

*Task 1: Review and Determination of
Waste Flow Predictions
EPCM Contract for New MRF - WasteServ*

WASTESERV MALTA LIMITED

CT2050/2019

SERVICE TENDER FOR THE ENGINEERING, PROCUREMENT
AND CONSTRUCTION OF A NEW MATERIALS RECOVERY
FACILITY

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1.0 INTRODUCTION

The development of a Materials Recovery Facility (MRF) is for the treatment of source separated dry recyclables separated and co-mingled dry recyclables.

In Task 1, E&D are to prepare:

1. An assessment of the current situation (review and determination of waste flow predictions)
2. A Demand Analysis (including projection of waste streams up to 2030)
3. Design standards

This report presents the *Assessment of the Current Situation*.

1.1 Approach

This report reviews and establishes current waste types and quantities based on existing data, characterisation and information provided by WSM and from other sources.

The result of this review is presented as a spreadsheet mass balance/Sankey Diagram in this report. The Sankey approach presents the possible material types and quantities that could be recovered in the current situation.

Following the completion and approval by WSM of this study, E&D will proceed to determine expected annual capacity of the MRF plant based on predicted waste arisings until 2030 and present such findings in *A Demand Analysis Report*.

Based on these predictions and approval by WSM, E&D will prepare *An Assessment of different available technologies for MRFs Report*.

2.0 DATA SOURCES

The Data Sources that have been used in this report include:

- WSM data: *Data Statistics 2019*, provided by email Friday 05/06/2020 13:25
- Cortis, R. (2019). *Waste-to-Energy Scientific Data Analysis Report*
- WSM Characterisation of mixed packaging waste (grey bags and mixed packaging) provided by email on 11/11/2020 13:15
- WSM characterisation of paper and cardboard in MSW, provided by email dated 18/08/2020 16:56

3.0 ABBREVIATIONS

Abbreviation	Definition
E & D	Environment & Design
Fe	Ferrous metals
HDPE	High-density polyethylene
KTS	Tal-Kus
MN	Malta North
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
MxdPL	Mixed plastics
Non-Fe	Non-ferrous metals
PET	Polyethylene terephthalate (plastic bottles)
PP	Polypropylene
Ppr_Cbd	Paper and cardboard
PS	Polystyrene
SAWTP	Sant Antnin Waste Treatment Plant
TTF	Thermal Treatment Facility
WEEE	Waste electrical and electronic equipment
WSM	WasteServ Malta

4.0 METHODOLOGY

The year 2019 is used as the basis year for the purpose of establishing the so called “Current Situation”. This exercise was based on the tonnage of waste received in WasteServ facilities located in Malta, and involved its characterisation into separate sub-categories to quantify the recyclable portion of the waste which may be processed at the MRF. The tonnage of waste received at the Tal-Kus facility based in Gozo was not considered in this report. Recyclable waste collected in Gozo was not factored in as it is currently treated at this facility and will not be diverted to the MRF when the plant is in operation.

The recyclable portion of the MSW was categorised using the proportions reported in the *Waste-to-Energy Scientific Data Analysis Report* (Cortis, 2019), which were derived from a sampling exercise on waste received throughout November 2017 to November 2018. Similarly, the different recyclable components which are received collectively as mixed packaging waste were quantified by utilising characterisation data provided by WSM.

These data sources provided a collective tonnage for paper and cardboard. However, tonnage data recorded by WSM for inputs of cardboard at SAWTP, and the proportion of paper and cardboard in MSW (Cortis, 2019) indicate that cardboard and paper are in a proportion of 1:9 in MSW. This ratio was employed to determine the respective tonnages of these two waste streams for waste collected in 2019.

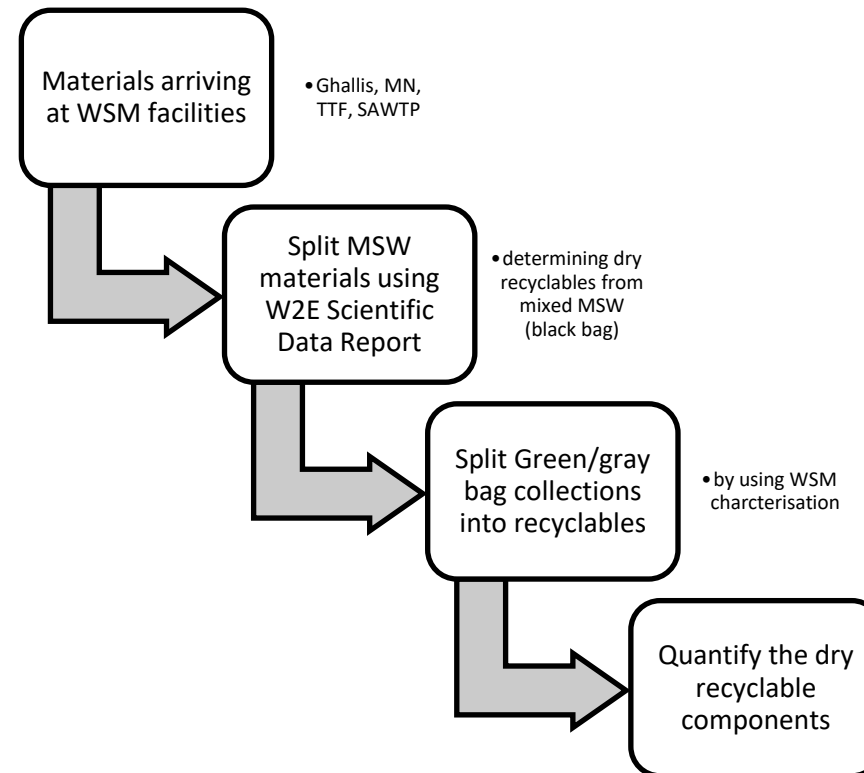


Figure 1: Methodology flow chart

5.0 DETERMINATION OF DRY RECYCLABLES

Waste by type and quantity received at the WSM facilities in 2019 have been provided by WSM. An extract of the relevant waste streams for the purposes of the MRF is summarised in Table 1. The bulk (79%) of the waste materials received at WSM are mixed Municipal Solid Waste (MSW), arriving at WSM mostly in “black bags” (158,475 tonnes out of a total of 200,698 tonnes). The remaining tonnage comprises of mixed packaging waste and glass, which are collected either in “green/grey bags” or as separate waste streams, and plastics, metals and paper and cardboard which are collected as source-separated waste.

Table 1: Extract of waste received at WSM facilities 2019 (source WSM 5 June 2020)

MSW, and C&I waste resembling MSW, received at WSM facilities in 2019	
Paper	2,149 ¹
Cardboard	239 ¹
Plastics	751
Metals	1,297
Mixed packaging (<i>grey bags collection & mixed packaging</i>)	28,988
Glass (<i>Includes Glass collected through Grey Bag Collection</i>)	8,799
Mixed MSW	158,475
Total MSW (and C&I resembling MSW)	200,698

Tonnes

¹ The ratio cardboard : paper is 1:9 (as provided by WSM, 2020)

Within the MSW, there exists a quantity of dry-recyclables that is currently being lost and which at some point in the future, these dry-recyclables are expected to be processed in the new MRF facility.

In order to estimate the amounts of dry-recyclables within the MSW, the results of a year-long study conducted throughout November 2017 to November 2018 were utilised to determine the relative proportions of the different components found in MSW. The derived proportions were then applied to the 158,475 t of mixed MSW which were received by WSM throughout 2019. The percentages and derived quantities of glass, paper, cardboard, ferrous metals, non-ferrous metals, mixed plastics, HDPE and plastic film are shown in Table 2. These collectively amount to 36 % of the MSW waste collected in 2019 and may be treated at the MRF. The remaining 64 % comprise of feedstock which is unsuitable for treatment at the facility.

Table 2: Composition of household MSW derived from the *Waste-to-Energy Scientific Data Analysis Report*

Waste Category	Proportion of waste in MSW received in 2018	Derived quantities of MSW received in 2019
Glass	3.71 %	5,882 t
Ppr	9.20 %	14,576 t ¹
Cbd	1.02 %	1,620 t ¹
Fe	1.51 %	2,388 t
Non-Fe	1.40 %	2,214 t
MxdPL	5.12 %	8,107 t
HDPE	3.71 %	5,878 t
Film	10.61 %	16,816 t
Unsuitable feedstock	63.73 %	100,994 t
Total	100 %	158,475 t

¹ The ratio cardboard : paper is 1:9 (as provided by WSM, 2020)

Furthermore, waste characterisation data provided by WSM for mixed packaging waste (green/grey bag collection & mixed packaging) was used to obtain more detail of the quantities and type of dry recyclables present in this particular waste stream. The percentage of each component shown in Table 3 are the average percentages derived from seven characterisation exercises conducted from the third quarter of 2015 to the first quarter of 2017. These percentages were applied to the 28,988 t of mixed packaging waste collected in 2019, to quantify the fractions which may be processed at the MRF (i.e. glass, paper, cardboard, metals, and plastics), and the proportion of the feedstocks that is unsuitable for the facility (Table 4). Following the introduction of the separate collection of the organic fraction (white bag), the amount of mixed packaging waste increased and is reflected in the 2019 figures. Despite this increase, the observed proportions of the different types of materials in the green/grey bag (mixed packaging waste collections) remained practically the same.

Table 3: Percentage components of mixed packaging waste (source WSM 5 June 2020)

Component of Mixed Packaging waste (grey bags and mixed packaging)	Average percentage recorded in seven characterization exercises conducted in 2015 to 2017
HDPE	3.83%
Jablo	0.37%
Other Plastics	1.35%
PET Clear	8.82%
PET Colour	3.35%
Plastic Film	5.08%
PP	0.98%
PS	0.76%
Cardboard	5.27%
Cardboard + Plastic	0.42%
Greyboard	6.23%

Other Cardboard (>60 x 60cm)	11.77%
Spoilt Cardboard	1.13%
Ferrous	4.44 %
Non-Ferrous	0.80%
Magazines, etc	11.47%
Newspapers	2.94%
Office Paper (Colour)	3.05%
Office Paper (White)	5.68%
Milk Cartons	1.09%
Tetrapaks	0.79%
Glass	1.68%
Rejects	12.95%
Rejects (< 50 x 50 mm)	5.46%
WEEE	0.27%

Table 4: Composition of mixed packaging waste collected in 2019

Waste Cluster	Components	Quantity
Glass	Glass	488 t
Paper	Mixed paper (magazines, newspapers and office paper)	6,708 t
	Greyboard	5,219 t
Cardboard	Cardboard	1,528 t
	Multi-layer materials	545 t
Metals	Ferrous metals	1,288 t
	Non-ferrous metals	231 t
Plastics	HDPE	1,111 t
	Polystyrene	329 t
	Mixed plastics	393 t
	PET (clear and coloured)	3,526 t
	PP + Film	1,757 t
Unsuitable feedstock	Rejects	5,744 t
	RDF	121 t
Total		28,988 t

5.1 Categorising dry recyclables

The waste types that will be accepted and processed by the MRF are shown in Table 5. These are defined using specific EWC codes as established by the Commission Decision 2000/532.

Table 5: Legend of waste types and EWC codes

<i>Stream</i>	<i>Description of Waste INPUT to MRF</i>	<i>EWC*</i>	<i>Received at gate of MRF</i>	<i>EWC**</i>	<i>Received at gate of MRF</i>
MSW	Mixed MSW (Black bag collections)	20 03 01	No		
MxPW	Mixed packaging (Green/grey bag collections)			15 01 06	Yes
GL	Glass	20 01 02	Yes	15 01 07	Yes
PL	Plastics unsorted	20 01 39	Yes	15 01 02	Yes
HDPE	HDPE	20 01 39	Yes	15 01 02	Yes
PS	Polystyrene & Expanded PS (Jablo)	20 01 39	Yes	15 01 02	Yes
PET_Clr	PET Clear	20 01 39	No	15 01 02	Yes
PET_ClrD	PET Colour	20 01 39	No	15 01 02	Yes
Film	Plastic Film	20 01 39	Yes	15 01 02	Yes
PP	Polypropylene	20 01 39	No	15 01 02	Yes
Mtl	Metals unsorted	20 01 40	No	15 01 04	Yes
Fe	Ferrous metals	20 01 40	No	15 01 04	Yes
NonFe	Non-Ferrous metals	20 01 40	No	15 01 04	Yes
P_Cb	Paper and cardboard (mixed)	20 01 01	Yes	15 01 01	Yes
Cb	Cardboard	20 01 01	Yes	15 01 01	Yes
Gbrd	Greyboard	20 01 01	Yes	15 01 01	Yes
MxdPpr	Magazines, newspaper, office paper	20 01 01	Yes		
M_layer	Multi-layer materials (Tetrapacks, milk cartons, etc)			15 01 05	Yes
RDF	Plastics + Paper (mixed RDF)	19 12 10	No		
MSWMisc	Municipal wastes not otherwise specified	20 03 99	No		

6.0 CONCLUSIONS

The waste characterisation exercise carried out in this *Assessment of Current Situation Report* is based on the tonnage of waste received at WSM facilities during 2019 (basis year).

A total of 200,698 tonnes of MSW (originating from black bag and green/grey bag collections and waste from commercial & industrial sources similar to MSW) was received at WSM facilities during the basis year. More than half of the received material (106,859 t, 53%) is believed to be unsuitable as a feedstock for the MRF leaving an amount of 94kt of potential dry recyclables, including glass. The breakdown of the MSW into the main material fractions (Plastics, Paper, Cardboard, Glass, and Metals) is shown in Table 6 and graphically in Figure 2.

Table 6: Quantities of dry recyclables and unsuitable feedstock received by WSM in 2019

Waste type	Qty (tonnes)
Glass	15,169t
Paper	28,652t
Cardboard	3,932t
Metals	7,418t
Plastics	38,668t
Unsuitable feedstock	106,859t
TOTAL	200,698t

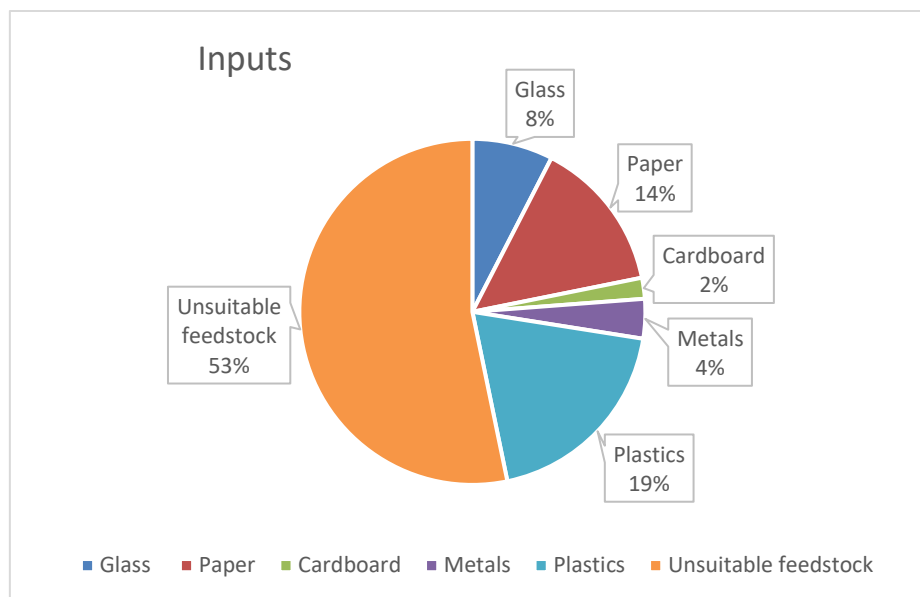


Figure 2: Proportions of dry recyclables received by WSM in 2019

7.0 WASTE FLOW

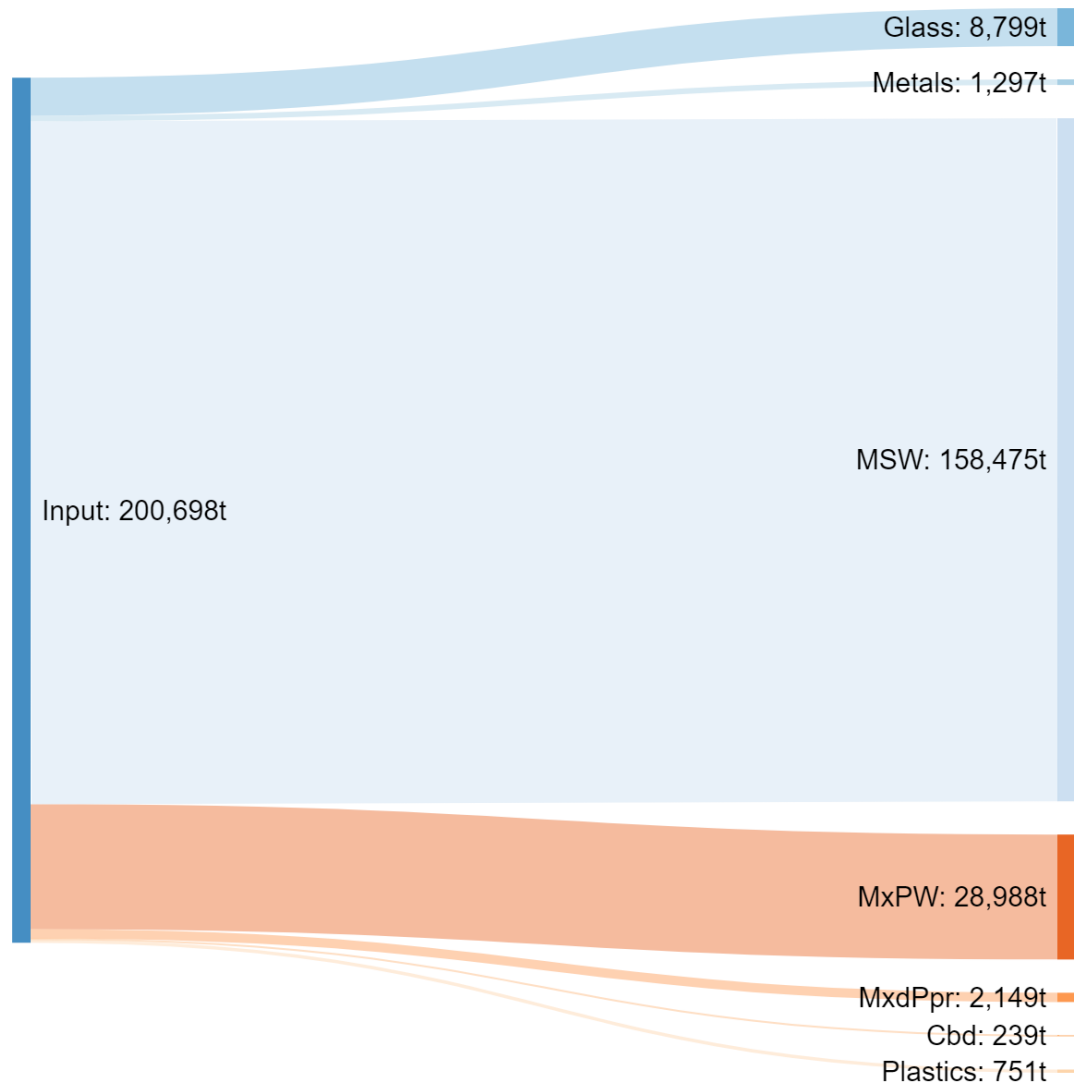


Figure 3: Materials received at WSM Facilities in 2019

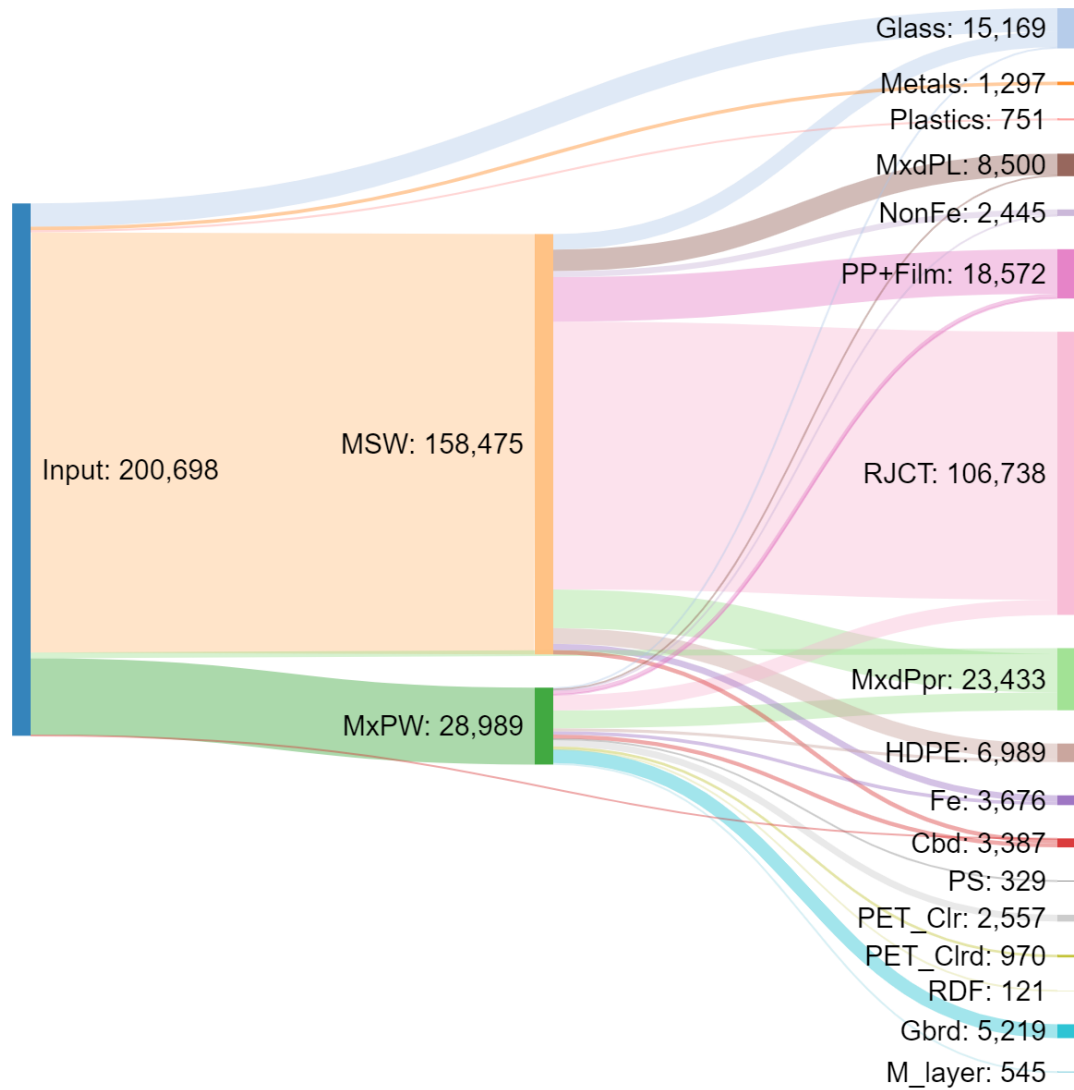


Figure 4: Materials received in 2019 broken into the main dry recyclable components