



## I1.3.1 Deliverable - Sampling plan

(Meerhout landfill)

Date: April, 2019

**SUBJECT:** I1.3.1. Sampling plan

☒ report
 ☐ information
 ☐ consideration
 ☐ decision

**To:** ... **From:** NERG & Université de Liège

## WP I1 Pilot test Landfill 1 - LF of Meerhout, Belgium

### D I1.3.1 Sampling positions

In January 2018 a range of complementary geophysical methods were applied on the pilot landfill in Meerhout. The measurements identified several strong geophysical anomalies, which are indicative for structural or compositional changes within the landfill or the transition to the host material. Based on this result, we identified several sampling positions. They should help to verify and to calibrate the geophysical measurements but they should also suit as an example to identify ideal sampling strategies on landfills. In order to test different sampling strategies, we plan to use two different drilling techniques as well as trenching. The boreholes should provide detailed information about compositional changes with depth and the trench should give a better understanding of lateral changes. For both sampling techniques, waste material will be extracted in order to perform lab analysis.

The initial sampling positions described below in section 1.1 had to be slightly adjusted just before the drilling start. This was because a lower amount of boreholes were feasible due to slightly increased drilling costs. The adjusted sampling positions target the same anomalies and are described in section 1.3.

#### 1.1 Preliminary sampling positions

The sampling positions are planned to target all major anomalies as well as the background geophysical signature. Eleven boreholes and one long trench are planned. The sampling is much denser on the lower, North-Eastern part of the landfill where intensified geophysical measurements were conducted. In particular for the lower part, the sampling positions are aligned with the SRT and ERT profiles such that the sampling is directly comparable to the geophysical measurements.

The target positions are listed below in which the sampling numbers relate to the positions shown in Figure 1. A list with the coordinates and the desired drilling depths can be found in Table 1. For further details on the geophysical results please refer to the geophysical imaging report I1.2.2.

#### **Sampling on investigation area 1**

- **Borehole Nr. 7:** strong magnetic anomaly indicating a big metallic object.
- **Borehole Nr. 2:** potential earth dam seen in the magnetic and the hvsnr results running in E-W direction through the middle of area 1
- **Borehole Nr. 1, 8, 6:** area with highly perturbed value in the vertical gradient (magnetics) and magnetic susceptibility data (EM).
- **Borehole Nr. 2 and 6:** low conductivity anomaly in the EM data
- **Borehole Nr. 4 and 5:** high conductivity anomaly in the EM data
- **Borehole Nr. 1, 3, 4 and 9:** anomalies in the ERT and IP data at depth
- **Borehole Nr. 2, 3, 6 and trench:** validation of the shallow layering structure seen in the resistivity and IP data

- **Borehole Nr. 3:** validation of the layer with a sharp change in electrical permitting seen in the GPR radargrams

**Sampling on investigation area 2:**

- **Borehole Nr. 10 and 11:** contrast in the total magnetic field and the conductivity (EM)
- **Borehole Nr. 10:** anomaly in the magnetic susceptibility data (EM)

## 1.2 Sampling analysis

During drilling and trenching, detailed records of the encountered material have to be taken on site. For the trench they should include a description of the trench walls, with special attention to visually recognisable material layers. Similarly, borehole logs should include depths and descriptions of material layers as well as potential depth information about water table and the transition to the host material.

Lab analysis will be performed on several samples from drilling and trenching. These analyses should provide the following information:

- water content
- bulk density
- resistivity (as calibration for the ERT measurements)
- fractions of waste streams in % and weight  
(ferrous metals, non-ferrous, cardboard and paper, plastics, glass, rubber, wood, organic materials and fine fraction (0 to 40 or 50 mm or what cannot be distinguished by visual analysis))
- particle size distribution (sieving)

For boreholes which reach beyond the waste material, undisturbed samples of the host material should be taken in order to determine water content, bulk density, geophysical parameters and composition (gravels, sand, silt and clay content in %).

*Table 1: Coordinates and depths of the sampling locations. The numbering corresponds to Figure 1. The coordinate system is Belge\_Lambert\_1972.*

Nr.	x (m)	y (m)	drilling depth
1	197760.186	199539.395	11-12m
2	197766.446	199507.017	11-12m
3	197727.106	199478.526	11-12m
4	197721.994	199505.911	11-12m
5	197749.180	199482.615	11-12m
6	197783.454	199530.843	11-12m
7	197727.678	199502.701	11-12m
8	197773.809	199545.010	11-12m
9	197719.608	199517.675	11-12m
10	197720.442	199375.434	20m
11	197655.852	199404.324	20m

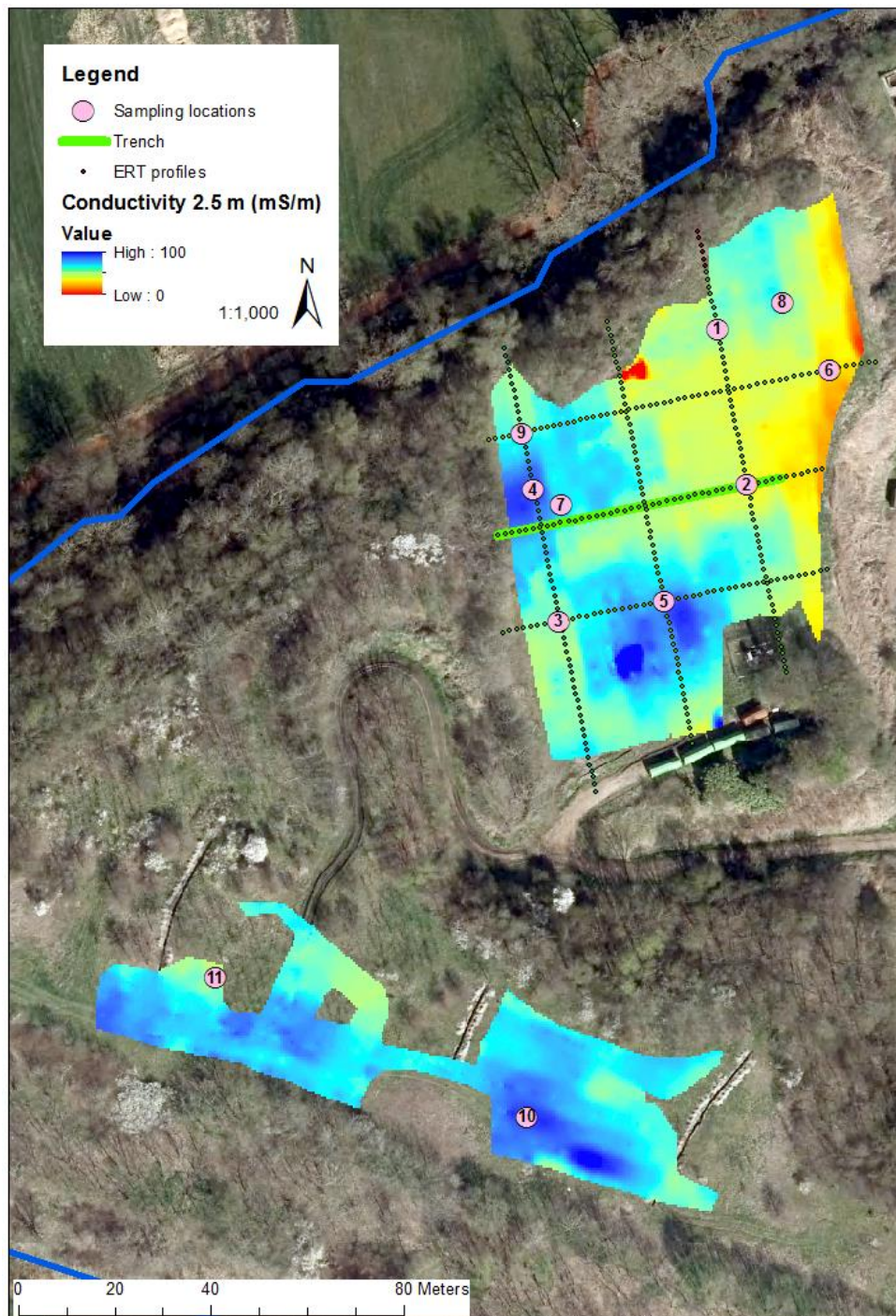
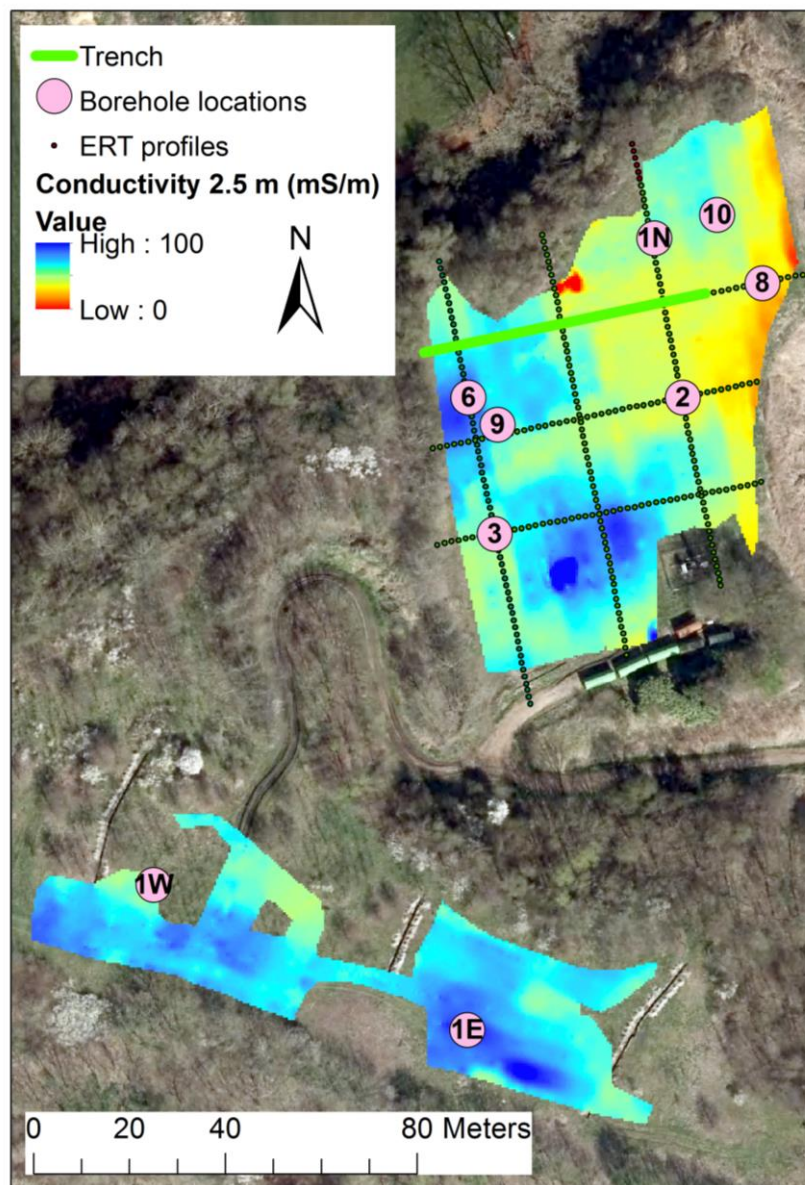


Figure 1: Preliminary sampling positions plotted on to the Electrical conductivity map at 2.5m depth below the surface. The borehole positions are indicated with a pink dot and the trench is displayed as a green line. The EM map was derived from the quadrature-phase data measured with the 4 m antenna and vertical coil alignment.



### 1.3 Adjusted sampling positions

The adjusted sampling positions and the corresponding coordinates are shown in Figure 2 and Table 2. The sampling positions target the same anomalies as described in section 1.1. In order to accomplish the reduction of two boreholes we shifted the trench towards North onto the northern ERT line. This allowed replacing borehole 9 in Figure 1 by the trench. Borehole 5 in Figure 1 was regarded as less important and therefore neglected.



*Figure 2: Adjusted sampling positions plotted on to the Electrical conductivity map at 2.5m depth below the surface. The borehole positions are indicated with a pink dot and the trench is displayed as a green line. The EM map was derived from the quadrature-phase data measured with the 4 m antenna and vertical coil alignment.*

*Table 2 : Coordinates and depths of the sampling locations. The numbering corresponds to Figure 2. The coordinate system is Belge\_Lambert\_1972.*

Nr.	x (m)	y (m)	drilling depth
<b>1E</b>	197721.7	199375.1	20m
<b>1N</b>	197760.6	199540	11-12m
<b>1W</b>	197656.2	199405.3	20m
<b>2</b>	197766.6	199506.8	11-12m
<b>3</b>	197727.4	199478.4	11-12m
<b>6</b>	197721.9	199506.8	11-12m
<b>8</b>	197783.2	199530.7	11-12m
<b>9</b>	197727.9	199501.2	11-12m
<b>10</b>	197773.7	199545	11-12m

## Contact

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