Bodemkundige observaties
van de site: Herentals, Geelseweg

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Jan. 2016

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research & training

FOIO

Doel en werkwijze

Ter ondersteuning van een archeologische prospectie uitgevoerd door FODIO werd de bodemgesteldheid van de site Geelseweg in Herentals 7 januarie 2017. Na inspectie van de proefsleuven werden zes referentieprofielen in detail beschreven die een goed beeld geven over de bodemgesteldheid van de site (beschrijving in Bijlage).

De specifieke onderzoeksvragen in verband met de bodem waren:

- Hoe is de oorspronkelijke (natuurlijke) bodem opgebouwd en hoe is die in de loop van de tijd geëvolueerd (is er een oude akkerlaag/plaggenlaag)?
- In hoeverre is de bodemopbouw intact?
- Is er erosie geweest en in welke mate?
- In welke mate is de bewaring van de sporen aangetast en welke processen zijn hiervoor verantwoordelijk?

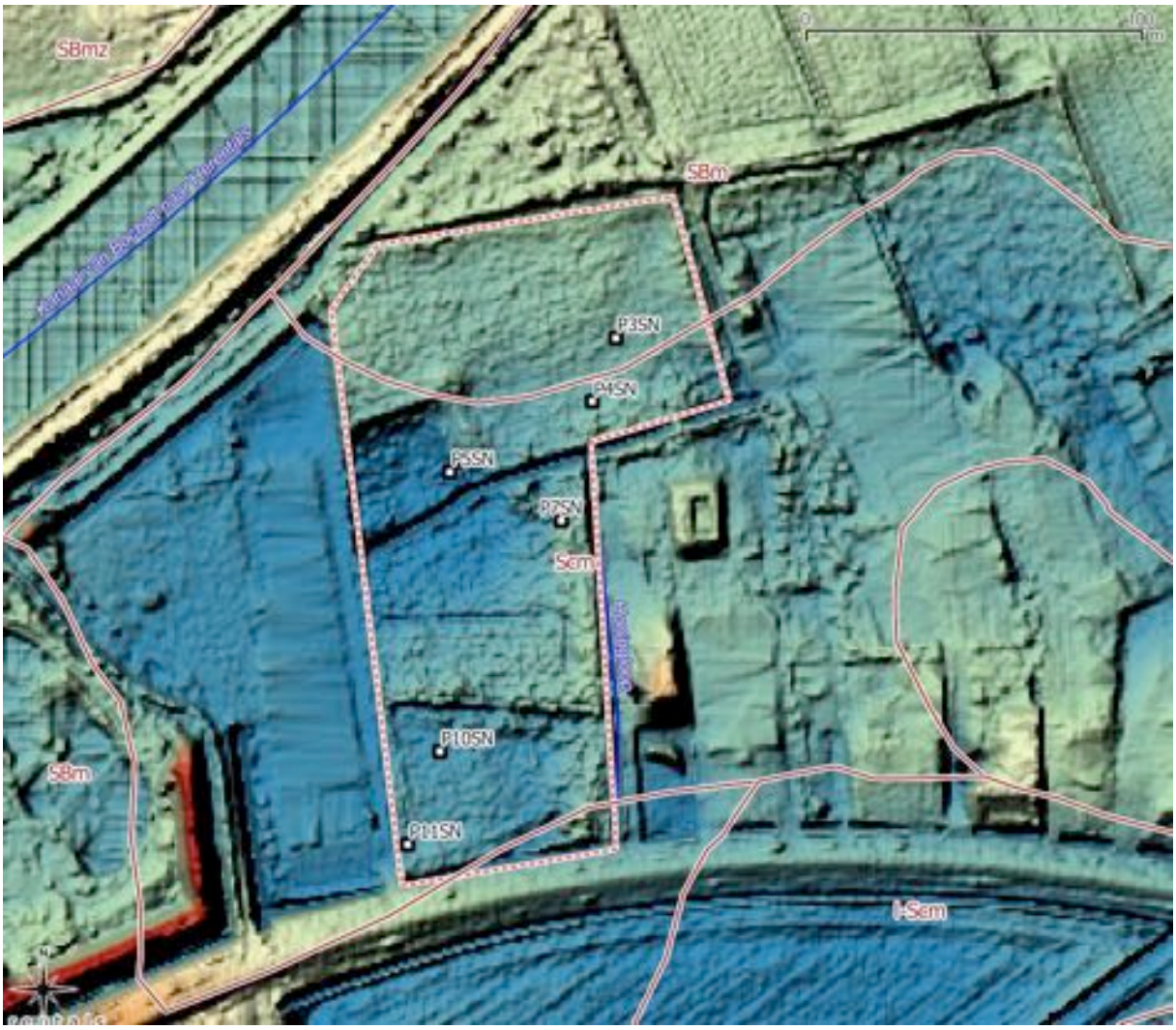

Fig. 1 - Ligging van de bodemprofielen – site Herentals, Geelseweg met op de achtergrond beschaduwd terreinbeeld en de digitale bodemkaart (bron data DOV, Lidar res. 1 x 1 m)

Fig. 2 – Uitstreksel van de Quartaire geologische kaart in de omgeving van de site Geelseweg, Herentals Kaarteenheid 21 omvat Pleistocene dekzanden van de formatie van Wildert, die 1 tot 4 m dik is boven Tertiaure mariene afzettingen (bron data DOV, beschaduwd terrainbeeld op basis van Lidar res. 1 × 1 m; Goolaerts & Beerten, 2006)

Bevindingen

De bodems bestonden allen uit lemig sand (textuurklasse S) met een dikke tot mattig dikke zwart of grijze, antropogene humeuze A horizont.
Daaronder bevonden zich:

- in het noordelijk deel het Tertiaire zand substraat, rijk aan glauconiet, van de *Formatie van Diest*
- in het centraal deel, de resten van een eerder natte Podzol
- in het zuidelijk deel, zijn er geen sporen van een Podzol maar wel talrijke sporen van regenworm- en molgangen. Dit geeft aan dat de bodem-pH in dit deel van het perceel minder zuur is. Mogelijks was hier de dekzandafzetting dikker en rijker aan kalkrijke loess, en/of leidt het substraat van Tertiair materiaal van de *Formatie van Kasterlee* tot minder zure bodems.

De bodems vertonen in de oppervlakkig horizont (Ap1) sporen van recente bewerking, en in de daaronderliggende horizont (Ap2, Ap3, 2Ap) sporen van oudere bewerking. Er zijn geen aanwijzigen van bodemerosie maar wel van egalisatie. De archeologische sporen blijken ouder te zijn dan de egalisatiewerken.

De waargenomen bodems komen deels overeen met de bodemtypes **SBm** en **Scm** zoals aangeduid op de bodemkaart. Drie kenmerken werden echter niet weergegeven op de bodemkaart:

1. De dikte van de antropogene humeuze A horizonten is niet homogeen en vaak minder dik dan 60 cm (wat verondersteld is voor een bodem met profiel **..m)**. Plaatselijk, en vooral in het natste centraal deel zijn er resten van een Podzol bodem aangetroffen, maar het voorkomen van begraven bodems wordt standaard niet weergegeven in het Belgische classificatiesysteem.
2. Het voorkomen van Tertiair substraat van de *Formatie van Diest* in het noordelijk deel van de site en van de *Formatie van Kasterlee* in het zuidelijk deel zijn niet aangeduid op de bodemkaart. Dit is allicht niet gebeurd omdat het verschil in textuur tussen de dekzanden en het substraat niet erg uitgesproken is. Dit is echter wel aangegeven op de gedetailleerde Quartair geologische kaart.
3. Het lijkt er sterk op dat het terrein geëgaliseerd is geweest. De resten van Podzols in het centrale en laagste deel van het terrein (bv. profiel P7SN en profiel P5SN) zijn hiervoor een aanwijzing. In het hogere, noordelijk deel van de site zijn Podzols afwezig (profiel P3SN), of werd slechts een afgetopte dunne laag van gevonden (profiel P4SN). De afwezigheid van Podzols in het zuidelijk deel kan toegeschreven worden aan de hogere bodem pH.

Bijlage: Profielbeschrijvingen

Date 10 Jan 2017

Profile: P7SN

Location: Herentals, Geelseweg

Coordinates: E 4.85301, N 51.17117, LB72-x 183868, LB72-y 206907; (gps ± 5 m)

Land-use: grassland in industrial area

Altitude: 17.5 m (TAW); **Groundwater**: -

Author: Stefaan Dondeyne

Cloudy, cool (~5°C) with some rain, the profile were freshly dug, so colours are described moist

Classification[1]: BSM: **Scm**; BSC: **s-Scm(g)**; WRB-2014: *Plaggic Anthrosol (Arenic, Bathyruptic, Thapto-spodic)*

Fig. 3 – Profiel P7SN, Herentals, Geelseweg, westwand

[1] BSM = Belgian Soil Mapping unit; BSC = soil type according to Belgian Soil Classification; WRB-2014 = Soil Unit following the 3rd edition of the World Reference Base for soil resources.

Beknopte algemene beschrijving – P7SN

Zandige bodem, met een dikke antropogene humus laag (60 cm) boven de resten van een begraven Podzol. Substraat is mattig fijn zand waar nog dunnen bandjes van humus en/of klei-inspoeling in aangetroffen worden.

Detailed description [2]

Horizon	Depth (cm)	Description	Diagnostic features
Ap1	0-29	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 7.5YR 2/2 (moist); weak medium granular and subangular blocky structure; not sticky, not plastic, very friable moist; many fine roots; common earthworm galleries, channels and interstitial pores; small pieces of bricks; clear and smooth boundary	Plaggic horizon; Arenic material
Ap2	29-60	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 7.5YR 3/2 (moist), many small (1-3 cm) white patches as traces of tillage; weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; very few earthworm galleries; common channels and interstitial pores; small pieces of bricks; abrupt and wavy boundary	Plaggic horizon; Arenic material
2Ap	60-78	Loamy fine Sand in FAO classes (S in Belgian classes); black 7.5YR 2/1 (moist); common small (1-3 cm) white patches as traces of tillage; very weak subangular blocky structure; not sticky, not plastic, very friable moist; few fine roots; interstitial pores; small pieces of bricks; clear wavy boundary	Umbric horizon, Arenic material
2AE	78-80/85	Loamy fine Sand in FAO classes (S in Belgian classes); very dark brown 7.5YR 2/3 (moist) to grayish brown 5YR4/2; very weak subangular blocky structure; not sticky, not plastic, very friable moist; very few fine roots; interstitial pores; clear to gradual wavy boundary	Brunic horizon, Arenic material
2Bh	80/85-90/100	Loamy fine Sand in FAO classes (S in Belgian classes); dark reddish brown 5YR 3/2 (moist); very weak subangular blocky structure; not sticky, not plastic, very friable moist; clear wavy to irregular boundary	Spodic horizon; Arenic material
3Cg/Bh	90/100-120+	Loamy medium fine Sand in FAO classes (S in Belgian classes);, with some fine lamellae of humus (and/or clay?) illuviation; brown 2.5YR 4/4 (moist); no structure; not sticky, not plastic, very friable moist; no roots	Arenic material

[2] Volgens de FAO 2006. Guidelines for soil descriptiion, 4th Edition. Rome.

Date 10 Jan 2017
Profile: P4SN
Location: Herentals, Geelseweg
Coordinates: E 4.85315, N 51.17149, LB72-x 183878, LB72-y 206942; (gps ± 5 m)
Land-use: grassland in industrial area
Altitude: 17.4 m (TAW); **Groundwater**: -
Author: Stefaan Dondeyne
Cloudy, cool (~5°C) with some rain, the profile were freshly dug, so colours are described moist
Classification[3]: BSM: **Scm**; BSC: **s-Scm(g)**; WRB-2014: *Plaggic Anthrosol (Arenic, Endogleyic, Ruptic)*

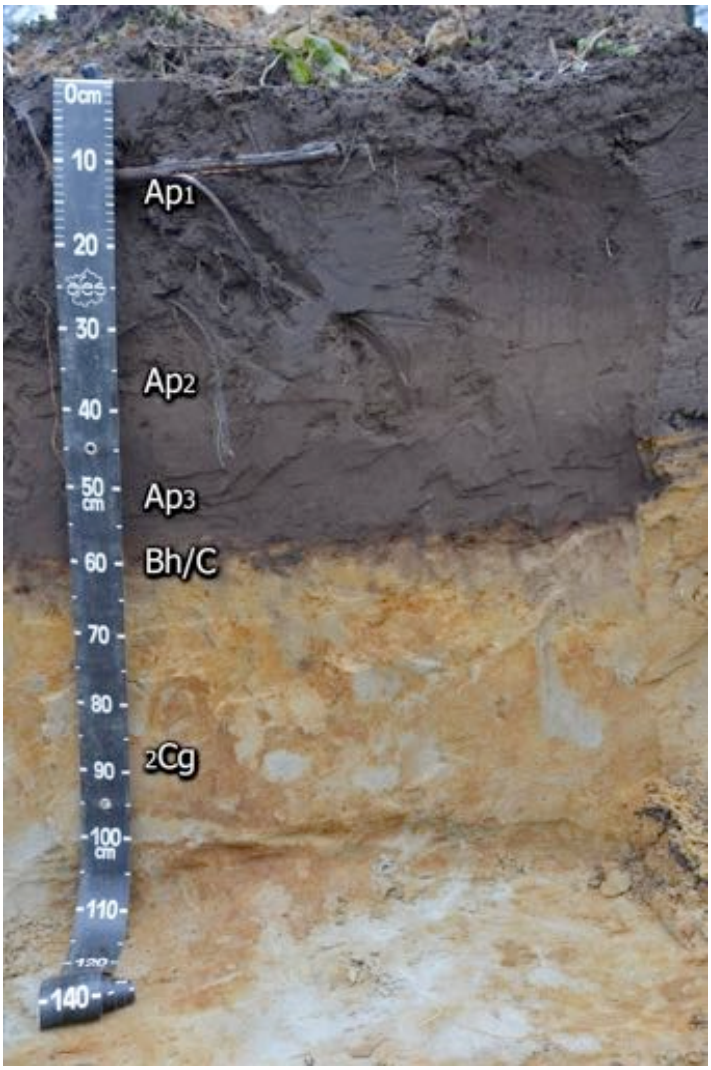

Fig. 4 – Profiel P4SN, Herentals, Geelseweg, oostwand

[3] BSM = Belgian Soil Mapping unit; BSC = soil type according to Belgian Soil Classification; WRB-2014 = Soil Unit following the 3rd edition of the World Reference Base for soil resources.

Beknopte algemene beschrijving – P4SN

Fijn zandige bodem, met een dikke antropogene humus laag (60 cm) boven de vage resten van een Spodic horizont. Het substraat is grof en scherp glauconiet houdend zand, met uitgesproken roestvlekken.

Detailed description

Horizon	Depth (cm)	Description	Diagnostic features
Ap1	0-25	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 7.5YR 2/2 (moist); very weak medium granular and subangular blocky structure; not sticky, not plastic, very friable moist; many fine roots; interstitial pores; small pieces of bricks; clear and smooth boundary	Plaggic horizon; Arenic material
Ap2	25-45	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 7.5YR 3/2 (moist), very weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; very few earthworm galleries; common channels and interstitial pores; small pieces of bricks; clear and smooth boundary	Plaggic horizon; Arenic material
Ap3	45-58	Loamy fine Sand in FAO classes (S in Belgian classes); dark reddish brown 5YR 3/2 (moist); traces of ridges and furrows agriculture; very weak subangular blocky structure; not sticky, not plastic, very friable moist; few fine roots; interstitial pores; clear smooth boundary	Plaggic horizon; Arenic material
Bh/C	58-68	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 10YR 2/3 (moist) large brown 10YR 4/4 (moist) patches (taken as degraded Spodic horizon); very weak subangular blocky structure; not sticky, not plastic, very friable moist; very few fine roots; interstitial pores; gradual irregular boundary	Brunic horizon, Arenic material
2Cg	68-105+	Loamy medium Sand in FAO classes (S in Belgian classes), coarser and sharper than the above sands; bright brown 7.5YR 5/8 (moist) with coarse patches of light yellow of 2.5Y 7/4 (moist) next to reddish brown 5YR 4/8 (moist) and dark reddish brown 5YR 3/6; no structure; not sticky, not plastic, very friable moist	Gleyic properties; Arenic material

Date 10 Jan 2017
Profile: P3SN
Location: Herentals, Geelseweg
Coordinates: E 4.85325, N 51.17166, LB72-x 183885, LB72-y 206962; (gps ± 5 m)
Land-use: grassland in industrial area
Altitude: 17.5 m (TAW); **Groundwater**: -
Author: Stefaan Dondeyne
Cloudy, cool (~5°C) with some rain, the profile were freshly dug, so colours are described moist
Classification[4]: BSM: **SBm**; BSC: **s-Scm(g)**; WRB-2014: *Plaggic Anthrosol (Arenic, Relicticryic; Endogleyic, Ruptic;)*

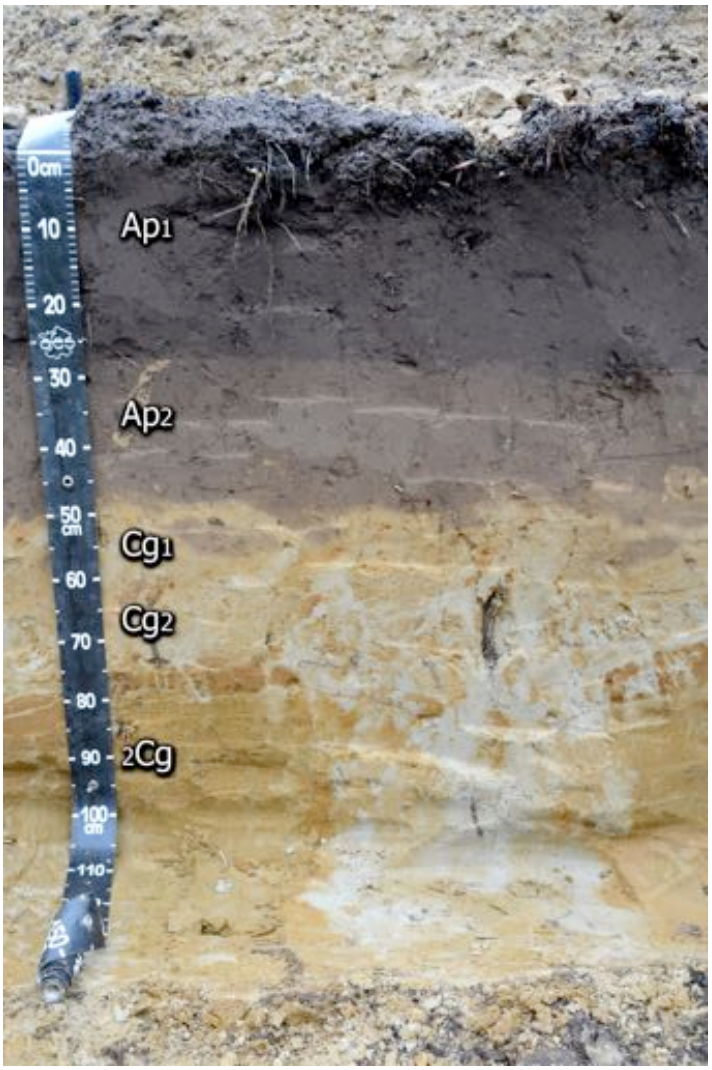

Fig. 5 – Profiel P3SN, Herentals, Geelseweg, westwand

[4] BSM = Belgian Soil Mapping unit; BSC = soil type according to Belgian Soil Classification; WRB-2014 = Soil Unit following the 3rd edition of the World Reference Base for soil resources.

Beknopte algemene beschrijving – P3SN

Fijn zandige bodem, met een dikke antropogene humus laag (*ca.* 50 cm) op dekzand. Substraat is grover en scherper glauconiet houdend zand, met uitgesproken roestvlekken, met sporen van een grote ijswig waar dekzand is ingespoeld.

Detailed description

Horizon	Depth (cm)	Description	Diagnostic features
Ap1	0-28	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 10YR 3/2 (moist); very weak medium granular and subangular blocky structure; not sticky, not plastic, very friable moist; many fine roots; interstitial pores; small pieces of bricks; abrupt and smooth boundary	Plaggic horizon; Arenic
Ap2	28-48	Loamy fine Sand in FAO classes (S in Belgian classes); dark brown 10YR 3/3 (moist), very weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; earthworm and mole galleries; interstitial pores; small pieces of bricks; abrupt and wavy to irregular boundary	Plaggic horizon; Arenic
Cg1	48-60	Loamy fine Sand in FAO classes (S in Belgian classes); yellow brown 10YR 5/8 (moist) with coarse dull yellow orange 10YR 6/4 (moist) and dark reddish brown 5YR 3/6 (moist) mottles; very weak subangular blocky structure; not sticky, not plastic, very friable moist; few fine roots; earthworm and mole galleries; interstitial pores; clear smooth boundary	Arenic material; Gleyic properties
Cg2	60-75/110+	Loamy medium fine Sand in FAO classes (S in Belgian classes); dull yellow orange 10YR 6/4 (moist) with coarse yellowish brown 10YR 5/6 (moist) and dull yellow orange 10YR 7/2 (moist) mottles; very weak subangular blocky structure; not sticky, not plastic, very friable moist; very few fine roots; interstitial pores; gradual irregular boundary	Arenic material; Gleyic properties Relictiturbic
2Cg	75-110+	Loamy medium fine Sand in FAO classes (S in Belgian classes), coarser and sharper than the above sands; yellowish brown 10YR 5/6 to dull yellowish brown 10YR 4/3 (moist); no structure; not sticky, not plastic, very friable moist	Arenic material; Gleyic properties

Date 10 Jan 2017
Profile: P5SN
Location: Herentals, Geelseweg
Coordinates: E 4,85254, N 51,17131, LB72-x 183835, LB72-y 206922; (gps ± 5 m)
Land-use: grassland in industrial area
Altitude: 16.8 m (TAW); **Groundwater**: -
Author: Stefaan Dondeyne
Cloudy, cool (~5°C) with some rain, the profile were freshly dug, so colours are described moist
Classification[5]: BSM: **Scm**; BSC: **s-Sdg3**; WRB-2014: *Plaggic Endogleyic Podzol (Arenic)*

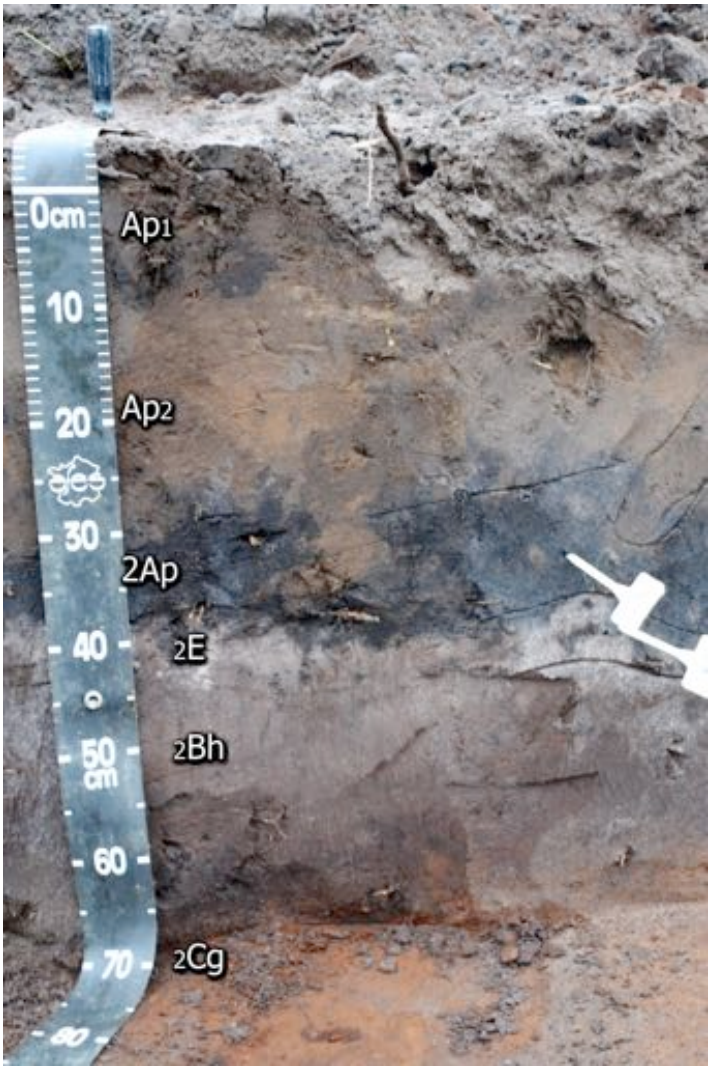

Fig. 6 – Profiel P5SN, Herentals, Geelseweg, oostwand

[5] BSM = Belgian Soil Mapping unit; BSC = soil type according to Belgian Soil Classification; WRB-2014 = Soil Unit following the 3rd edition of the World Reference Base for soil resources.

Beknopte algemene beschrijving - P5SN

Fijn zandige bodem, met een niet zo dikke antropogene humus laag (*ca.* 30 cm) boven een natte Podzol bodem ontwikkeld in dekzand.

Detailed description

Horizon	Depth (cm)	Description	Diagnostic features
Ap1	0-15	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 10YR 3/2 (moist); very weak medium granular and subangular blocky structure; not sticky, not plastic, very friable moist; common fine roots; interstitial pores; gradual and broken boundary	Plaggic material; Arenic material
Ap2	15-25/38	Loamy fine Sand in FAO classes (S in Belgian classes); dark brown 10YR 3/3 (moist), very weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; common interstitial pores; clear and broken boundary	Plaggic horizon; Arenic
2Ap	25/38-40	Loamy fine Sand in FAO classes (S in Belgian classes); black 10YR 2/2 (moist); very weak subangular blocky structure; not sticky, not plastic but smeary consistency, very friable moist; few fine roots; interstitial pores; clear smooth boundary	Arenic material; Umbric properties
2E	40-45	Loamy fine Sand in FAO classes (S in Belgian classes); brownish gray 7.5YR 6/1 (moist); very weak subangular blocky structure; not sticky, not plastic, very friable moist; very few fine roots; interstitial pores; gradual irregular boundary	Arenic material; Albic horizon
2Bh	45-65	Loamy fine Sand in FAO classes (S in Belgian classes), brown 7.5YR 4/4 (moist); no structure; not sticky, not plastic, very friable moist	Arenic material; Spodic horizon
2Cg	65+	Loamy fine Sand in FAO classes (S in Belgian classes), dark reddish brown 5YR 3/6 (moist); no structure; not sticky, not plastic, very friable moist	Arenic material Gleyic properties

Date 10 Jan 2017
Profile: P10SN
Location: Herentals, Geelseweg
Coordinates: E 4,85249, N 51,17056, LB72-x 183832, LB72-y 206838; (gps ± 5 m)
Land-use: grassland in industrial area
Altitude: 17.2 m (TAW); **Groundwater**: -
Author: Stefaan Dondeyne
Cloudy, cool (~5°C) with some rain, the profile were freshly dug, so colours are described moist
Classification[6]: BSM: **Scm**; BSC: **s-Sdf3**; WRB-2014: *Plaggic Endogleyic Arenosol*

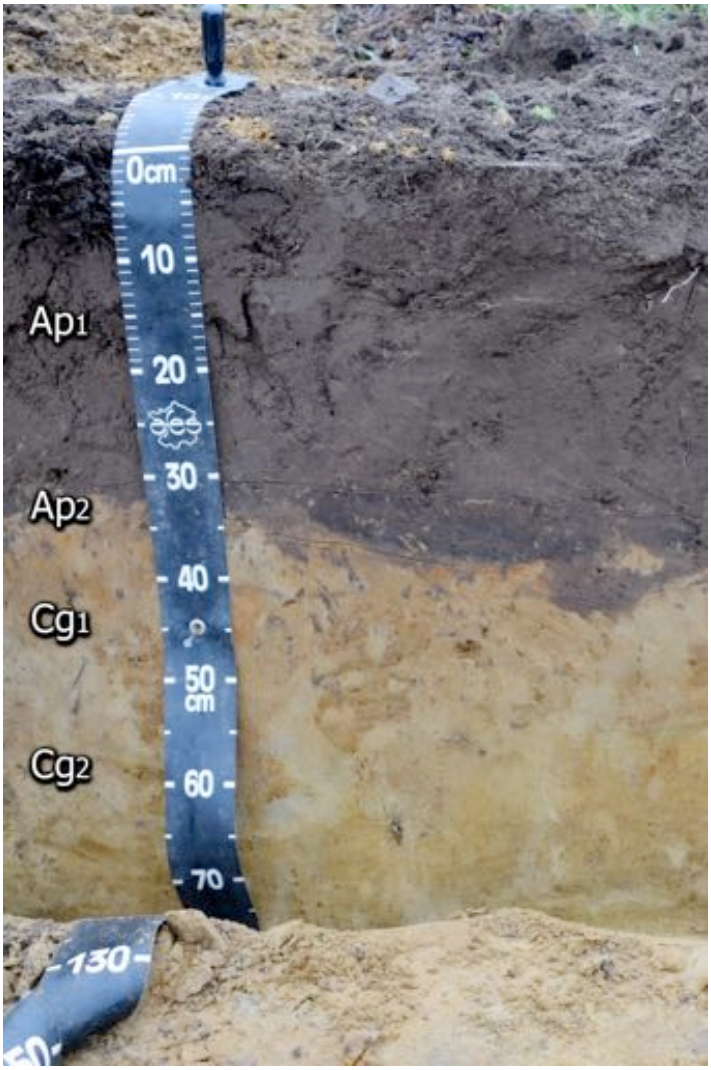

Fig. 7 – Profiel P10SN, Herentals, Geelseweg, westwand

[6] BSM = Belgian Soil Mapping unit; BSC = soil type according to Belgian Soil Classification; WRB-2014 = Soil Unit following the 3rd edition of the World Reference Base for soil resources.

Beknopte algemene beschrijving – P10SN

Fijn zandige bodem, met een niet zo dikke antropogene humus laag (*ca.* 35 cm) op dekzand. Het tertiair substraat werd hier niet bereikt; er komen talrijke sporen van wormgangen en molgangen voor wat wijst op een gunstige pH.

Detailed description

Horizon	Depth (cm)	Description	Diagnostic features
Ap1	0-30	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 7.5YR 3/2 (moist); very weak medium granular and subangular blocky structure; not sticky, not plastic, very friable moist; many fine roots; interstitial pores; clear and smooth boundary	Plaggic horizon; Arenic
Ap2	30-35	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 7.5YR 2/2 (moist), very weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; common earthworm and mole galleries; interstitial pores; abrupt and irregular boundary – (note could be seen as "ploughed Ah")	Plaggic horizon; Arenic
Cg1	35-60	Loamy fine Sand in FAO classes (S in Belgian classes); yellowish brown 10YR 5/6 (moist) with some coarse lighter and bright brown mottles; no structure; not sticky, not plastic, very friable moist; few fine roots; many traces of earthworm and mole galleries; interstitial pores; gradual and smooth boundary	Arenic material; Gleyic properties
Cg2	60-85+	Loamy medium fine Sand in FAO classes (S in Belgian classes); brown 10YR 4/6 (moist) with some coarse lighter and greenish brown mottles; no structure; not sticky, not plastic, very friable moist; few fine roots; many traces of earthworm and mole galleries; interstitial pores; gradual and smooth boundary	Arenic material; Gleyic properties

Date 10 Jan 2017
Profile: P11SN
Location: Herentals, Geelseweg
Coordinates: E 4,85234, N 51,17031, LB72-x 183822, LB72-y 206810; (gps ± 5 m)
Land-use: grassland in industrial area
Altitude: 17.2 m (TAW); **Groundwater**: -
Author: Stefaan Dondeyne
Cloudy, cool (~5°C) with some rain, the profile were freshly dug, so colours are described moist
Classification[7]: BSM: **Scm**; BSC: **Sdc3**; WRB-2014: *Plaggic Endogleyic Arenosol*

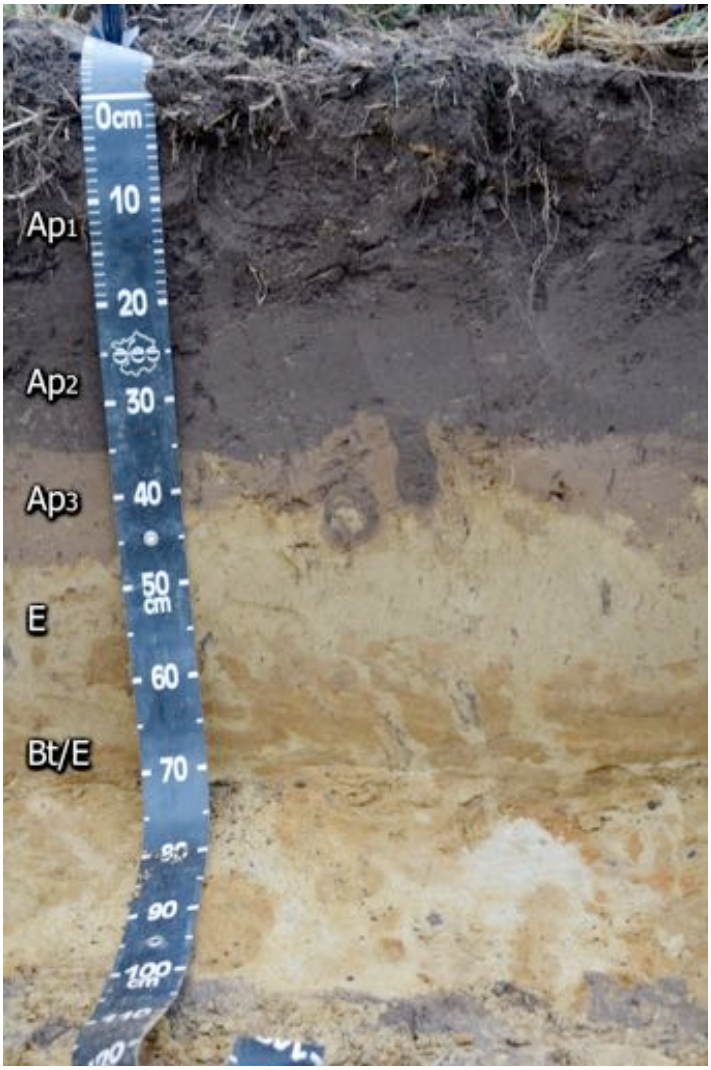

Fig. 8 – Profiel P10SN, Herentals, Geelseweg, westwand

[7] BSM = Belgian Soil Mapping unit; BSC = soil type according to Belgian Soil Classification; WRB-2014 = Soil Unit following the 3rd edition of the World Reference Base for soil resources.

Beknopte algemene beschrijving – P11SN

Fijn zandige bodem, met een niet zo dikke zwarte antropogene humus laag (*ca.* 35 cm) en een bruine bewerkingshorizont op dekzand. Onder een uitlogingshorizont, is er een verbrokkeld kleiaanrijkingshorizont. Ook hier waren er talrijke sporen van wormgangen en molgangen.

Detailed description

Horizon	Depth (cm)	Description	Diagnostic features
Ap1	0-20	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 10YR 2/2 (moist); weak medium granular and subangular blocky structure; not sticky, not plastic, very friable moist; many fine roots; interstitial pores; clear and smooth boundary	Plaggic horizon; Arenic
Ap2	20-35	Loamy fine Sand in FAO classes (S in Belgian classes); brownish black 10YR 3/2 (moist); very weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; common earthworm and mole galleries; interstitial pores; abrupt and wavy boundary	Plaggic horizon; Arenic
Ap3	35-45	Loamy fine Sand in FAO classes (S in Belgian classes); brown 10YR 4/4 (moist); very weak medium to coarse sub-angular blocky structure; not sticky, not plastic, very friable moist; few fine roots; common earthworm and mole galleries; interstitial pores; abrupt and wavy boundary	Plaggic horizon; Arenic
E	45-55/60	Loamy fine Sand in FAO classes (S in Belgian classes); dull yellow orange 10YR 6/4 (moist); no structure; not sticky, not plastic, very friable moist; very few roots; common traces of earthworm galleries; interstitial pores; gradual and broken boundary	Arenic material; Gleyic properties
Bt/E	55/60-75+	Loamy fine Sand in FAO classes (S in Belgian classes), but with some what more clay; brown 10YR 4/6 (moist) with some coarse lighter and greenish brown mottles; no structure; not sticky, not plastic, very friable moist; few fine roots; interstitial pores; gradual and smooth boundary	Arenic material; Gleyic properties