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RAWFILL
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RAWFILL Deliverable WP I1.3.3 Sampling and Characterization results

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1. Introduction

The Meerhout landfill site was chosen as a pilot site for implementing and testing geophysical measurements for landfill characterisation. The landfill is located in Meerhout, a municipality within the province of Antwerp, in Flanders (Belgium) (**Fig. 1**). The landfill is situated nearby two different transport routes that connect Antwerp (Flanders) with Liège (Wallonia), namely the E313 highway and the Albertkanaal (Albert Channel). Between 1981 and 1997, both municipal solid waste and industrial waste were deposited on the Meerhout landfill. In total, 942 589 m³ of municipal solid waste and 370 909 m³ of industrial waste materials were deposited based on historical records. The landfill site area is approximately 7.5 ha and today, a container park facility with transfer station is implemented on the oldest part of the landfill in the northwest.

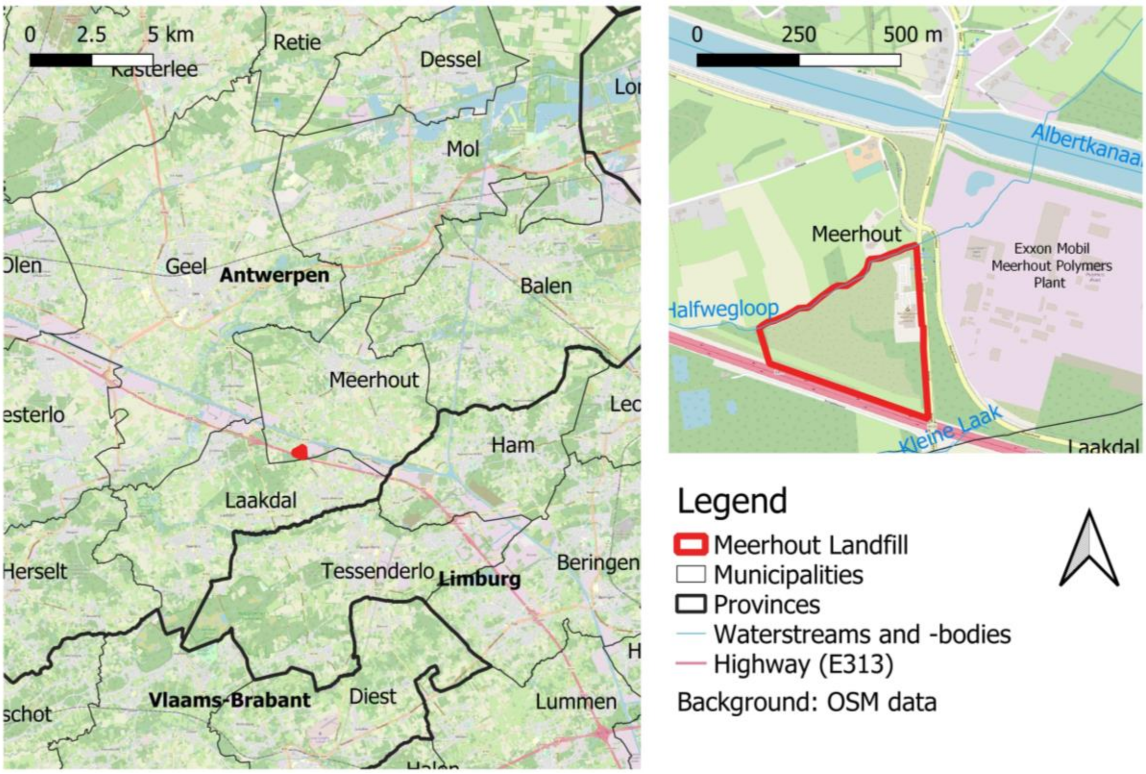

Figure 1 - Location of the Meerhout Landfill. Backround data: OpenStreetMap.

2. Design sampling plan

Based on the interpretation of the geophysical data on the Meerhout landfill site, a sampling plan was designed in order to identify the landfill content at specific zones. This sampling plan is shown in **Figure 2**. For more details regarding the sampling plan, please refer to the ***Deliverable WP I1.3.1. Design sampling plan***. In this report, the results of the sampling campaign are summarized. A description of the waste materials retrieved from Meerhout landfill and their physical properties (i.e. density, moisture content) is included.

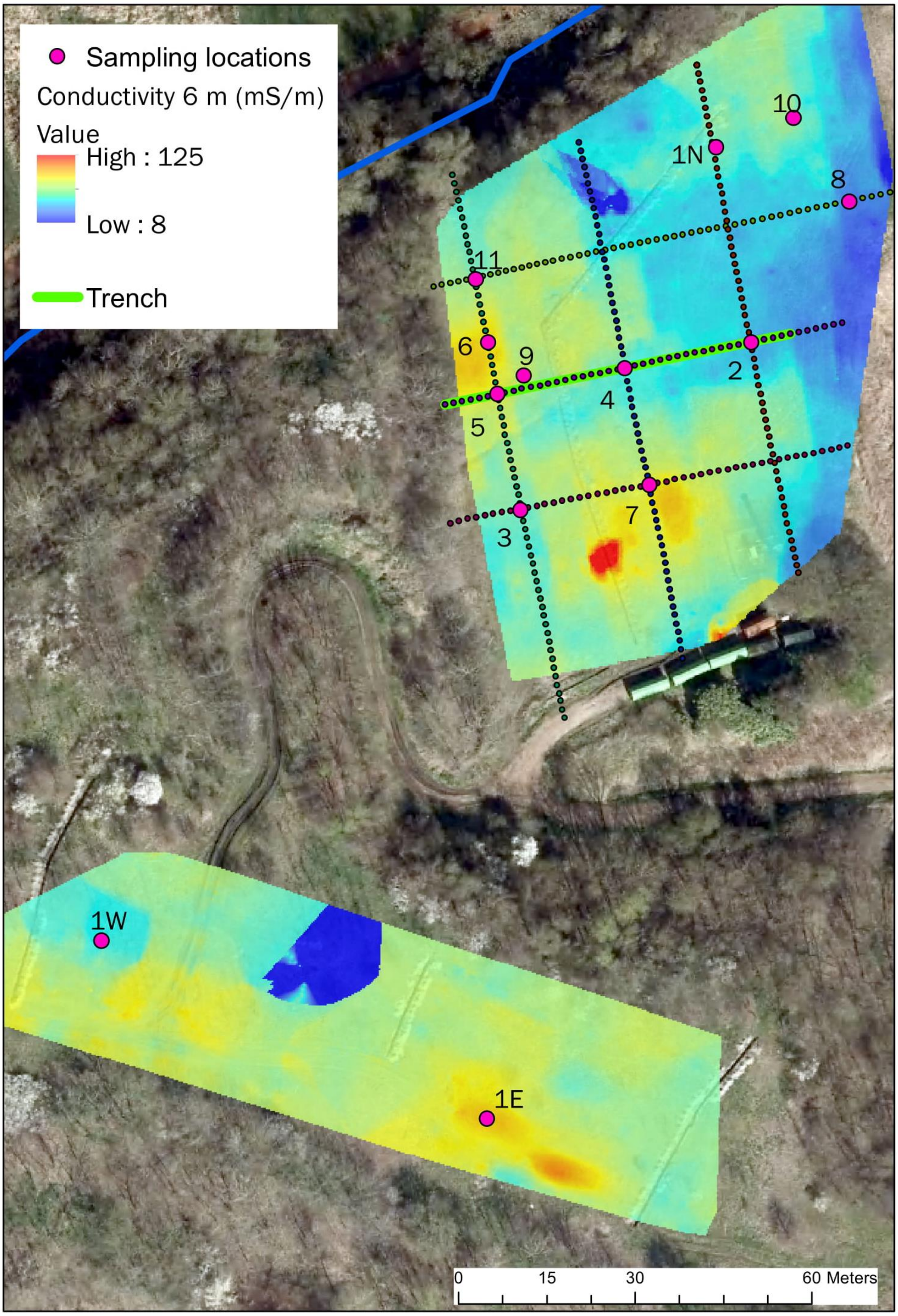

Figure 2 – Design of the sampling plan: localisation of the boreholes and trenches performed at Merhout landfill.

3. Methods

Each soil sample (and/or drill core) arrived at the laboratory of the subcontractor in anindividual closed tube. After taking the drill cores out of the tube, pictures were taken (see ***Annex Deliverable I1.3.3 - pictures of soil samples***). Firstly, a general description of the drill cores was done, indicating which waste materials were present in the different samples. The following types of waste materials were found within the boreholes:

- Plastics
- Metals
- Building material (BM)
- Paper
- Glass
- Rubber
- Polystyrene
- Other (soil, sand, pieces of wood, ...)

Secondly, a detailed analysis was performed on the drill cores in order to identify the specific weight percentages of the different waste material types. These were determined according to the NBN EN 933-11[1] standards. This was done in function of the depth of the drill core: each two meters, a fraction of the drill core was taken for analysis. As the landfill is characterised by lateral variation of thickness of the waste deposits (**Fig. 3**), the amount of data retrieved from analysis of the boreholes will vary as well.

After the description, physical parameters were measured in the lab. The density of the waste materials was determined based on the volume and the mass of the waste materials present in the drilling section. The dry mass was obtained after drying the waste samples at 40 degrees Celsius. With this data, the moisture content and dry density were calculated.

The percentage of organic material present in the waste samples was determined for the 0-40 mm fraction. Within this fraction, small particles of plastic and rubber were also present. However, these materials were not distinctly detected and measured with the determination method used. The weight percent of the plastics and rubber as well as the organic matter present within the residual fraction were calculated. The determination method was based on the NBN 589-207[2] standards.

Results are available for location 1W, 1E,1N 2, 3, 6, 8, 9 and 10 (**Fig. 2**).

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[1]The NBN (Bureau voor Normalisatie in dutch) is the Belgian government agency that is responsible for setting up standards and for promoting normalisation. The NBN EN 933- 11 includes a standard for "Tests for geometrical properties of aggregates - Part 11: Classification test for the constituents of coarse recycled aggregate (+ AC:2009)". More information on https://www.nbn.be/shop/en/standard/nbn-en-933-11-2009~328295/

[2] The NBN (Bureau voor Normalisatie in dutch) is the Belgian government agency that is responsible for setting up standards and for promoting normalisation. The NBN EN 933- 11 includes a standard for "tests on the organic matter content". More information on https://www.nbn.be/shop/en/standard/nbn-589-207-1969~97367/

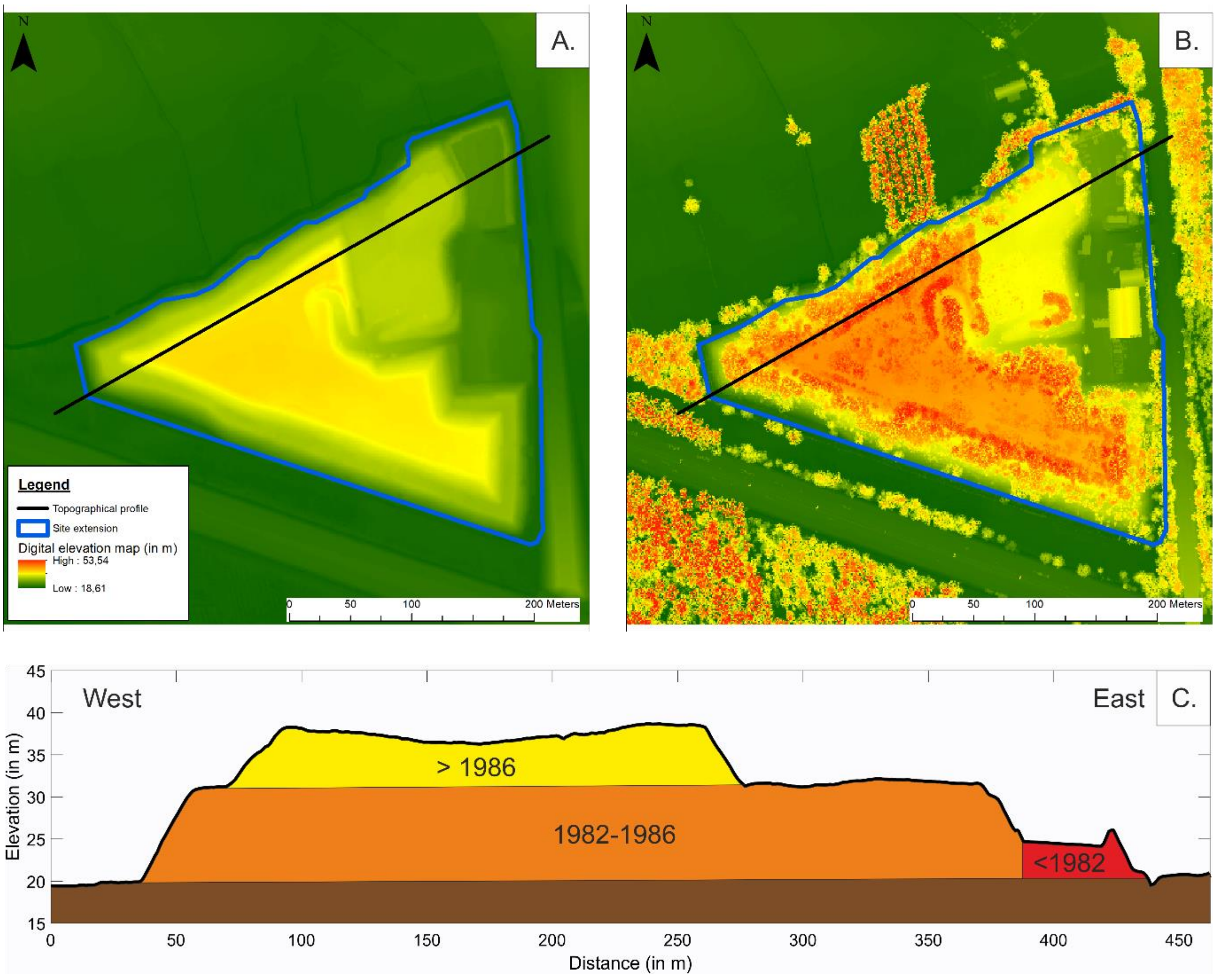

Figure 3 - The Meerhout landfill topography: A. DEM soil elevation; B. DEM top of vegetation; C. cross-section.

4. Waste characterization results

4.1. Description of the boreholes

In **Annex 1**, the tables with the weight percents of the different waste material types are provided per drill core.

4.1.1. General remarks

Plastics and building materials were found at each location and almost at every depth. Metal scraps were identified in all the boreholes at most of the depths, but in a lesser extent in the southern part of the landfill (borehole 1W in **Fig. 2**) where there was an absence of metal scraps between 4 and 9 m depth. Glass was frequently identified as well but was more dependent on the depth of each drill core. Rubber only appeared in small proportions within distinct layers at various depths within all the boreholes. Contrastingly, paper was only found at location 1E and 2 at a specific depth (6-6.6 m and 10-10.6m, respectively). Polystyrene was not found in the samples taken in the southern part of the landfill (1W, 1E) and in borehole 3 (**Fig. 2**).

4.1.2. Detailed analysis for individual samples

The detailed analysis for the individual soil samples was done in a specific order to improve comparison based on location, from the northeast towards the southwest of the landfill (**Fig. 2**).

- Oldest part of the landfill (Northeast of the site, < 1986)

In the borehole 10 (**Fig. 4**), all types of waste material were present except paper. Underneath the cover layer, at a depth between 2 and 2.6 m, a relatively large fraction of the waste deposit consisted of building materials. This material was found in other layers as well, but only in a small extent. A little deeper, at a depth between 4 and 4.6 m, mostly plastics were found. This counts as well for the depth ranging from 8 to 10.6 m. At this depth, the most heterogeneous waste composition was found, including rubber and polystyrene. Only glass and paper were not identified at that depth. Lastly, there can be noted that at a depth between 6 and 6.6 m only very few waste (1,2%) was collected (see **Annex 1 – Table 9**).

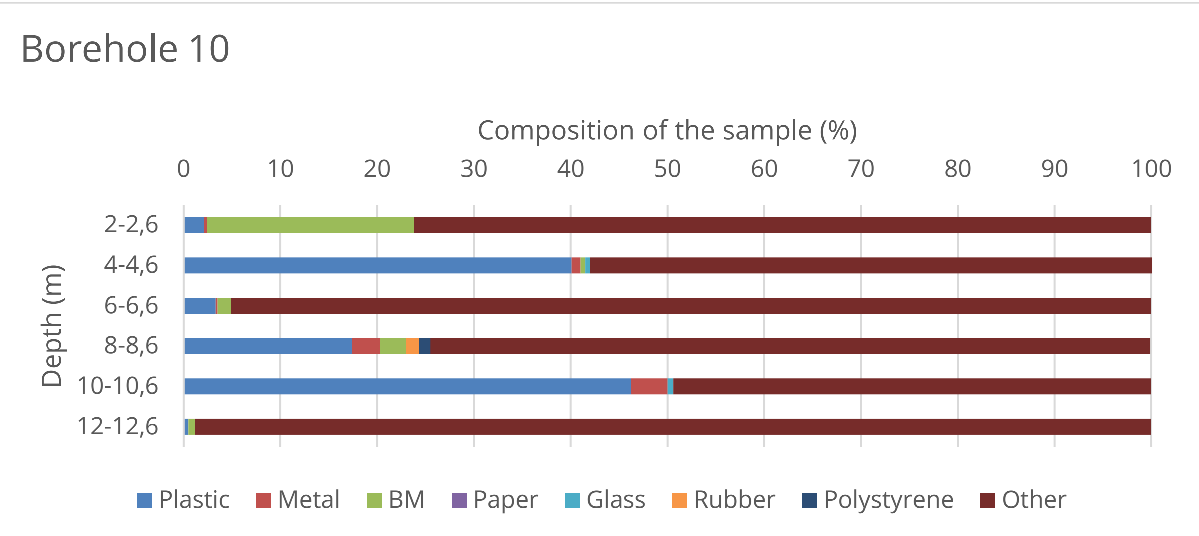

Figure 4 - Waste composition of borehole 10 in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

Borehole 1N was characterized by a more consistent waste composition in function of depth, ranging from 30 to 40% weight percent waste (**Fig. 5**). Like in borehole 10, building material was the dominant waste material type in the upper layer of the landfill (2-2.6 m depth). Below that layer, mostly plastics were found (with a highly dominant presence at

10-10.60 m depth). Also a significant fraction of metal scraps was present in the layer ranging from 4 to 8.6 m depth as well as in the deepest layer (12–12.6 m).

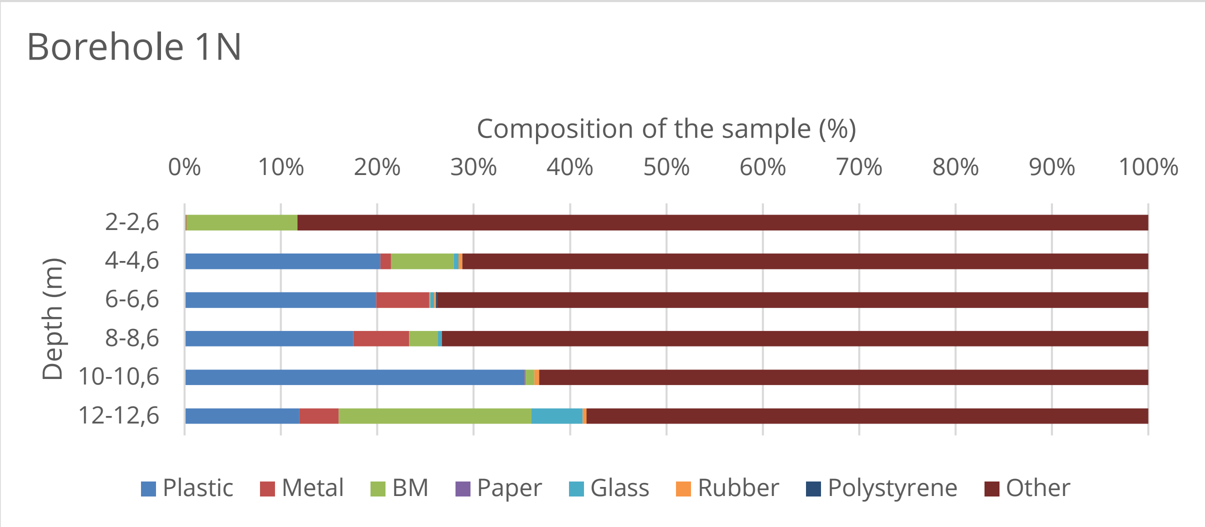

Figure 6 - Waste composition of borehole 1N in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

In borehole 8, a relatively low amount of waste was present in the sample, ranging from only 5 up to 15% weight percent waste (**Fig. 6**). One exception was the 10-10.6 m depth layer, where approximately 50% of the sample consisted of waste fractions. This included mostly plastics, but also a relatively high amount of metals, building material and glass were present. At depths between 8 and 8.6 m and between 14 and 14.6 m, metals were the most dominant waste type material with waste percentages of 7.1 and 6.8% weight, respectively (See **Annex 1 – Table 7**).

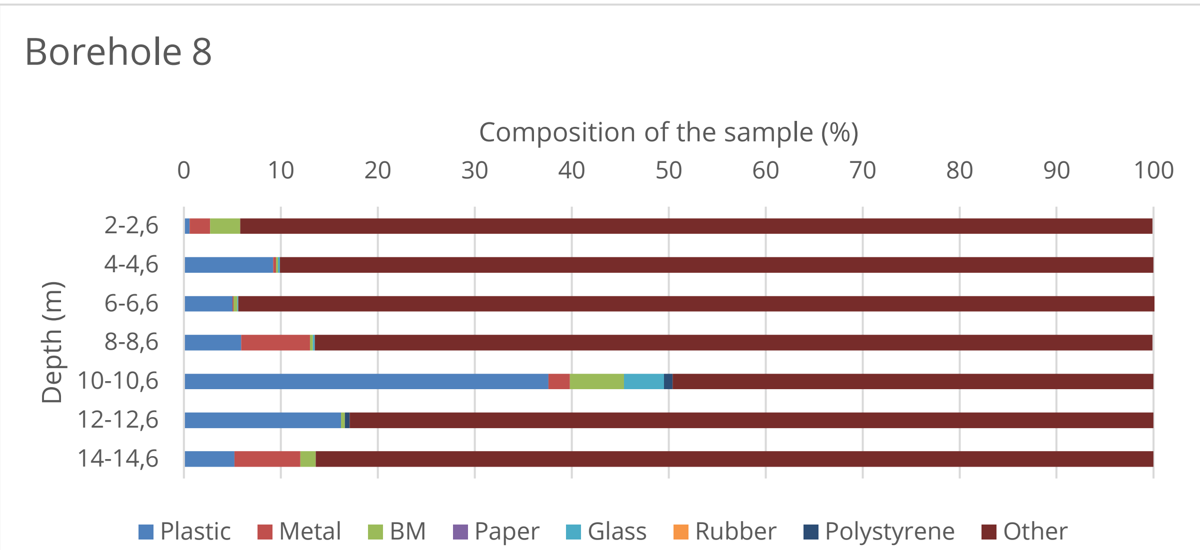

Figure 7 - Waste composition of borehole 8 in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

At borehole 2, very low waste percentages of all waste material types were detected, ranging from 3 till 17% (**Fig. 7**). In comparison with the other waste type materials, plastic was the most dominant fraction along the profile. At 4-4.6 m depth, also significant fractions of metals and building materials were present. At a depth between 12 and 12.6 m a noteworthy amount of polystyrene (2.1%, see **Annex – Table 6**) was detected.

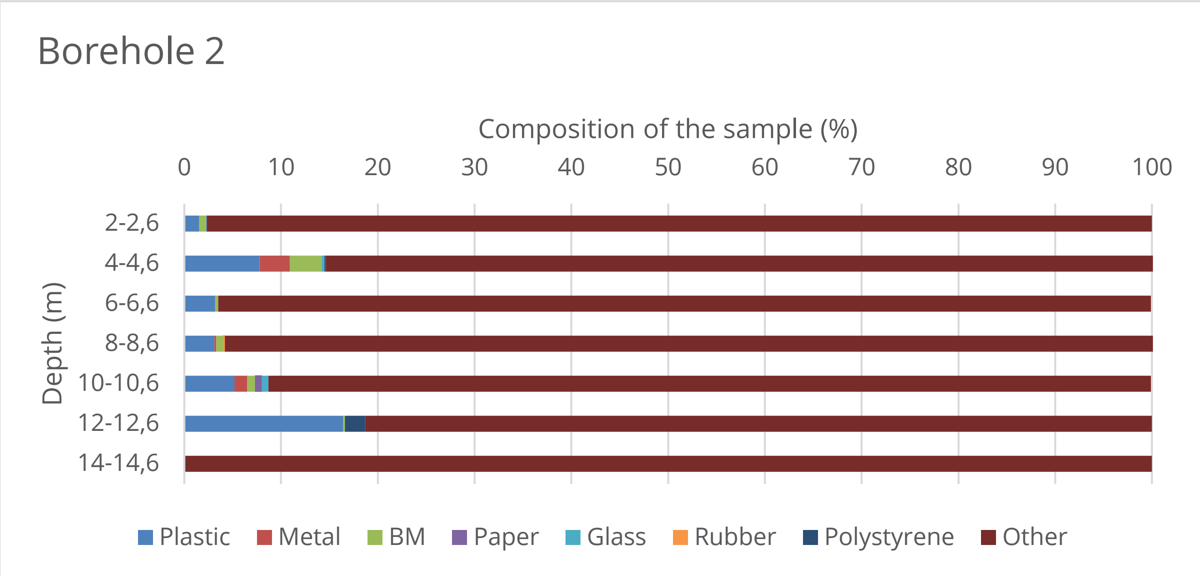

Figure 8 - Waste composition of borehole 3 in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

In borehole 6, plastics fraction was the most dominant waste type material in the entire core (**Fig. 8**). At this location, the amount of waste present decreases with depth, ranging from almost 50% of waste at the top to only 5% at 14.6 m depth. At 4-4.6 m depth, also 4.1% metals were present (see **Annex 1 – Table 5**). Building materials were only detected at a depth between 6 and 8.6 m and at 14-14.6 m depth.

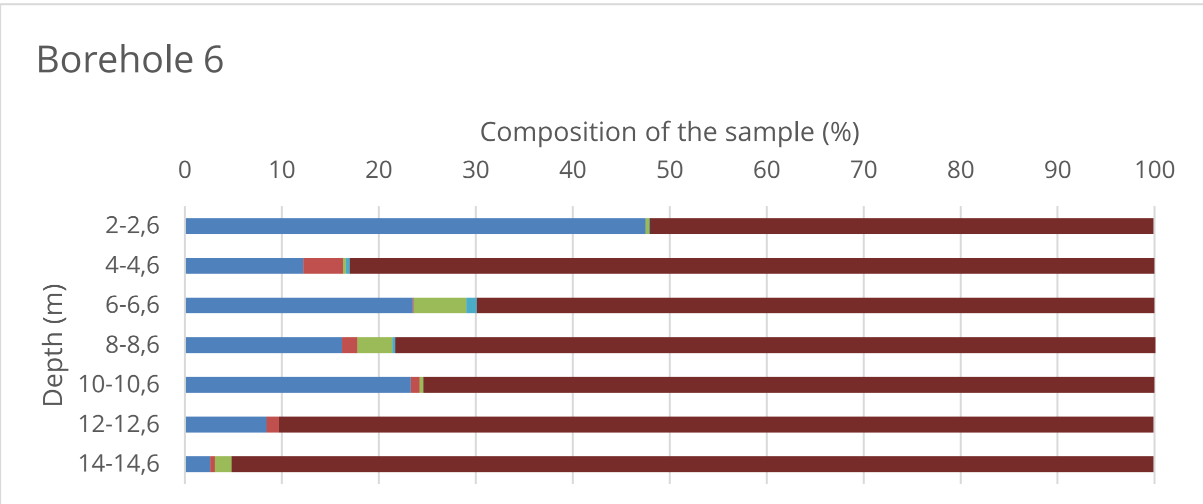

Figure 10 - Waste composition of borehole 6 in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

In borehole 9, a relatively large amount of waste was detected within the different layers, characterised by a high heterogeneity in waste composition (**Fig. 9**). In comparison with the other cores, plastic was not as dominant at this location. Additionnaly, some high percentages of building materials (up to 42.7%) and metals (up to 10.4%) were detected (see **Annex 1 – Table 4**). At a depth between 6 and 6.6 m, 70% of the weight consisted of waste materials (mostly plastics and building materials). Furthermore, a significant amount of rubber (2,1%) was identified at this depth, which was not detected at this extent in other boreholes location.

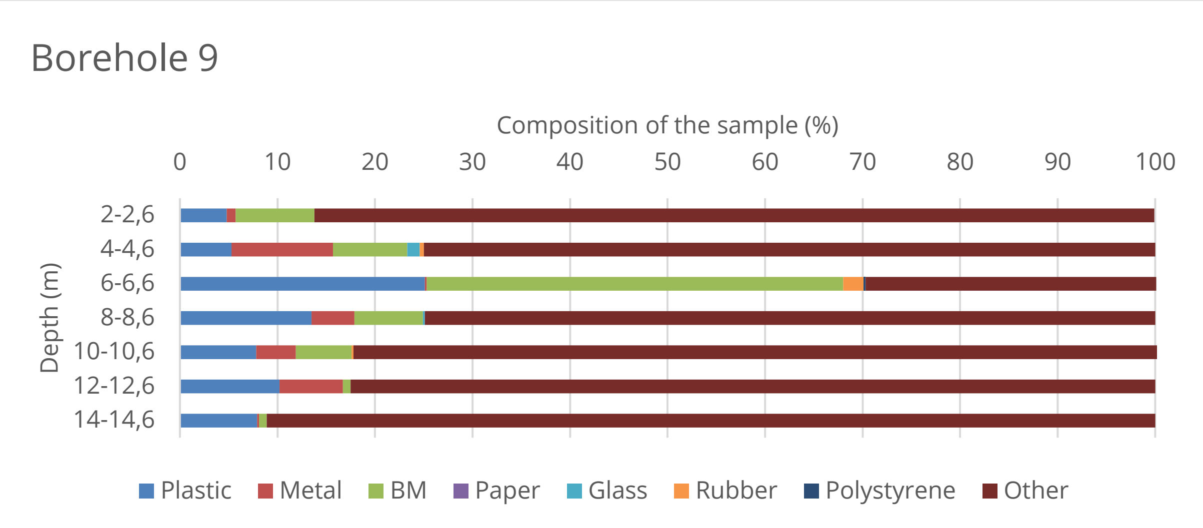

Figure 11 - Waste composition of borehole 9 in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

In borehole 3, plastic fraction was again the most dominant waste type material present in the core (**Fig 10**). The percentage of waste increased with depth. In each of layers, building material were identified with the highest fraction detected at 8-8.6 m depth. Rubber was described at a depth between 6 and 6.6 m.

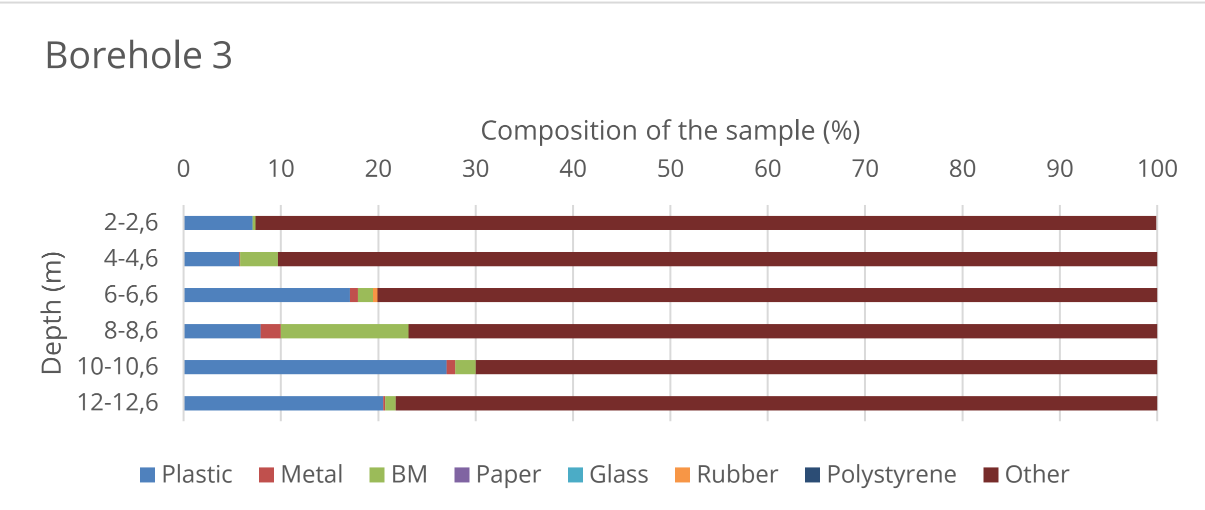

Figure 13 - Waste composition of borehole 3 in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

- Deepest part of the landfill (South of the site, > 1986)

Boreholes 1W and 1E were located in the deepest part of the landfill in the south of the site. At the location of the boreholes, the bottom of the landfill was estimated at a depth of approximatively 24 m. Some important differences were detected between the two cores. In the borehole 1W (in the southwestern part of the landfill), a relatively low weight percentage of waste (up to 24%) was present (**Fig. 11**) in comparison with the borehole 1E in southeastern part of the landfill (up to 70%. Overall, plastic was the dominant waste type material (up to 69.2%, see Annex 1- Table 2). However, in the borehole 1E (**Fig. 12**), the waste composition was more heterogenous than in borehole 1W. There, building materials and metals were detected in larger fractions (up to 10.6% and 10.6%, respectively) over the different depths. Furthermore, rubber was detected in the two boreholes. In borehole 1W, rubber was identified between 10 to 12.6 m depth whereas in borehole 1E, rubber was detected between 6 and 8.6 m depth. Lastly, also a remarkable fraction of paper (2.7%) was detected at a depth of 6 to 6.6 m at location 1E. This wasn't detected before, only in a very small amount at location 2.

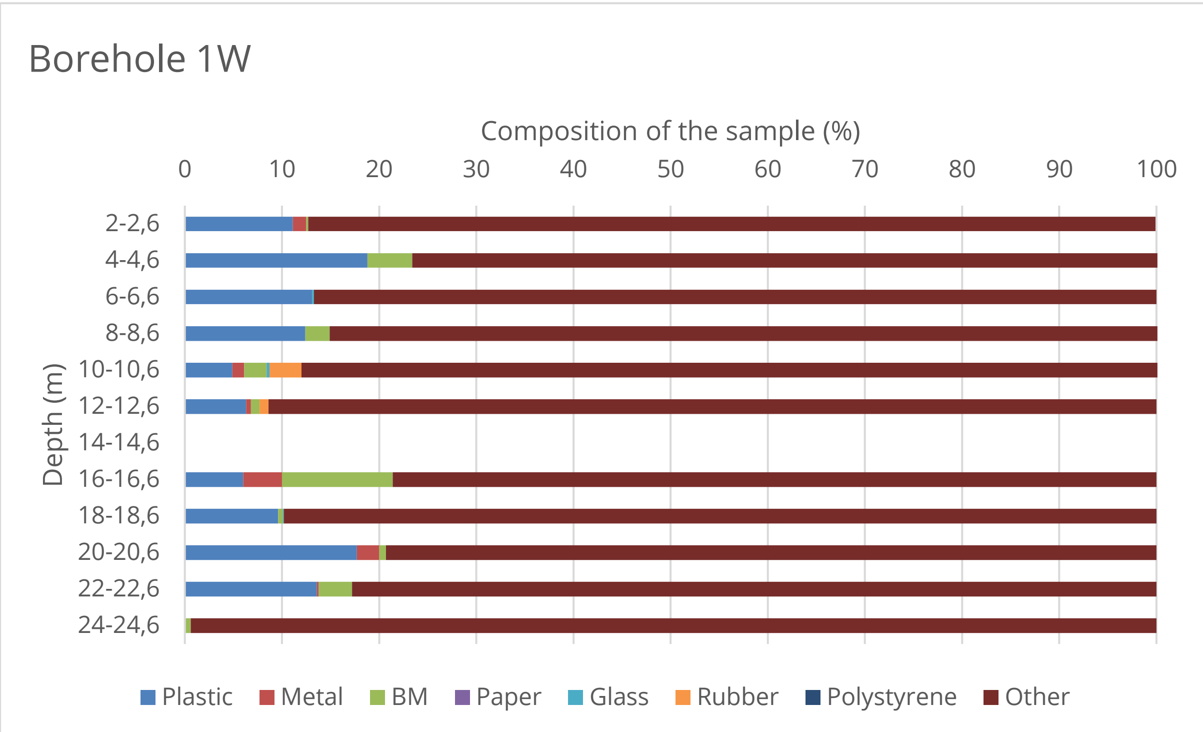

Figure 14 - Waste composition of borehole 1W in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

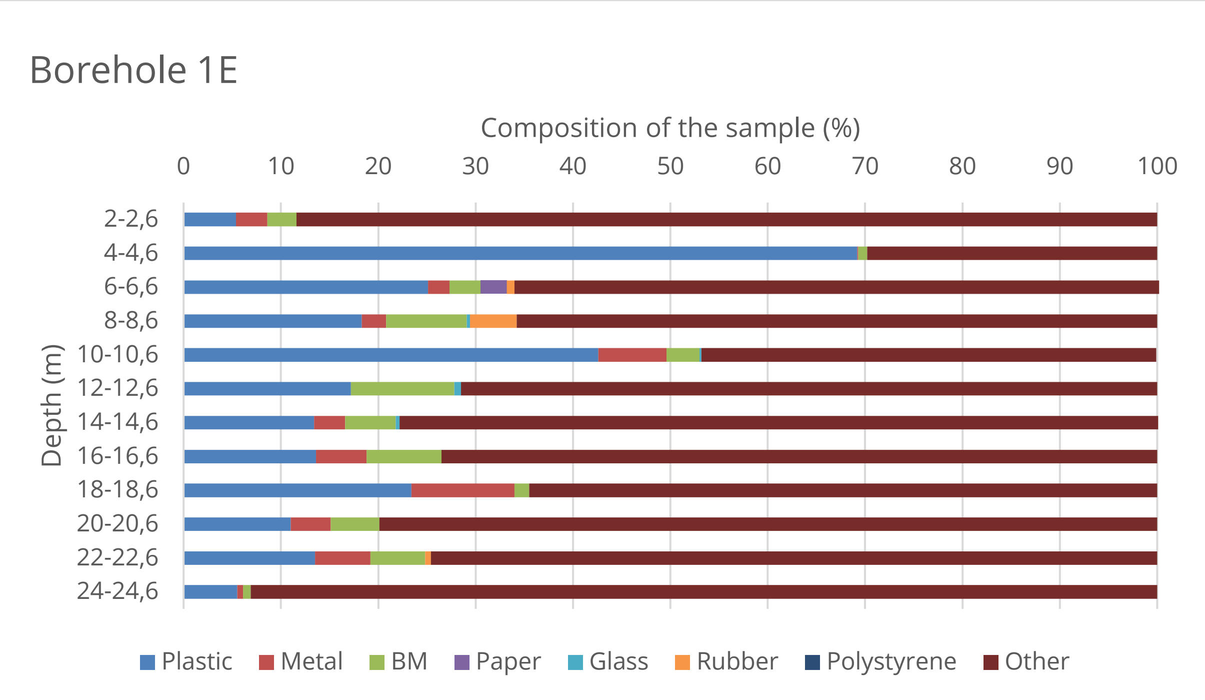

Figure 15 - Waste composition of borehole 1E in function of depth. BM = Building material, Other represents soil, sand, pieces of wood, etc.

4.2. Determination of important parameters

The specific results of the determined parameters can be found in **Annex 2**. These results will be visualized in function of the depth. For each parameter, two graphs will be shown in order to improve the readability due to the different depths: one including the boreholes from the lower landfill area (northern part) and one including the boreholes from the higher area (1W and 1E).

4.2.1. Density

The first graph (**Fig. 13**) shows the density of the cores in function of the layer depth for the lower part of the landfill. From this graph, it is clear that the density of a certain sample really depends on the location as well as on the depth, ~~probably~~ due to the type of waste content.

For instance, the density pattern of borehole 8 shows two decreases in density (one at 4-4.6 m and one at 10-10.6m depth). It corresponds to the highest percentage of waste present in the core (**Fig. 6)**. Furthermore, borehole 2 showed the highest densities (**Fig. 13**) which could be explained by the low weight percentages of waste materials present in the core (**Fig. 7**).

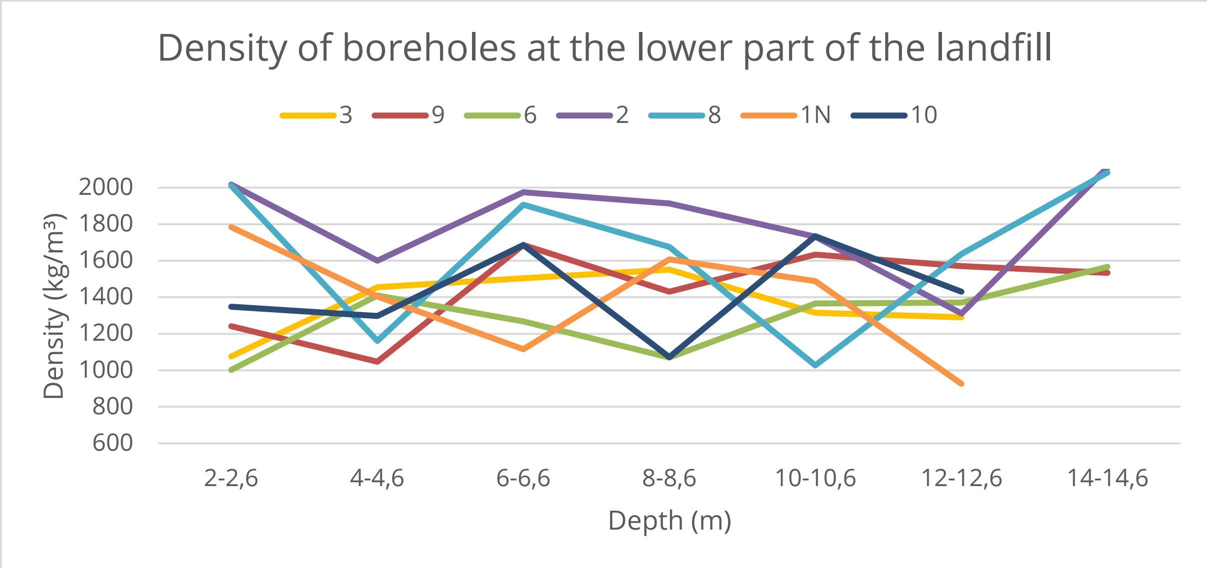

Figure 13 – Density of the waste in the boreholes at the lower part of the landfill in function of depth.

In the south part of the landfill, the density tended to slightly increase with depth (**Fig. 14)**. In this area, the density seemed to be less dependent of the sample composition and the percentage of waste present, as the patterns of 1W and 1E are quite alike, in contrast to the differing weight percentages of the present waste (see **Figs. 11 and 12**). However, the lowest density measured in borehole 1E at 4-4.6 m depth (**Fig. 14**) corresponds with the highest percentage of plastics present in the core (70%) (**Fig. 12**).

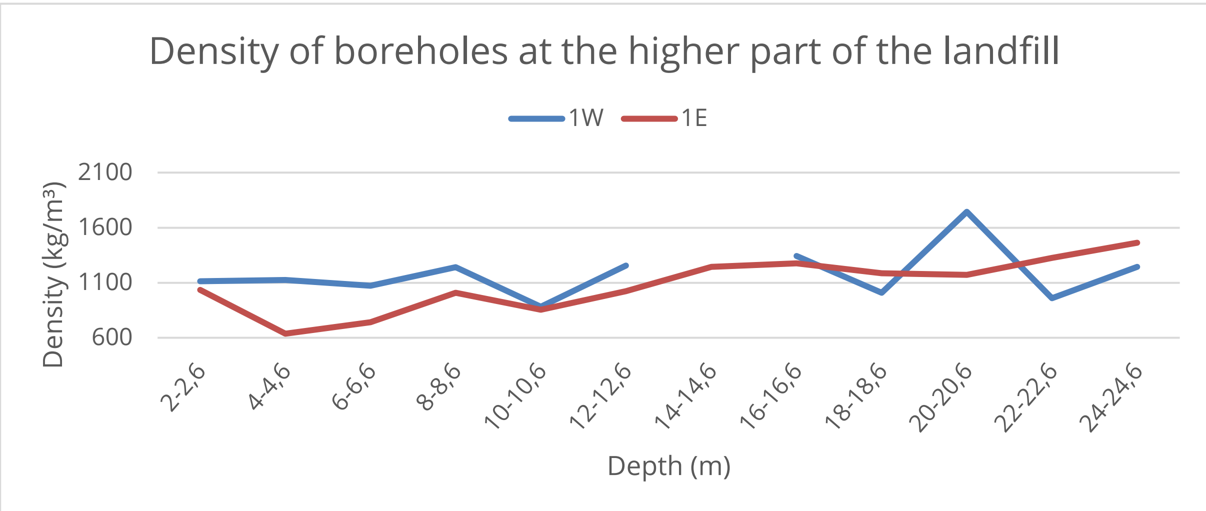

Figure 14 - Density of the waste in the boreholes at the higher part of the landfill in function of depth.

4.2.2. Moisture content

Overall, the moisture content showed less variation in the upper part of the cores. More specifically, at 2-2.6 m depth, the moisture content ranged from 10 to 30% whereas at 10-10.6 m depth, large fluctuations were observed (from 10 to 55%; **Fig. 15**). In the deepest part of the landfill, the moisture content presented more or less the fluctuations with depth than the density, with a peak in moisture content at 20-20.6 m depth in the southwestern part of the landfill (**Fig. 16**).

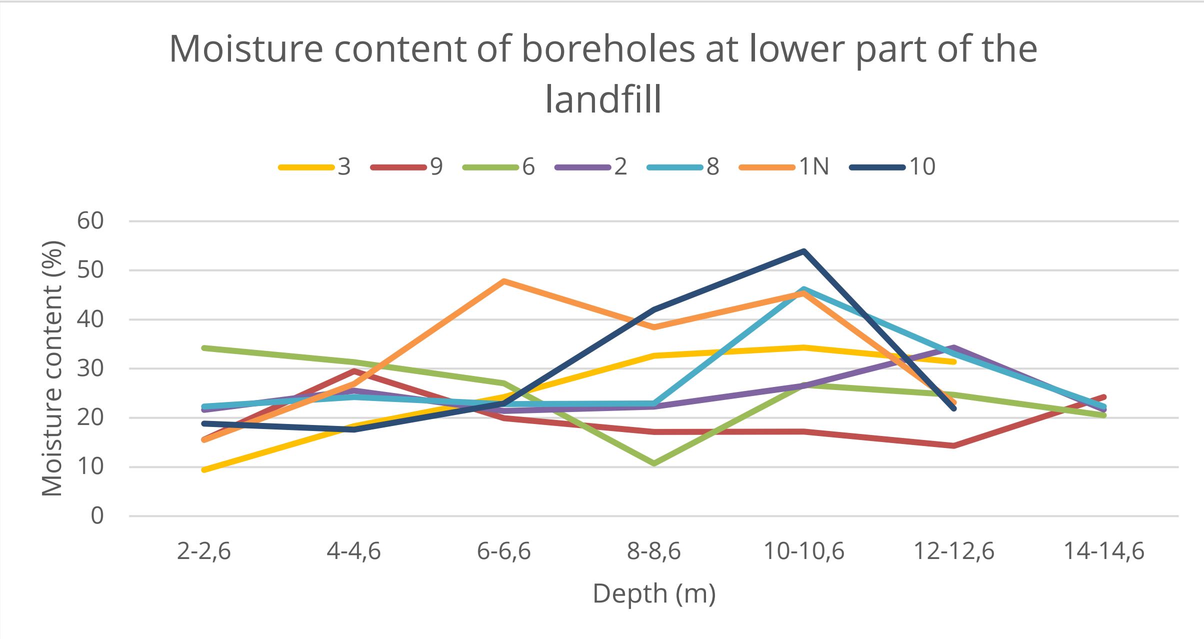

Figure 15 – Moisture content (%) of the waste in the boreholes at the lower part of the landfill in function of depth.

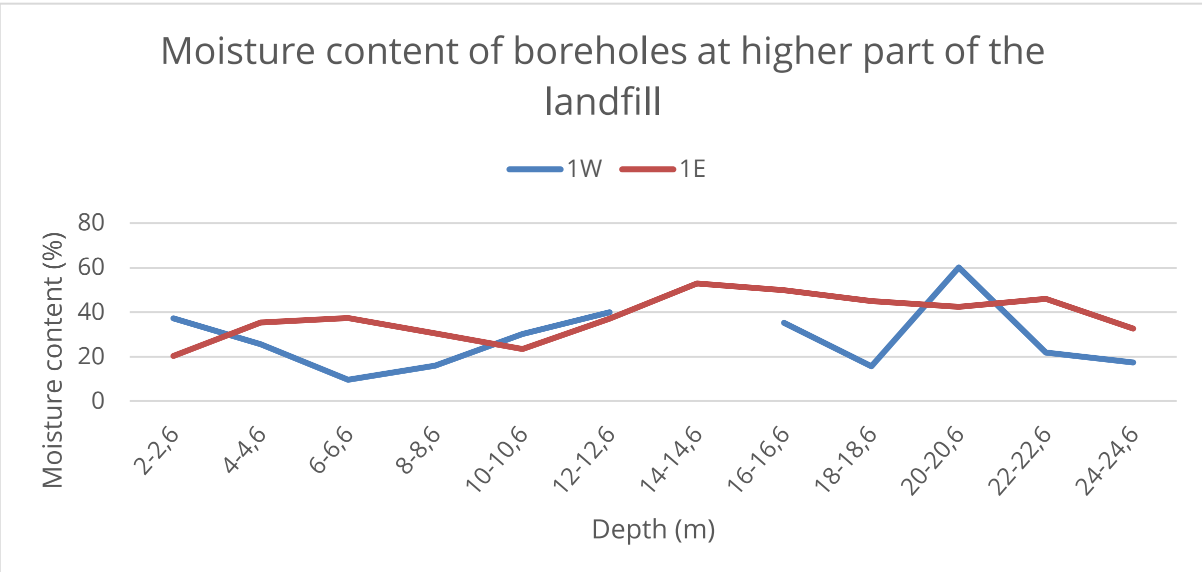

Figure 16 - Moisture content (%) of the waste in the boreholes at the higher part of the landfill in function of depth.

4.2.3. Weight percentage of organic material (OM)

Figure 17 shows the weight percentage of the organic material present in the cores taken at the lower part of the landfill. Here, some outliers can be detected for borehole 1N and 10, both located in the upper north of the landfill (oldest part of the landfill). These two peaks corresponds (6-6.6 m depth in borehole 1N and 10-10.6 m depth in borehole 10) to artefact related to the method used to determine the organic content of the sample. At the other locations, the weight percentage of the OM is rather constant, varying between ~5 and ~10%. However, in borehole 6, the OM decreased with depth. This could be linked to the decrease in the percentage of waste materials with depth (**Fig. 8**).

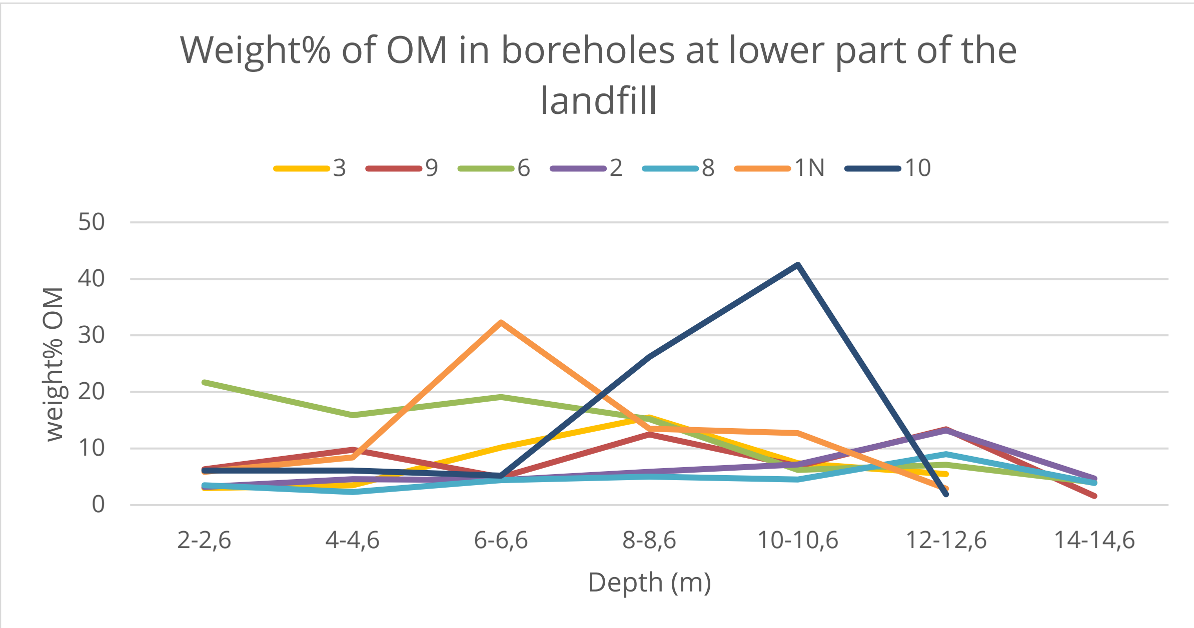

Figure 17 – Weight percentage of organic matter (%) of the waste in the boreholes at the lower part of the landfill in function of depth.

In the deepest part of the boreholes 1N and 1E (from 16 to 24.6 m depth), the same pattern in OM was detected (**Fig. 18**). In borehole 1E, two peaks in OM were identified at 4-4.6 m and 10-10.6 m depth. These are artefact related to high amounts of plastics within the samples, as can be seen in **Figure 12**.

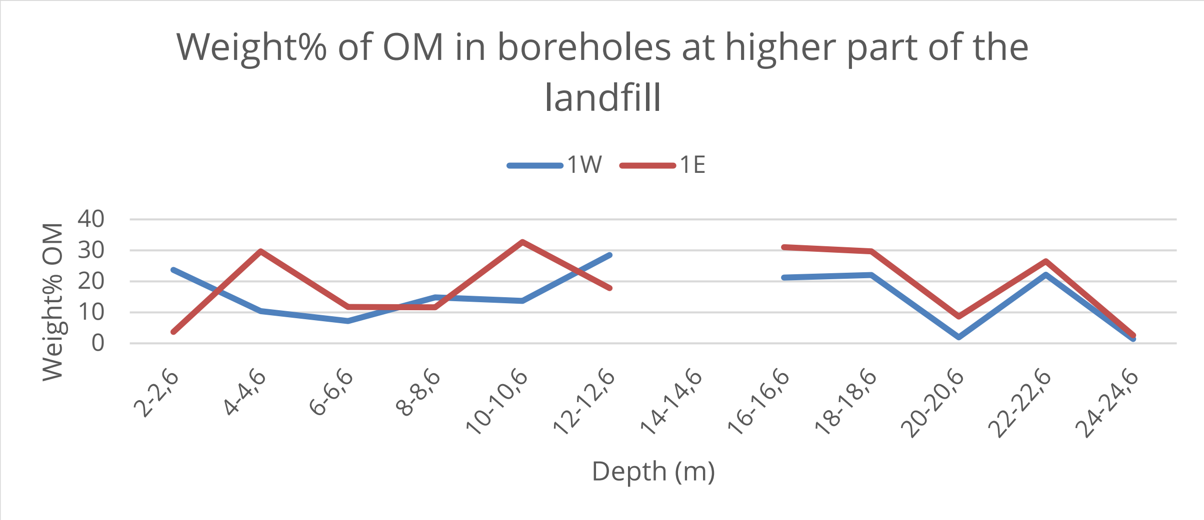

Figure 18 - Weight percentage of organic matter (%) of the waste in the boreholes at the lower part of the landfill in function of depth

4.2.4. Weight percentage of plastic and rubber

At most locations and within the majority of the different boreholes, the plastic waste type material was the most dominant one. Hence, from the analysis in the previous section we already get an idea of the spatial distribution of plastics within the Meerhout landfill. To summarize this information into one graph, **Figure 19** gives an overview of the weight percentage of plastics within the different boreholes at the lower part of the landfill. From this graph can be concluded that there is a lot of difference between the different boreholes and at different depths. However, it is clear that there is relatively high amount of plastic present at a depth between 12 and 12.6 m. For all boreholes except 2 and 9, high weight percentages of plastic and rubber were detected. The reason for low values at borehole 2 and 9 can be explained by the overall low presence of waste and the relatively high presence of metals in the two boreholes respectively (**Fig. 7 and 9,** resp.). Also for locations 3, 6, 9 and 1N higher amounts of plastics and rubber were found at 6-6.6 m depth.

For the weight percentages within the boreholes from the upper part of the landfill, two peaks for location 1E were detected at shallow depths (**Fig. 20**). For location 1W, the weight percentage of plastic and rubber was rather stable in depth.

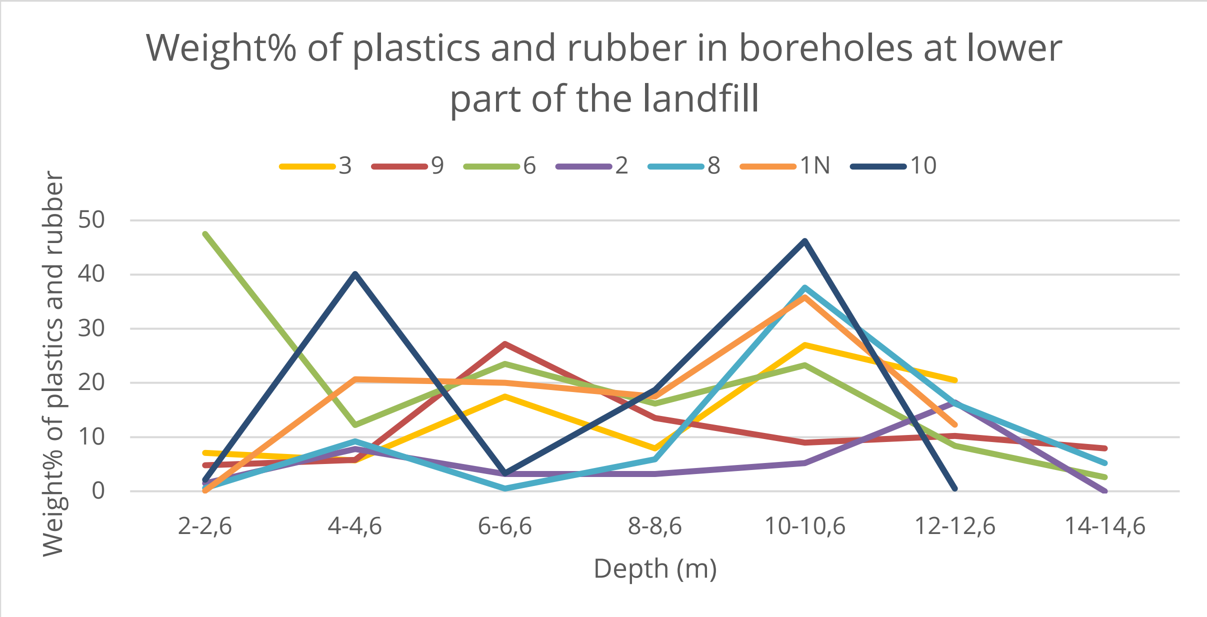

Figure 19 - Weight percentage of plastics and rubber (%) of the waste in the boreholes at the lower part of the landfill in function of depth.

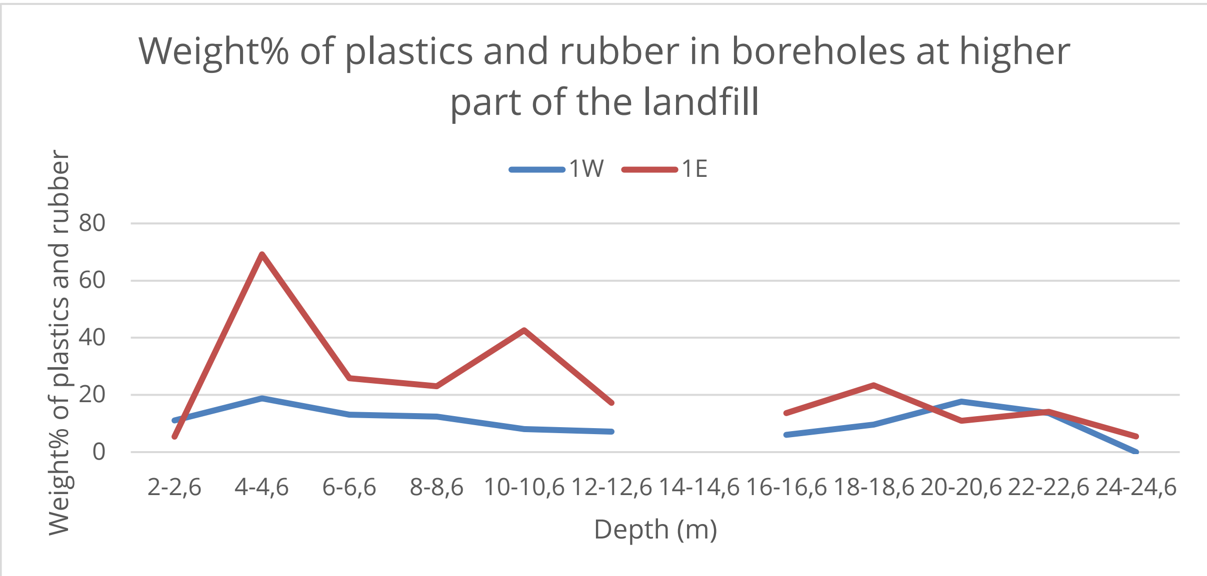

Figure 20 - Weight percentage of plastics and rubber (%) of the waste in the boreholes at the higher part of the landfill in function of depth.

4.3. Description of the trench

Seven trenches were performed following the electrical profile (P6) in the northern part of the Meerhout landfill. The localisation of the profile is shown in **Figure 21**. The coordinates of the trenches are listed in **Table 1**. The description of the seven trenches are presented in **Table 2**. No samples were taken from these trenches and hence, no further analysis was performed.

Along this trench, grass, weeds and dirt were found in the upper 0.05 m. Underneath this cover layer, mostly building materials were found in the first 3 trenches (e.g. debris, bricks, traces of asbestos, concrete chuncks). For the other trenches (4-7), mostly sand and plastics (e.g. foils, PET) were found within a range of approximately 0.05 to 1.3 m. From 1.3 m, the waste composition became more heterogenous, including a mix of municipal solid waste (MSW), metal scraps, plastics, traces of rubber, traces of glass.

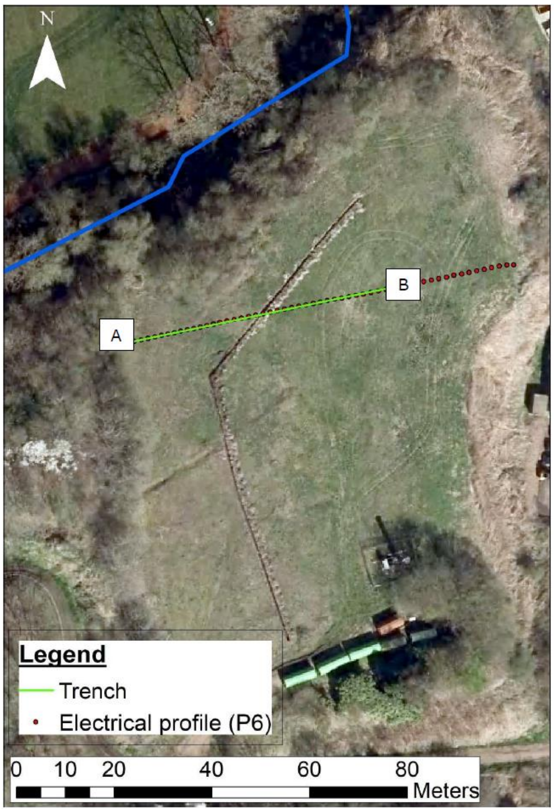

Figure 21 - Localisation of the trenches performed on Meerhout site.

Table 1 - Trench locations measured by GPS.

No. trench	X-coordinate	Y-coordinate	Z-coordinate	Trench size (L x W)
1	197720.54	199515.70	31.00	5 m x 3.5 m
2	197734.88	199518.97	30.97	4 m x 2.5 m
3	197745.66	199522.06	31.31	3 m x 2.5 m
4	197751.00	199524.40	31.47	4 m x 2 m
5	197758.53	199526.80	31.70	4 m x 2 m
6	197768.55	199530.22	31.65	4 m x 2 m
7	197776.40	199532.79	31.36	4 m x 2 m

Table 2 - Description of the trench.

N° trench	Layer	Depth (cm)	Colour	Description
1	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 45	brown-black	sand, traces of asbestos, debris, bricks, traces of wood, traces of ceramic tiles
	3	45 - 85	green-beige	sand, traces of roots

	4	85 - 280	grey-black	silty sand, wood, traces of plastic foils, one car tyre, traces of debris
	5	280 - ...		traces of silty sand, plastic foils, metal scraps, traces of PS, PET bottles, hard plastics, MSW
2	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 90	brown	sand, traces of asbestos, bricks, debris
	3	90 - 110	black	sand, much wood, debris
	4	110 - 200	green-grey	silty sand, traces of debris, traces of wood
	5	200 - 290		plastic foils, PET bottles, traces of glass, traces of rubber, traces of wood, MSW
3	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 100	brown	sand, traces of rebars, bricks, traces of asbestos, some large concrete chunks, some debris, some reinforced concrete
	3	100 - 110	black	sand, wood
	4	110 - 240	grey-green	silty sand, traces of wood, traces of debris
	5	240 - ...		plastic foils, PET bottles, MSW, traces of metal scraps, traces of glass
4	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 110	brown	sand, plastic foils
	3	110 - 270	grey-green	silty sand, traces of debris
	4	270 - ...		plastic foils, PET bottles, MSW, wood
5	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 130	brown	sand, plastic foils, construction wood, MSW, PET bottles, traces of asbestos, bricks
	3	130 - 150	black	sand, wood
	4	150 - 295	green-grey	silty sand, traces of wood
	5	295 - ...		plastic foils, MSW, traces of metal scraps, hard plastics, 1 bike tyre, traces of bitumen
6	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 45	beige-brown	silty sand, traces of debris
	3	45 - 155		hard plastics, plastic foils, PET bottles, MSW, debris, wood, bricks
	4	155 - 285	grey-green	silty sand
	5	285 - ...		plastic foils, MSW, traces of debris
7	1	0 - 5	brown	grass, weeds, dirt
	2	5 - 40	beige-green	sand
	3	40 - 130		plastic foils, PET bottles, hard plastics, MSW, debris, wood, jute bags
	4	130 - 260	grey-brown	silty sand
	5	260 - ...	grey-black	sand, wood, MSW, metal scraps, plastic foils

5. Conclusion

The waste analysis provides a better understanding of the landfill content at the Meerhout pilot site. The waste composition of the Meerhout landfill was dominated by the plastic fractions. However, the weight percentage of the plastics varies greatly depending on the location and depth. Besides plastics, building materials also appeared in relatively high weight percentages at some depths depending on the location. Lastly, the presence of metal scraps was more or less consistent throughout the characterization.

Some interesting remarks can be made regarding the spatial distribution of the waste in the landfill. In the northern part of the landfill, there is a high amount of building material present underneath the cover layer of the landfill (borehole 10 and 1N). Furthermore, there seems to be a concentration of plastics at a depth of 10 m in that part of the landfill. In the west of the lower part of the landfill, borehole 6 and 9 were sampled relatively closely (±7.5 m), but show great differences in waste composition. More specifically, at borehole 6 a lot of plastics were present (with a high weight percentage underneath the cover layer), in contrast to the dominance of building material and relatively high presence of metals at borehole 9. In addition, some important differences were found between the samples in the deepest part of the landfill (1W and 1E). In the southeast (1E), overall larger weight percentages of waste were found in comparison with 1W (northwest). The waste at 1E had a more heterogenous composition as well.

Regarding the dominance of the plastic waste type, high concentrations were detected at certain depths. For all boreholes except from 2 and 9, higher values of weight percentage of plastic were detected at a depth of approximately 12 m. Furthermore, for boreholes 3, 6 and 9 a high concentration of plastic material was found at a depth of around 6 m. These boreholes are all located in the west of the lower part of the landfill.

These conclusions already give some insights into the overall waste composition and structure of the landfill. Eventually, these data will be correlated with the geophysical data collected on site in order to built a Resource distribution model (RDM). This RDM will provide a more clear overview of the waste composition of the Meerhout landfill.

Annex 1: Tables with the waste composition (weight percent) of the different boreholes in function of depth

Table 1 - Description of the borehole 1W.

Location 1W (Depth: 24.60m) 19/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S1W1	2-2.6	Landfill	11,1	1,4	0,2	0	0	0	0	87,2
S1W2	4-4.6	Landfill	18,8	0	4,6	0	0	0	0	76,7
S1W3	6-6.6	Landfill	13,1	0	0	0	0,2	0	0	86,7
S1W4	8-8.6	Landfill	12,4	0	2,5	0	0	0	0	85,2
S1W5	10-10.6	Landfill	4,9	1,2	2,3	0	0,3	3,3	0	88,1
S1W6	12-12.6	Landfill	6,3	0,5	0,9	0	0	0,9	0	91,4
S1W7	14-14.6	Landfill	No data							
S1W8	16-16.6	Landfill	6	4	11,4	0	0	0	0	78,6
S1W9	18-18.6	Landfill	9,6	0	0,5	0	0,1	0	0	89,8
S1W10	20-20.6	Landfill	17,7	2,3	0,7	0	0	0	0	79,3
S1W11	22-22.6	Landfill	13,6	0,2	3,4	0	0	0	0	82,8
S1W12	24-24.6	Soil	0	0	0,6	0	0	0	0	99,4

Table 2 - Description of the borehole 1E.

Location 1E (Depth: 24.60m) 15/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S1E1	2-2.6	Landfill	5,4	3,2	3	0	0	0	0	88,4
S1E2	4-4.6	Landfill	69,2	0,1	0,9	0	0	0	0	29,8
S1E3	6-6.6	Landfill	25,1	2,2	3,2	2,7	0	0,8	0	66,2
S1E4	8-8.6	Landfill	18,3	2,5	8,3	0	0,3	4,8	0	65,8
S1E5	10-10.6	Landfill	42,6	7	3,4	0	0,2	0	0	46,7
S1E6	12-12.6	Landfill	17,2	0	10,6	0	0,7	0	0	71,5
S1E7	14-14.6	Landfill	13,4	3,2	5,2	0	0,4	0	0	77,9
S1E8	16-16.6	Landfill	13,6	5,2	7,7	0	0	0	0	73,5
S1E9	18-18.6	Landfill	23,4	10,6	1,5	0	0	0	0	64,5
S1E10	20-20.6	Landfill	11	4,1	5	0	0	0	0	79,9
S1E11	22-22.6	Landfill	13,5	5,7	5,6	0	0	0,6	0	74,6
S1E12	24-24.6	Soil	5,5	0,6	0,8	0	0	0	0	93,1

Table 3 - Description of the borehole 3.

Location 3 (Depth: 12.60m) 15/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S3.1	2-2.6	Landfill	7,1	0	0,3	0	0	0	0	92,5
S3.2	4-4.6	Landfill	5,7	0,1	3,9	0	0	0	0	90,3
S3.3	6-6.6	Landfill	17,1	0,8	1,6	0	0	0,4	0	80,1
S3.4	8-8.6	Landfill	7,9	2,1	13,1	0	0	0	0	76,9
S3.5	10-10.6	Landfill	27	0,9	2,1	0	0	0	0	70
S3.6	12-12.6	Soil	20,5	0,2	1,1	0	0	0	0	78,2

Table 4 - Description of the borehole 9.

Location 9 (Depth: 14.60m) 15/11/2018			**Description**							
Reference	Depth (m)	Locatio n	Plastic	Metal	BM	Pape r	Glass	Rubber	Polystyrene	Other
S9.1	2-2.6	Landfill	4,8	0,9	8,1	0	0	0	0	86,1
S9.2	4-4.6	Landfill	5,3	10,4	7,6	0	1,3	0,4	0	75
S9.3	6-6.6	Landfill	25,1	0,2	42, 7	0	0	2,1	0,2	29,8
S9.4	8-8.6	Landfill	13,5	4,4	7	0	0,2	0	0	74,9
S9.5	10-10.6	Landfill	7,8	4,1	5,7	0	0	0,2	0	82,5
S9.6	12-12.6	Landfill	10,2	6,5	0,8	0	0	0	0	82,5
S9.7	14-14.6	Soil	7,9	0,2	0,8	0	0	0	0	91,1

Table 5 - Description of the borehole 6.

Location 6 (Depth: 14.60m) 15/11/2018			**Description**							
Reference	Depth (m)	Locatio n	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyren e	Othe r
S6.1	2-2.6	Landfill	47,5	0	0,4	0	0	0	0,1	51,9
S6.2	4-4.6	Landfill	12,2	4,1	0,3	0	0,4	0	0	83
S6.3	6-6.6	Landfill	23,5	0,1	5,4	0	1,1	0	0	69,9
S6.4	8-8.6	Landfill	16,2	1,6	3,6	0	0,3	0	0	78,4
S6.5	10-10.6	Landfill	23,3	0,9	0,4	0	0	0	0	75,4
S6.6	12-12.6	Landfill	8,4	1,3	0	0	0	0	0	90,2
S6.7	14-14.6	Soil	2,6	0,5	1,7	0	0	0	0	95,1

Table 6 - Description of the borehole 2.

Location 2 (Depth: 14.60m) 14/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S2.1	2-2.6	Landfill	1,5	0	0,7	0	0,1	0	0	97,7
S2.2	4-4.6	Landfill	7,8	3,1	3,3	0	0,3	0	0,1	85,5
S2.3	6-6.6	Landfill	3,2	0	0,3	0	0	0	0	96,4
S2.4	8-8.6	Landfill	3,1	0,2	0,7	0	0	0,2	0	95,9
S2.5	10-10.6	Landfill	5,2	1,3	0,8	0,7	0,7	0	0	91,2
S2.6	12-12.6	Landfill	16,4	0	0,2	0	0	0	2,1	81,3
S2.7	14-14.6	Soil	0	0	0	0	0	0	0	100

Table 7- Description of the borehole 8.

Location 8 (Depth: 14.60m) 13/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S8.1	2-2.6	Landfill	0,6	2,1	3,1	0	0	0	0	94,1
S8.2	4-4.6	Landfill	9,2	0,3	0,2	0	0,2	0	0	90,1
S8.3	6-6.6	Landfill	5	0,1	0,4	0	0,1	0	0	94,5
S8.4	8-8.6	Landfill	5,9	7,1	0,3	0	0,2	0	0	86,4
S8.5	10-10.6	Landfill	37,6	2,2	5,6	0	4,1	0	0,9	49,6
S8.6	12-12.6	Landfill	16,2	0	0,4	0	0	0	0,5	82,9
S8.7	14-14.6	Soil	5,2	6,8	1,6	0	0	0	0	86,4

Table 8 - Description of the borehole 1N.

Location 1N (Depth: 14.10m) 13/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S1N.1	2-2.6	Landfill	0,1	0,1	11,5	0	0	0	0	88,3
S1N.2	4-4.6	Landfill	20,3	1,1	6,5	0	0,5	0,4	0	71,1
S1N.3	6-6.6	Landfill	19,9	5,5	0,1	0	0,4	0,2	0,1	73,8
S1N.4	8-8.6	Landfill	17,5	5,8	3	0	0,4	0	0	73,3
S1N.5	10-10.6	Landfill	35,3	0,1	0,9	0	0	0,5	0	63,2
S1N.6	13.5-14.1	Soil	11,9	4,1	20	0	5,3	0,4	0	58,3

Table 9 - Description of the borehole 10.

Location 10 (Depth: 12.60m) 12/11/2018			**Description**							
Reference	Depth (m)	Location	Plastic	Metal	BM	Paper	Glass	Rubber	Polystyrene	Other
S10.1	2-2.6	Landfill	2,1	0,3	21,4	0	0	0	0	76,2
S10.2	4-4.6	Landfill	40,1	0,9	0,5	0	0,5	0	0	58,1
S10.3	6-6.6	Landfill	3,3	0,2	1,4	0	0	0	0	95,1
S10.4	8-8.6	Landfill	17,4	2,9	2,7	0	0	1,3	1,2	74,4
S10.5	10-10.6	Landfill	46,2	3,8	0	0	0,6	0	0	49,4
S10.6	12-12.6	Soil	0,5	0	0,7	0	0	0	0	98,8

Annex 2: parameters for the different boreholes in function of depth

Table 1 - Characterization of the waste samples taken at borehole 1W.

Location 1W					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S1W1	2-2.6	1114	37.2	11.1	23.7
S1W2	4-4.6	1124	25.5	18.8	10.4
S1W3	6-6.6	1073	9.6	13.1	7.2
S1W4	8-8.6	1240	15.9	12.4	14.8
S1W5	10-10.6	882	30.1	8.1	13.7
S1W6	12-12.6	1255	40	7.2	28.5
S1W7	14-14.6	No data			
S1W8	16-16.6	1342	35.2	6	21.2
S1W9	18-18.6	1008	15.7	9.6	22.1
S1W10	20-20.6	1744	60.1	17.7	1.9
S1W11	22-22.6	959	21.9	13.6	22.2
S1W12	24-24.6	1243	17.4	0	1.4

Table 2 - Characterization of the waste samples taken at borehole 1E.

Location 1E					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S1E1	2-2.6	1036	20.3	5.4	3.7
S1E2	4-4.6	637	35.4	69.2	29.7
S1E3	6-6.6	742	37.4	25.8	11.7
S1E4	8-8.6	1010	30.4	23.1	11.6
S1E5	10-10.6	855	23.4	42.6	32.7
S1E6	12-12.6	1024	37.1	17.2	17.8
S1E7	14-14.6	1243	52.9	No data	
S1E8	16-16.6	1276	49.8	13.6	31.0
S1E9	18-18.6	1187	45.0	23.4	29.7
S1E10	20-20.6	1171	42.4	11.0	8.6
S1E11	22-22.6	1325	46.0	14.1	26.5
S1E12	24-24.6	1463	32.6	5.5	2.6

Table 3 - Characterization of the waste samples taken at borehole 3.

Location 3					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S3.1	2-2.6	1076	9.4	7.1	3
S3.2	4-4.6	1454	18.3	5.7	3.5
S3.3	6-6.6	1503	24.2	17.5	10.2
S3.4	8-8.6	1551	32.6	7.9	15.5
S3.5	10-10.6	1314	34.3	27	7.4
S3.6	12-12.6	1291	31.4	20.5	5.5

Table 4 - Characterization of the waste samples taken at borehole 9.

Location 9					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S9.1	2-2.6	1242	15.6	4..8	6.3
S9.2	4-4.6	1047	29.5	5.8	9.8
S9.3	6-6.6	1686	19.9	27.2	4.9
S9.4	8-8.6	1431	17.1	13.5	12.5
S9.5	10-10.6	1633	17.2	9.0	6.9
S9.6	12-12.6	1571	14.3	10.2	13.4
S9.7	14-14.6	1533	24.2	7.9	1.6

Table 5 - Characterization of the waste samples taken at borehole 6.

Location 6					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S6.1	2-2.6	1002	34.2	47.5	21.7
S6.2	4-4.6	1409	31.3	12.2	15.9
S6.3	6-6.6	1267	27.0	23.5	19.1
S6.4	8-8.6	1069	10.7	16.2	15.2
S6.5	10-10.6	1365	26.7	23.3	6.2
S6.6	12-12.6	1370	24.7	8.4	7.1
S6.7	14-14.6	1566	20.5	2.6	4.0

Table 6 - Characterization of the waste samples taken at borehole 2.

Location 2					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S2.1	2-2.6	2016	21.6	1.5	3.2
S2.2	4-4.6	1600	25.5	7.8	4.6
S2.3	6-6.6	1975	21.4	3.2	4.4
S2.4	8-8.6	1914	22.3	3.2	5.9
S2.5	10-10.6	1732	26.5	5.2	7.2
S2.6	12-12.6	1311	34.3	16.4	13.2
S2.7	14-14.6	2110	21.7	0.0	4.7

Table 7 - Characterization of the waste samples taken at borehole 8.

Location 8					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S8.1	2-2.6	2009	22.3	0.6	3.5
S8.2	4-4.6	1160	24.2	9.2	2.3
S8.3	6-6.6	1906	22.8	0.5	4.4
S8.4	8-8.6	1676	22.9	5.9	5.0
S8.5	10-10.6	1027	46.2	37.6	4.5
S8.6	12-12.6	1636	33.0	16.2	9.0
S8.7	14-14.6	2082	22.3	5.2	3.9

Table 8 - Characterization of the waste samples taken at borehole 1N.

Location 1N					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S1N.1	2-2.6	1784	15.5	0.1	5.9
S1N.2	4-4.6	1404	26.9	20.7	8.4
S1N.3	6-6.6	1116	47.8	20.0	32.3
S1N.4	8-8.6	1607	38.4	17.5	13.5
S1N.5	10-10.6	1488	45.3	35.8	12.7
S1N.6	13.5-14.1	926	23.1	12.3	2.9

Table 9 - Characterization of the waste samples taken at borehole 10.

Location 10					
Reference	Depth (m)	Density (kg/m³)	Moisture content (%)	Plastics and rubber content (wt%)	Organic matter content (wt%)
S10.1	2-2.6	1348	18.8	2.1	6.1
S10.2	4-4.6	1298	17.6	40.1	6.1
S10.3	6-6.6	1686	22.9	3.3	5.2
S10.4	8-8.6	1072	42.0	18.7	26.2
S10.5	10-10.6	1734	53.9	46.2	42.5
S10.6	12-12.6	1430	21.9	0.5	1.9

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