTE RECYCLING & UTILIZATION

The developed waste management action plans should contain specific quantitative measures for the achievement of the final and intermediate targets. Apart from being tools for monitoring of the extent to which targets are fulfilled, these quantitative indicators could also serve as guidelines for cost-effective approaches and measures to achieve resource-oriented waste management.

When determining the quantitative measures - indicators for achieving the targets, the negative trend of the population decrease, respectively the decrease of the waste generated in the years from 2015 to 2020, should be taken into consideration.

After determining the annual quantities in tons per year, the neessary waste to be prepared for recycling and disposal, conclusions were drawn for which is the

most effective way for the municipality to achieve the normative targets at the most affordable price for the population.

There is a need of efforts for the organization of an efficient system for the utilization of packaging waste. We recommend the following approach:

- Concluding contractual agreements with clear quantitative targets with all interested parties for the packaging utilization and other licenced organizations deaing with the separate collection at the source.

- Introducing in the municipal normative documents a regular reporting of the separately collected quantities of waste from all the organizations operating on the territory of the municipality licensed under Article 35 of the Waste Management Law.

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