GUIDELINES
for
AUGER DESCRIPTIONS
OF ESTUARINE TIDAL MUDFLATS AND MARSHES

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Introduction

This guideline is a simplified version of the guidelines for site and soil description of estuarine tidal mudflats and marshes. Many parameters are standard for soil science are taken over from the FAO guideline (FAO 2006).

To facilitate the fieldwork following extra document has been prepared and added as appendix at the end of this booklet:

Appendix **A**: Field recording forms

To enhance the fieldwork 4 different field sheets has been prepared. The one to use depends on the level of details wanted and the environment either tidal mud flat or tidal marsh.

Table: The different field description sheets, the applicable environment (either tidal mud flat or tidal marsh) and the number of potential information to be collected. E.g. the abundance of gravel should be recorded on all levels of description, but if no gravel is present the field is left empty.

Title	**Environment**	**General site information**	**Soil forming factors**	**Soil horizon description**
Reference level	Tidal marsh	7	8	43
Standard level	Tidal marsh	7	5	27
Basic level	Tidal marsh	7	4	17
Tidal mud flat	Tidal mud flat	7	23	16

The auger description always begins with some vital general site information. They are the same for all field sheets and concerns “name of the site, date, time etc. Secondly, a series of soil forming factors should be recorded. These information are collected before the auger observation is made, as it concerns mostly geomorphological and hydrological information. Finally, information to be deduced from the auger observation itself are listed.

The required information (see field tables in appendix C) is linked with the field guidelines for auger descriptions of estuarine tidal mudflats and marshes. As an example, the site name is found described in chapter 1.1 and the information is stored in the database under code PLOT. The auger observation number is described in chapter 1.2 and is stored in the database under code P-NO etc.

Chap-ter	Reporting category title	Reporting category code	Auger observations: REFERENCE LEVEL Field observations:
1.1	Site name	[PLOT]	
1.2	Observation no.	[P-NO]	

A second example is found below. Here the subchapters on coarse surface fragments is introduced with some background information. Then the information category (surface cover) and the database abbreviation (STO-COV) are provided. Finally the categories for surface stone coverage are listed, where e.g. if the surface coverage is estimated to 10-12% the category RC3 applies and is reported on the field sheet.

2.6 Coarse surface fragments (FAO, 2006)
Coarse surface fragments- boulders and stones, including those that are partly buried, should be described in terms of percentage of surface cover and size of the fragments. Remember, a stone or boulder partly buried is only included in the coverage and class estimate based on the visible part, it is not the purpose to uncover partly or completely buried coarse fragments. The classes of coverage and size handled are:

2.6.1 Surface cover ***[STO-COV]***

RC0	None	0 %
RC1	Very few	0 - 2 %
RC2	Few	2 - 5 %
RC3	Common	5 - 15 %
RC4	Many	15 - 40 %
RC5	Abundant	40 - 80 %
RC6	Dominant	>80 %
RCX	Not determined	

1. General site information, registration and location

1.1. Site name [PLOT]

The site is named after its location
Example*:* Schor van Ouden Doel (SvOD)

1.2. Observation number [P-NO]

The observation identification number
Example*:* Auger observation [A7]

1.3. Date and time of field description [DATE; TIME]

The date of description is given as ddmmyy (6 digits). When field information are collected in an environment under tidal influence recording the time of description, is recommended.
Example*:* 160504 (16 May 2004); Description initiated at 13:30

1.4. Author(s) [AUT]

The person(s) who perform(s) the field description should be acknowledged by first name and surname. If the person that validates the data is different from the field person, his or her name should appear as well.

1.5. Profile latitude-/ longitude coordinates [LAT; LONG]

The latitude and longitude coordinates of the observation should be recorded as accurately as possible (in degrees, minutes and seconds).
If applying a GPS, make sure not to report the location more detailed than the GPS system enables. If for some reason recording of the observation coordinates is impossible, then the distance (in metres and centimetres) and direction (in degrees) from any fixed observation point in the neighbourhood (e.g. a building, road…)should be measured.
If using a GPS system the location of the observation is reported as:
Latitude geographic coordinates (+/- degrees, minutes, seconds) [WGS84]
Longitude geographic coordinates (+/- degrees, minutes, seconds) [WGS84]
Example*:* Latitude: 51° 23´ 31´´ N ; is reported as +512331
Longitude: 11° 52´ 40´´ E ; is reported as : +115240

2. Soil forming factors

2.1. Atmospheric climate and weather conditions

Additional climatic data to be collected but not in the field are listed in chapter 4.1.

2.1.1. Present weather conditions *[WETH-PR]*

The weather condition while describing the profile is noticed, using following classes (after BBC weather):

PW1 sunny
PW2 partly cloudy
PW3 overcast
PW4 light rain
PW5 heavy rain
PW6 thunder
PW7 sleet
PW8 hail
PW9 snow
PWX no data

2.2. Landforms and topography

2.2.1. Meso-scale landform *[LND-FRM]*

On a meso-scale the landscape position can be allocated within one of following categories.

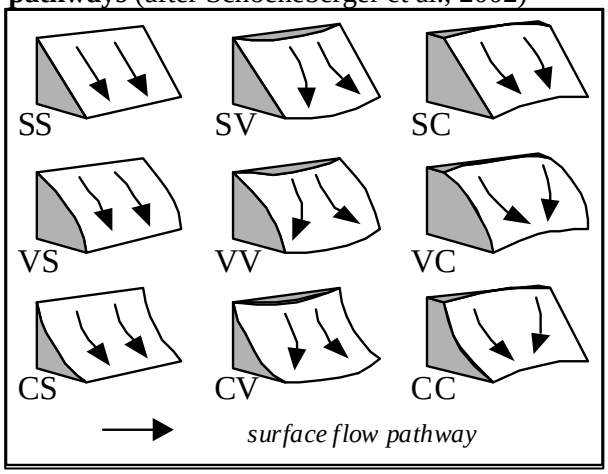
ML1	Stream channel (stroomkanaal)
ML2	Tidal mud flat (slik)
ML2.1	Tidal mud flat, lower part
ML2.2	Tidal mud flat, central part
ML2.3	Tidal mud flat, upper part
ML3	Transition tidal mud flat to marsh (pioneer vegetation)
ML4	Tidal marsh
ML4.1	Tidal marsh, ridge (kreekrug)
ML4.2	Tidal marsh, lower landscape position (komgronden)
ML4.3	Tidal marsh, intermediate landscape position
ML4.4	Tidal marsh, higher landscape position
ML5	Creeks and gullies (kreken en geulen)
ML5.1	Main creek bank (hoofdkreekrand)
ML5.2	Tributary creek bank (zijkreekrand)
ML5.3	Creek stream bed (kreekbodem)

2.2.2. Slope form (after Schoeneberger et al., 2002; FAO, 2006) ***[SLP-FRM]***

The slope shape is described in two directions: up and down slope, which is perpendicular to the contour, and across slope, which is along the horizontal contour. The slope shape classes defined are provided in figure 2:

Figure 2: Slope forms and surface drainage pathways (after Schoeneberger et al., 2002)

SF01	SS	Straight, straight
SF02	SV	Straight, convex
SF03	SC	Straight, concave
SF04	VS	Convex, straight
SF05	VV	Convex, convex
SF06	VC	Convex, concave
SF07	CS	Concave, straight
SF08	CV	Concave, convex
SF09	CC	Concave, concave
SF10		Terraced
SF11		Slope dominated by drainage channels
SF12		Complex (irregular)



2.2.3. Slope orientation (UN-ECE, 2004) *[SLP-ORI]*

The slope orientation (from the observation point and upslope) should be recorded in the field using a 360° compass. The result is reported with the exact figure. The slope orientation can in addition be expressed as an orientation class, using following classes:

N	North	338-23°
NE	North East	23-68°
E	East	68-113°
SE	South East	113-158°
S	South	158-203°
SW	South West	203-248°
W	West	248-293°
NW	North West	293-338°
F	Flat	
ND	Not known	

Example*:* The slope dips towards the profile in south west direction (210°)

2.3. Tidal mud flat morphology

The general surface morphology, special surface morphology and more detailed aspects of the surface morphology are recorded. More than one code may apply.

Example*:* A tidal mud flat composes of regular current ripples covering most of the surface on the lower half and a smooth surfaced upper part. This complex is coded SM3: RM1, RB3; SM1.

2.3.1. Tidal mud flat, general surface morphology *[MUD-MOR]*

SM1	Smooth	The surface morphology lacks visible depressions, rill or ripple marks
SM2	Irregular	The surface is covered with small depressions
SM3	Rippled	Surface dominated with current ripples [stroomribbels]
SM4	Layered	Layers of different lithology and sensitivity to erosion results in a layered surface morphology
SM5	Complex	Mix of different surface characteristics

Irregular: depth of depressions [DEP-D]

ID1	<5 cm
ID2	5-10 cm
ID3	10-20 cm
ID4	>20 cm

Irregular: Size (diameter) of depressions [DEP-SIZE]
IM1 >20 cm
IM2 20-50 cm
IM3 50-100 cm
IM4 100-200 cm
IM5 >200 cm

Current ripples: general morphology [RIP-MOR]
RM1 Homogeneous
RM2 Heterogeneous
RM3 Other

Current ripples: abundance (coverage of complete surface) [RIP-ABU]
RB1 <40%
RB2 40-80%
RB3 >80%

Current ripples: height [RIP-ELEV]
RH1 <1 cm
RH2 1-2 cm
RH3 2-5 cm
RH4 5-10 cm
RH5 >10 cm

Current ripples: wideness [RIP-WID]
RI1 <10 cm
RI2 10-20 cm
RI3 20-50 cm
RI4 >50 cm

Current ripples: length [RIP-LGT]
RL1 <5 cm
RL2 5-10 cm
RL3 10-20 cm
RL4 >20 cm

2.3.2. Special surface morphology [MUD-SMOR]

MS1	Rill marks	Small rills on the tidal mud flat [kleine afwateringsstructuren]
MS2	Micro cliffs	Micro cliffs dividing the tidal mud flat
MS3	Other	Define (e.g. scattered stones or debris…)

Rill marks: size (width) [RILL-SIZE]
RS1 <2 cm
RS2 2-5 cm
RS3 5-10 cm
RS4 >10 cm

Rill marks: length [RILL-LGT]
RT1 < 1 m
RT2 1-2 m
RT3 >2 m

Rill marks: mutual distance [RILL-DIS]
RK1 <0.2 m

RK2 0.2-0.5 m
RK3 0.5-2 m
RK4 2-5 m
RK5 >5m

Micro cliffs: height [MCLIF-ELEV]
CH1 <10 cm
CH2 10-20 cm
CH3 >20 cm

Micro cliffs: Position on the tidal mud flat [MCLIF-LOCA]
CF1 Lower part
CF2 Central part
CF3 Upper part

2.4. Human influence (modified from FAO, 2006) [HUM-INF]

Any evidence of human activity, which is likely to have affected the landscape or the physical and chemical properties of the soil (not erosion) should be noticed. Below are the most common examples of human influences with their recommended codes listed. One or more (if applicable) of these codes can be selected, or additional codes can be defined to facilitate local needs. Observations on human impact achieved from the soil profile is reported in chapter 3.16 (Man Made Materials) and 3.17 (Human Transported materials). Here only observations observed in the landscape on meso and micro scale is recorded.

HI01 No influence
HI02 Vegetation disturbed (not specified)
HI03 Vegetation slightly disturbed
HI04 Vegetation moderately disturbed
HI05 Vegetation strongly disturbed
HI06 Mineral additions (not specified)
HI07 Sand additions
HI08 Organic additions (not specified)
HI09 Ploughing (not specified)
HI13 Traces of spade marks
HI17 Land fill
HI18 Levelling
HI19 Artificial drainage
HI21 Clearing
HI23 Surface compaction
HI24 Traffic traces
HI26 Pollution
HI27 Dike boulders (Stortstenen)
HI28 Quarries (for e.g. dike construction)
HI29 Remains of old dikes
HI30 Others (explain)

2.5. External drainage (FAO, 1990) [EXT-DRA]

The external drainage of a site refers to its relative position in the landscape. Is the site in a landscape position where it will overall receive water from upslope or rather shed water downslope, and if shedding, by which speed is the water lost. The following classes are defined:
EX1 Ponded (run-on site)
EX2 Neither receiving nor shedding water

EX3 Slow run-off
EX4 Moderately rapid run-off
EX5 Rapid run-off

2.6. Coarse surface fragments (FAO, 2006)

Coarse surface fragments- boulders and stones, including those that are partly buried, should be described in terms of percentage of surface cover and size of the fragments. Remember, a stone or boulder partly buried is only included in the coverage and class estimate based on the visible part, it is not the purpose to uncover partly or completely buried coarse fragments. The classes of coverage and size handled are:

2.6.1. Surface cover *[STO-COV]*

RC0	None	0 %
RC1	Very few	0 - 2 %
RC2	Few	2 - 5 %
RC3	Common	5 - 15 %
RC4	Many	15 - 40 %
RC5	Abundant	40 - 80 %
RC6	Dominant	>80 %
RCX	Not determined	

2.6.2. Size classes *[STO-SIZE]*

Size classes according to the greatest dimension:

RS1	Fine gravel	0.2 - 0.6 cm
RS2	Medium gravel	0.6 - 2.0 cm
RS3	Coarse gravel	2 - 6 cm
RS4	Stones	6 - 20 cm
RS5	Boulders	20 - 60 cm
RS6	Large boulders	60 - 200 cm
RSX	Not determined	

Example: RC4, RS1-3 and RC2, RS4 (common fine to coarse gravel and very few stones)

2.7. Erosion & sedimentation (modified from FAO, 2006)

2.7.1. Type of erosion/sedimentation *[ERO]*

Erosion and sedimentation can be described according to the agency - water, wind, mass movements (landslides and related phenomena). Description should also include deposition of transported material:

ES00 No evidence of erosion
ES01 Water erosion and sedimentation
ES02 Sheet erosion by water
ES03 Rill erosion by water
ES04 Gully erosion by water
ES05 Tunnel erosion by water
ES06 Mass movement (landslides and similar phenomena)
ES07 Sedimentation by water
ES08 Wind erosion and sedimentation
ES09 Sedimentation by wind
ES10 Shifting sands
ES11 Salt deposition
ES12 Other erosion/sedimentation, related to human activity
ESXX Not known

3. Soil horizon description

In the following chapter, the variables forming the soil horizon description are presented.

3.1. Horizon boundary (modified from FAO, 2006)

3.1.1. Number *[HOR-NO]*

After delineation of the horizon depths each horizon is labelled with a "H" (from "horizon") and a number: H1, H2, H3 etc. While the horizon symbols may change according to new information, the horizon number is not to be changed at any point of the further profile description and sampling. The numbering starts from the interface between air and soil no matter if the surface horizon is an organic or a mineral horizon (see Figure 3).
If at a later stage, it is necessary to subdivide a horizon, it should by preference be done without loosing the original number, e.g. H2 becomes H2a and H2b or H2.1 and H2.2.

3.1.2. Depth *[D-HOR-L]*

The depth of the lower boundary of each horizon is measured in centimetres from the surface of the mineral soil.

3.1.3. Distinctness *[HOR-DIST]*

The distinctness of the lower horizon boundary refers to the thickness of the boundary zone in between adjacent horizons.

BD1	Extremely abrupt	0 - 0.3 cm
BD2	Very abrupt	0.3 - 1 cm
BD3	Abrupt	1 - 2 cm
BD4	Clear	2 - 5 cm
BD5	Gradual	5 - 15 cm
BD6	Diffuse	>15 cm

3.2. Photographic recordings

Quality photographs are essential for the soil database. A scale is needed on all photos, preferentially a bicoloured centimetre-scale. If possible avoid the use of a camera flash eventually by using a tripod or a monopod. If using a digital camera, use a high resolution (5 Mega Pixels or more) and a camera with a good quality lens. The photographic database should include following images:

- Photo of the immediate vicinity of the auger observation
- The augered material layed down on uniform coloured plastic with indications of depths. Remember depths are measured at regular intervals in the auger hole.

And may include following images:
- General photo illustrating the geomorphology and vegetation of the area surrounding the profile
- The auger observation with indications where to sample
- Close-up of the organic topsoil horizon(s) if any
- Special features

3.3. Soil colour **[D-COL; SM-COL; M -COL; W-COL]**

The colour of the soil matrix in each horizon should be recorded during fieldwork using the Munsell notation (e.g. Munsell, 2000). If there is no dominant colour, the horizon is described as mottled and two or more colours are given. In addition to the colour notations, the standard Munsell colour names

should be given. Do not forget to record the moisture condition of the horizon at the moment the colour is measured. Following classes apply:

Dry: no water is felt or observed in form of darker colours	[D-COL]
Slight moist: is when the moisture is below field capacity	[SM-COL]
Moist: is when the soil is at or close to field capacity (the surface is not shiny of water)	[M-COL]
Wet: the soil is above field capacity the surface is shiny of excess water	[W-COL]

Example: Greyish brown 10YR 5/2 (moist) and light brownish grey 10YR 6/2 (dry);
where 10YR (yellowish red) is the hue, 5 (or 6) is the value and 2 the chroma.

Example: Dark greyish brown to greyish brown 2.5Y 4.5/2 (moist) and light brownish grey 2.5Y 6/2 (dry);
Notice that interpolation between colours are possible both for hue, value and chroma

Example: Dark greenish grey 5GY 4/1 (moist) and greenish grey 10GY 5/1 (dry);
where 5GY or 10GY (greenish yellow) is the hue, 4 (or 5) is the value and 1 is the chroma.

3.4. Mottling (FAO, 2006)

Mottles are spots of different colours interspersed with the dominant colour of the soil. They commonly indicate that the soil has been subject to alternate wet (reducing) and dry (oxidizing) conditions. Other mottles can be a result of rock weathering, clay (+iron) migration and accumulation, selective decay by fungi of organic matter etc.
Mottling is described in terms of abundance, size, contrast, boundary and colour. In addition, the shape, position or any other feature may be recorded.

3.4.1. Colour *[MOT-COL]*

Measure the colours using the Munsell Soil Colour Charts.
If the colour changes after exposure to the air, measure both the colours before and after oxidation.

3.4.2. Abundance *[MOT-ABU]*

Abundance is described as an exact figure or in classes indicating the percentage of the exposed surface occupied by the mottles. When mottles are so abundant that distinction of matrix and mottle colour is not possible, the predominant colours should be described as soil matrix colours.

MA0	None	0 %
MA1	Very few	0 - 2 %
MA2	Few	2 - 5 %
MA3	Common	5 - 15 %
MA4	Many	15 - 40 %
MA5	Abundant	40 – 80 %
MA6	Dominant	>80 %

3.4.3. Size *[MOT-SIZE]*

The following classes are used to indicate the approximate diameters of individual mottles.

MS1	Very fine	< 2 mm
MS2	Fine	2 - 6 mm
MS3	Medium	6 - 20 mm
MS4	Coarse	20 - 40 mm
MS5	Very coarse	40 - 80 mm
MS6	Extremely coarse	> 80 mm

3.4.4. Contrast *[MOT-CNT]*

The colour contrast between mottles and soil matrix can be described as:
MC1 Faint: mottles are evident only on close examination. Soil colours in both the matrix and

mottles are similar.

MC2 Distinct: although not striking, the mottles are readily seen. The hue, chroma or value of the matrix is easily
distinguished from the mottles. They may vary by as much as 2.5 units of hue or several units in chroma or value.

MC3 Prominent: the mottles are conspicuous. Hue, chroma and value, alone or in combination, are several units apart.

3.4.5. Boundary [MOT-BDR]

The boundary between mottle and matrix is described according to the width of the transition zone.

MB1	Sharp	<0.5 mm
MB2	Clear	0.5-2 mm
MB3	Diffuse	2-5 mm
MB4	Very diffuse	>5 mm

3.5. Redoximorphic properties (IUSS Working Group WRB, 2006)

Redoximorphic features concerns a colour pattern observed in the soil, which is the result of depletion or concentration compared to the matrix colour, formed by oxidation/reduction of iron and/or manganese.

3.5.1. Reducing conditions [RED]

If reducing conditions prevails in a soil horizon, it can be tested in following ways:

1. Are Fe^{2+} ions present, as tested by spraying the freshly exposed soil surface with a 0.2% (M/V) α,α dipyridyl solution in 10% (V/V) acetic acid solution. The test yields a striking reddish colour in the presence of Fe^{2+} ions (be careful, the chemical is slightly toxic). Did a reddish colour (almost like red wine) appear on the tested soil surface after a few minutes?
2. Is iron sulphate present?
3. Is methane present?

If the answer to any of above 3 questions is yes, report:	**Y**
If none of the tests above are positive report :	**N**
If data for some reason are missing or impossible to collect, indicate:	**X**

3.5.2. Reductimorphic and oximorphic colours [COL-REDU; COL-OXIM]

If oximorphic and/or reductomorphic mottles as present they are first of all described according to the chapter on mottling (see chapter 3.4). Note that gleyic mottles should be recorded as fast as possible after the profile has been prepared, sometimes even while digging the profile, due to the fast oxidation of certain minerals.

- Are reductimorphic colours, reflecting permanently wet conditions, present on more than 90% of the soil surface? Reductimorphic colours are neutral white to black (Munsell N1/ to N8/) or bluish to greenish (Munsell 2.5Y, 5Y, 5G, 5B).

Y/N/X (Yes/No/Not known)

- Oximorphic colours reflect alternating reducing and oxidizing conditions, and comprise any colour, excluding reductimorphic colours (see above). Are 5% or more of the soil surface cover by oximorphic coloured mottles?

Y/N/X (Yes/No/Not known)

The above described field tests may to some degree illustrate the actual redoximorphic conditions at the moment of fieldwork, rather than the general condition of the soil. For the same reason it is strongly recommended in case of gley soils to give special attention to:

- roots (presence/absence), and
- the soil water (indications of a fluctuating or permanent water tables etc.)

3.5.3. Stagnic and gleyic colour pattern

Depending on the origin of the water, which is either the groundwater table, either surface water that is (at least temporarily) saturating the soil layer, two different colour patterns will develop. It is important to distinguish between both type of colour patterns during the profile description.

Note: When a stagnic colour pattern is identified in a genetic horizon, it is designated by the horizon subordinate symbol 'g'. When a gleyic colour pattern is seen, the horizon received the subordinate symbol 'l'.

Stagnic colour pattern

General description

Soil materials develop a stagnic colour pattern if they are, at least temporarily, saturated with surface water (or were saturated in the past, if now drained) for a period long enough that allows reducing conditions to occur.

Diagnostic criteria

A stagnic colour pattern shows mottling in such a way that the surfaces of the peds (or parts of the soil matrix) are lighter (at least one Munsell value unit more) and paler (at least one chroma unit less), and the interiors of the peds (or parts of the soil matrix) are more reddish (at least one hue unit) and brighter (at least one chroma unit more) than the non-redoximorphic parts of the layer, or than the mixed average of the interior and surface parts.

Additional characteristics

If a layer has a stagnic colour pattern in 50 percent of its volume the other 50 percent of the layer are non-redoximorphic (neither lighter and paler nor more reddish and brighter).

Gleyic colour pattern

General description

Soil materials develop a gleyic colour pattern if they are saturated with groundwater (or were saturated in the past, if now drained) for a period that allows reducing conditions to occur.

Diagnostic criteria

A gleyic colour pattern shows one or both of the following:

1. 90 percent or more (exposed area) reductimorphic colours, which comprise neutral white to black (Munsell hue N1/ to N8/) or bluish to greenish (Munsell hue 2.5Y, 5Y, 5G, 5B); or
2. 5 percent or more (exposed area) mottles of oximorphic colours, which comprise any colour, excluding reductimorphic colours.

Field identification

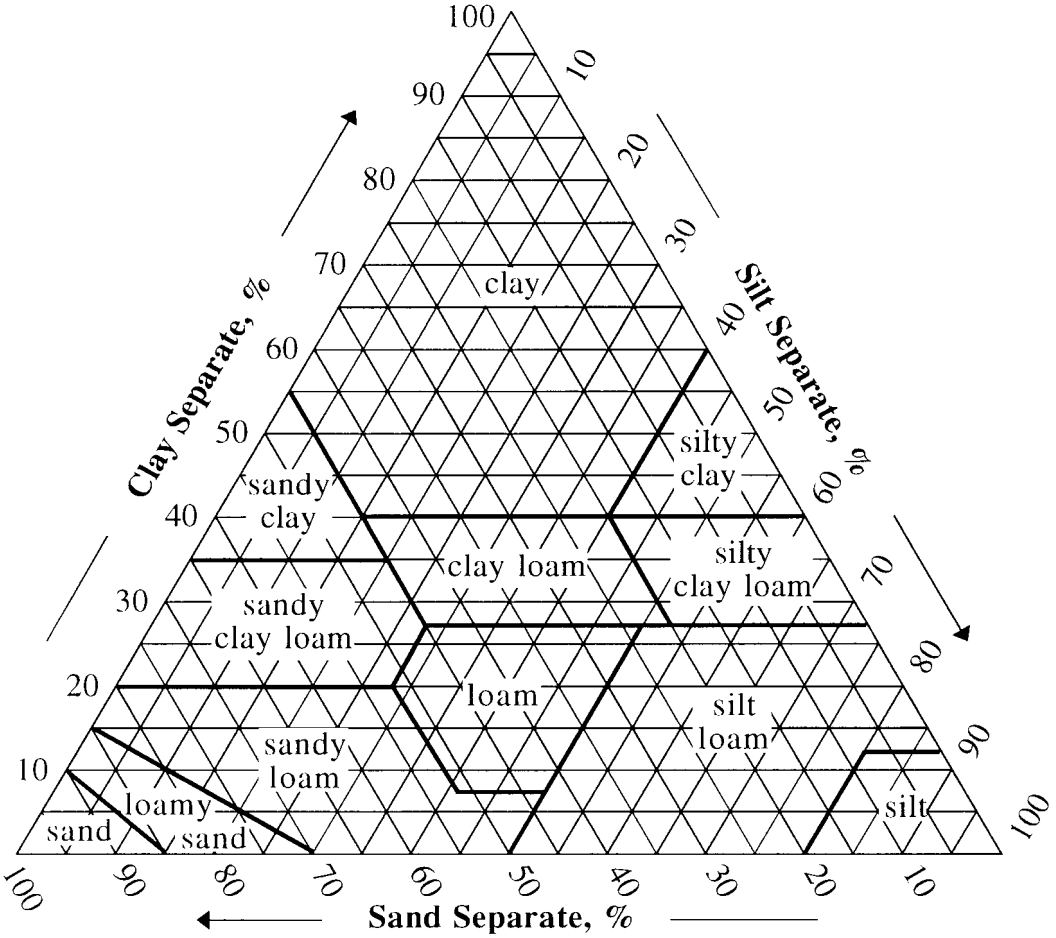
A gleyic colour pattern results from a redox gradient between groundwater and capillary fringe causing an uneven distribution of iron and manganese (hydr)oxides. In the lower part of the soil and/or inside the peds, the oxides are either transformed into insoluble Fe/Mn(II) compounds or they are translocated; both processes lead to the absence of colours with a hue redder than 2.5Y. Translocated Fe and Mn compounds can be concentrated in the oxidized form (Fe[III], Mn[IV]) on ped surfaces or in biopores (rusty root channels), and towards the surface even in the matrix. Manganese concentrations can be recognized by strong effervescence using a 10-percent H_2O_2 solution.

3.6. Texture of the fine-earth fraction (simplified from FAO, 2006) [TEX-CLAS]

Soil texture refers to the proportion of the various particle-size classes in a given soil volume and is described as soil textural classes (see Figure 5). The 2000–63–2 µm system for particle-size fractions is used.

The names of the textural classes, which describe combined particle-size classes, are coded as in Figure 5.

Figure 5: The fine earth by size and defining textural classes



Textural classes:

S	Sand	**CL**	Clay loam
LS	Loamy sand	**L**	Loam
SL	Sandy loam	**Si**	Silt
SCL	Sandy clay loam	**SC**	Sandy clay
SiL	Silt loam	**SiC**	Silty clay
SiCL	Silty clay loam	**C**	Clay

3.7. Rock fragments (modified from FAO, 2006)

Large fragments (>2 mm) are described according to abundance, size, shape, state of weathering and nature of the fragments. The abundance classes correspond with those for surface coarse fragments and mineral nodules.

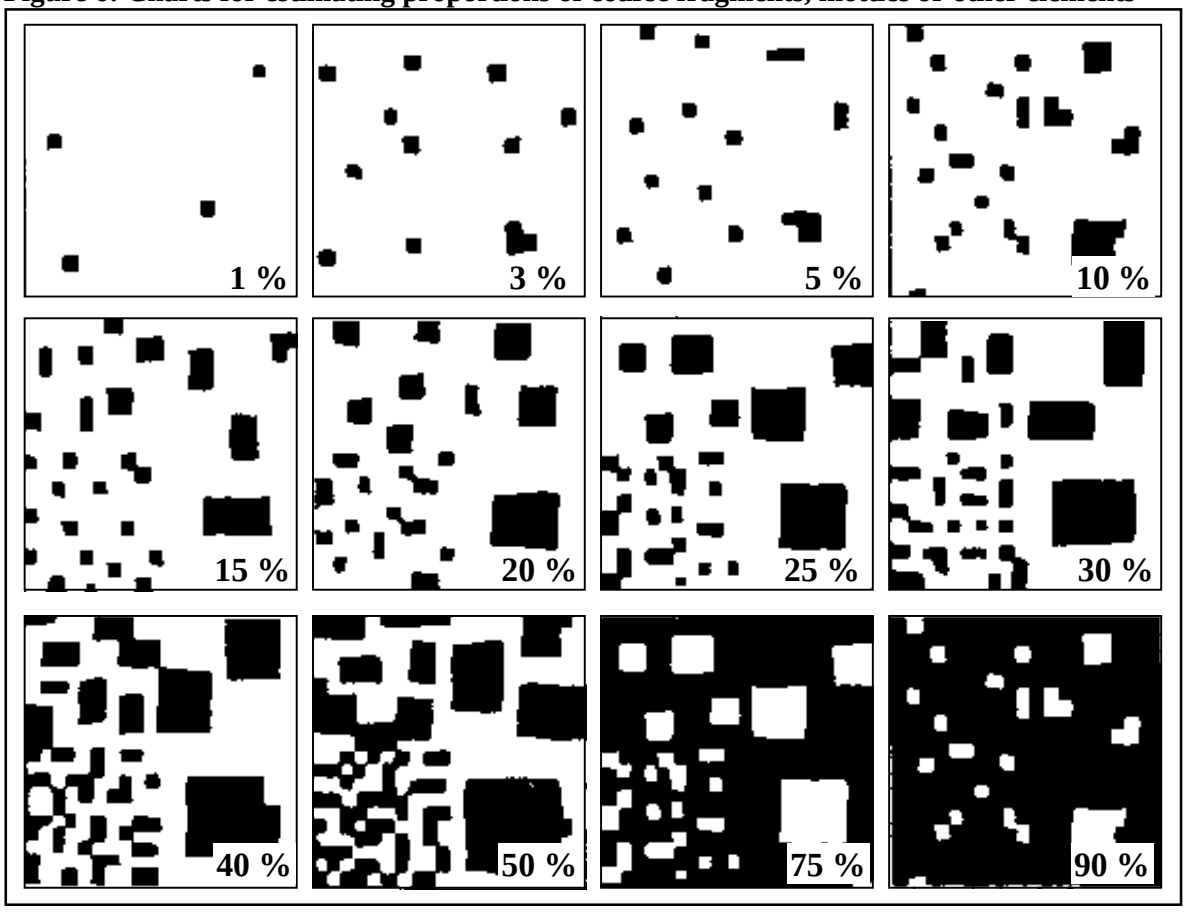
3.7.1. Abundance *[GRAVEL-ABU]*

The abundance of rock fragments is estimated (Figure 6) and expressed as a percent (by volume) of the total soil. By preference, the exact figure is provided rather than abundance classes.

RA0	None	0 %
RA1	Very few to few	0 - 5 %
RA2	Common	5 - 15 %

RA3	Many	15 - 40 %
RA4	Abundant	40 - 80 %
RA5	Dominant	>80 %

Figure 6: Charts for estimating proportions of coarse fragments, mottles or other elements



3.7.2. Size of rock fragments *[GRAVEL-SIZE]*

Code	Classes	Size range
RS1	Fine gravel	0.2 - 0.6 cm
RS2	Medium gravel	0.6 - 2 cm
RS3	Coarse gravel	2 - 6 cm
RS4	Stones	6 - 20 cm
RS5	Boulders	20 - 60 cm
RS6	Large boulders	60 - 200 cm

3.7.3. Dominant shape of rock fragments *[GRAVEL-SHP]*

The shape may be described as:

RF1 Flat
RF2 Angular
RF3 Sub-rounded
RF4 Rounded

3.7.4. State of weathering of rock fragments *[GRAVEL-WTH]*

The state of weathering is described as:

RW0 Fresh or slightly weathered: fragments show little or no signs of weathering
RW1 Weathered: partial weathering is indicated by discolouration and loss of crystal form in the

outer parts of the fragments while the centres remain relatively fresh; fragments have lost little of their original strength.

RW2 Strongly weathered: all but the most resistant minerals are strongly discoloured and altered throughout; the fragments tend to disintegrate under hand pressure.

3.8. Consistence (FAO, 2006)

Consistence refers to the degree of cohesion or adhesion of the soil mass - friability, plasticity, stickiness and resistance to compression. It depends on the amount and type of clay, organic matter and moisture content of the soil.

For reference descriptions, consistence is required for the soil in dry, moist and wet (both stickiness and plasticity) state. If applicable, thixotropy may be recorded. For routine descriptions, the soil consistence in the natural moisture condition of the profile is described. Wet consistence can always be described, and moist conditions if the soil is dry, by adding water to the soil sample.

3.8.1. Consistence when dry *[D-CONS]*

This is determined by breaking the air-dried soil in the hand:

CD0	Loose	Non-coherent.
CD1	Soft	Very weakly coherent and fragile; breaks to powder or individual grains under very slight pressure.
CD2	Slightly hard	Weakly resistant to pressure; easily broken between thumb and forefinger.
CD3	Hard	Moderately resistant to pressure; can be broken in the hands but not between thumb and forefinger.
CD4	Very hard	Very resistant to pressure; can be broken in the hands only with difficulty.
CD5	Extremely hard	Extremely resistant to pressure; cannot be broken in the hands.

3.8.2. Consistence when moist *[M-CONS]*

This is determined by squeezing a mass of moist soil material:

CM0	Loose	Non-coherent.
CM1	Very friable	Soil material crushes under very gentle pressure, but coheres when pressed together.
CM2	Friable	Soil material crushes easily under gentle pressure between thumb and forefinger, and coheres when pressed together.
CM3	Firm	Soil material crushes under moderate pressure between thumb and forefinger, but distinct resistance is felt.
CM4	Very firm	Soil material crushes under strong pressure; barely crushable between thumb and forefinger.
CM5	Extremely firm	Soil material crushes only under very strong pressure; cannot be crushed between thumb and forefinger.

3.8.3. Consistence when wet *[W-CONS-S; W-CONS-PL]*

Stickiness depends on water content and the extent to which soil structure is broken down. Wet consistence is described in terms of stickiness and plasticity. It should be assessed under standard conditions on a soil sample in which structure is completely destroyed and which contains just enough water to create maximum stickiness.

Stickiness is the quality of adhesion of the soil to other objects, assessed by observing its adherence when pressed between thumb and finger.

CS0	Non sticky	After release of pressure, practically no soil material adheres to thumb and finger.
CS1	Slightly sticky	After pressure, soil adheres to both thumb and finger but comes off one or the other rather cleanly; it is not appreciably stretched when the digits are separated.

CS2 Sticky — Soil adheres to both thumb and finger and tends to stretch and pull apart rather than pulling free.
CS3 Very sticky — Soil adheres strongly to both thumb and finger and is decidedly stretched when they are separated.

Plasticity is the ability of soil material to change shape continuously under stress and to retain the given shape on removal of stress. It is determined by rolling the soil into a wire about 3 mm in diameter, then bending the wire.

CP0 Non plastic — Will not form a wire.
CP1 Slightly plastic — Wire can be formed but immediately breaks if bent; soil deformed by very slight force.
CP2 Plastic — Wire can be formed but breaks if bent into a ring; slight to moderate force required for deformation of the soil mass.
CP3 Very plastic — Wire formed and can be bent into a ring; strong force required for deformation of the soil.

3.8.4. Physical soil ripening [RIPE]

The ripening of the soil is an important pedogenetic process in fluviatile and marine mineral soils as well as in peaty soils. To measure the degree of ripening, Pons & Zonneveld (1965) have defined the n-value, which is a factor that takes into consideration texture, organic matter and actual water content. Field classification of soil material according to the physical ripening has been defined as well (Pons & Zonneveld, 1965) based on the consistency. Notice, the categories does not apply to sandy soils with less than 8% clay.

Code	n-value	Designation	Description of consistency
CR1	<0.7	Ripe	Firm, does not stick to the hands or only slightly and cannot be squeezed out between fingers
CR2	0.7-1.0	Nearly ripe	Moderately firm, tends to stick to the hands, can just be pushed out between fingers when squeezed firmly
CR3	1.0-1.4	Half ripe	Moderately soft, sticks to then hands and can be squeezed between fingers when squeezed firmly
CR4	1.4-2.0	Practically unripe	Soft, sticks fast to the hands and can easily be squeezed between fingers
CR5	>2.0	Unripe	Liquid mud cannot be kneaded; runs between fingers without squeezing

3.9. Cementation and compaction (modified from FAO, 2006)

The occurrence of cementation or compaction, as pans or otherwise, is described according to their nature, continuity, structure, agent and degree. Cemented material does not slake after one hour of immersion in water.

3.9.1. Nature (type) [CEM-TYP]

The cementing agent or compaction activity composes of:

TT1 Gypsum
TT2 Silica
TT3 Carbonates
TT4 Iron oxides
TT5 Iron-manganese oxides
TT6 Iron-organic matter
TT7 Organic matter
TT8 Others
TT9 Not known

3.9.2. Degree *[CEM-DEG]*

TD0	Non-cemented and non-compacted	No compaction/compaction is observed (slakes in water)
TD1	Compacted	Compacted soil material is harder or more brittle than non-compacted soil material. Non-cemented.
TD2	Weakly cemented	Cemented mass is brittle and hard, but can be broken in the hands
TD3	Moderately cemented	Cemented mass cannot be broken in the hands but is discontinuous (less than 90 % of soil mass)
TD4	Cemented	Cemented mass cannot be broken in the hands and is continuous (more than 90 % of soil mass)

3.10. **Nodules** (FAO, 2006)

Mineral nodules cover a large variety of secondary concentrations. There are gradual transitions with mottles. Nodules are described according to their kind, type, abundance, size, shape, hardness and colour, as well as their presence within the horizon:

3.10.1. Type *[NOD-TYP]*

Nodules are described according to their composition or impregnating substance. Examples:

NT1	Gypsum
NT2	Silica
NT3	Carbonates
NT4	Carbonates-silica
NT5	Salt
NT6	Clay
NT7	Clay-oxides
NT8	Manganese oxides
NT9	Iron-manganese oxides
NT10	Iron oxides
NT11	Sulphur
NT12	Not known

3.10.2. Abundance (by volume) *[NOD-ABU]*

NA0	None	0 %
NA1	Very few	0 - 2 %
NA2	Few	2 - 5 %
NA3	Common	2 - 15 %
NA4	Many	15 - 40 %
NA5	Abundant	40 - 80 %
NA6	Dominant	> 80 %

3.10.3. Size *[NOD-SIZE]*

NZ1	Very fine	< 2 mm
NZ2	Fine	2 - 6 mm
NZ3	Medium	6 - 20 mm
NZ4	Coarse	> 20 mm

3.10.4. Shape *[NOD-SHP]*

NS1	Rounded (spherical)
NS2	Elongated
NS3	Flat
NS4	Irregular
NS5	Angular

3.10.5. Hardness *[NOD-HARD]*

NH1 Hard Cannot be broken between the fingers
NH2 Soft Can be broken between forefinger and thumb nail
NH3 Both hard and soft

3.10.6. Colour *[NOD-COL]*

General colour names are usually sufficient to describe nodules, in the same way as mottles:

NC1 White
NC2 Yellow
NC3 Yellowish red
NC4 Reddish yellow
NC5 Red
NC6 Yellowish brown
NC7 Reddish brown
NC8 Brown
NC9 Green
NC10 Blue
NC11 Bluish-black
NC12 Grey
NC13 Black

3.11. **Roots** (modified from FAO, 2006)

Presence/absence of roots is the most essential information to take notice of. If there is a sudden change in the quantity and/or size of the roots it is very important to explain why. Possible root limiting factors are: compaction (check the bulk density), cementations, discontinuous pore system etc. A qualitative description of the size and the abundance of roots is important. Sometimes it may be useful to record additional information, such as an abrupt change in root orientation.
Remember the abundance of roots should only be compared within the same size class.

3.11.1. Abundance (number of roots/dm^2) per size class *[ROO1-ABU; ROO2-ABU; ROO3-ABU; ROO4-ABU]*

Code	**Size class:** / **Abundance:**	**Very fine** **ROO1-ABU** <0.5 mm	**Fine** **ROO2-ABU** 0.5-2 mm	**Medium** **ROO3-ABU** 2-5 mm	**Coarse** **ROO4-ABU** >5 mm
OA0	None	0	0	0	0
OA1	Very few	1 - 20	1 - 20	1 - 2	1 - 2
OA2	Few	20 - 50	20 - 50	2 - 5	2 - 5
OA3	Common	50 - 200	50 - 200	5 - 20	5 - 20
OA4	Many	>200	>200	>20	>20

Example: common very fine, few fine, very few medium and no coarse roots, will be reported as:
Common very fine: ROO1-ABU: OA3;
Few fine ROO2-ABU: OA2;
Very few medium ROO3-ABU: OA1;
None Coarse ROO4-ABU: OA0

3.11.2. Effective rooting depth *[ROO-D]*

The effective rooting depth may be defined as the depth of the soil at which root growth is strongly inhibited. Rooting depth being plant specific, it is recommended that representative species are used to indicate the effective rooting depth of the soil. The effective rooting depth is governed by such factors

as the presence of cemented, toxic or compacted layers, hard rock, or indurated gravel layers. A high permanent water table may also control the rooting depth, but may change after drainage.
Example: The code for rooting depth is OD, so if the rooting depth is 113 cm, it is written as OD113.

3.12. **Carbonates** (modified from FAO, 2006)

The presence of calcium carbonate ($CaCO_3$) is established by adding some drops of 10% HCl to the soil. Following information should be collected per horizon:

- Is the matrix calcareous or non-calcareous (the exact quantity on carbonates will be tested in the laboratory). If traces are found in at least one horizon of the profile, the presence/absence should be recorded for all horizons.

3.12.1. Presence of carbonates *[CAR-PR]*

Following categories apply:

KK0 No presence of carbonates
KK1 Matrix is non-calcareous, but secondary carbonate is present
KK2 Matrix is calcareous, no evidences of secondary carbonate
KK3 Matrix is calcareous, and secondary carbonate is present

3.13. **Man-made materials** (simplified from FAO, 2006) **[MMM]**

The areas dominated or significantly changed by human activity are rapidly extending. Of particular importance are the man-made materials found in soils; their age, amount, state and composition determine their durability and environmental impact. Any human impact on the soil should be recorded. Examples are:

- Evidences of past agriculture
- Field roads
- Clay or sand quarries
- Dumping of waste material

3.14. **Human-transported material** (simplified from FAO, 2006) **[HTM]**

This is any material brought onto or removed from the site. This may be for agricultural purposes or simply to dispose of material (e.g. dredgings).

3.15. **Soil horizon designation** (Langohr, 1994; Schoeneberger et al., 2002; Soil Survey Staff, 2003; Englisch et al., 2005; FAO, 2006)

The term horizon indicates a soil layer presumed to bear the imprint of soil forming processes, as opposed to layers that are laid down by sedimentation, volcanic activity or other geological events.
Horizons are identified by symbols that consist of one or two capital letters for the master horizon and lower case letter suffixes for subordinate distinctions, with or without a figure suffix.

3.15.1. Master horizons and layers *[HOR-MAS]*

The capital letters H, O, A, E, B and C represent the master horizons.

H Dominated by organic material. All H horizons are saturated with water for prolonged periods or were once saturated but are now drained (e.g. bogs, swamps..)
O Dominated by organic material that is not saturated with water for prolonged periods (e.g. forest litter layers).
A Mineral horizon formed at the surface or below an O horizon, in which all or much of the original structure of the parent material has been obliterated.
E Mineral horizon in which the main feature is loss of clay, iron, aluminium, or some

combination of these.

B Horizon formed below an A, E, H or O horizon, and in which the dominant features are the obliteration of all or much of the original structure of the parent material

C Horizon, excluding hard bedrock, that is little affected by pedogenetic processes (lacks properties of H, O, A, E, or B horizon.

3.15.2. Subordinate symbols [HOR-SOR]

Designations of subordinate distinctions and features within the master horizons and layers are based on characteristics observable in the field. The list of symbols and terms is shown in Table 5 and explanations are given below:

Table 5: Subordinate characteristics within master horizons

b	Buried horizon	**n**	Pedogenetic accumulation of exchangeable sodium
c	Concretions or nodules.	**p**	Ploughing or other artificial disturbance
d	Dense horizon (physically root-restrictive; not used in combination with m).	**r**	Strong reduction
g	Mottles due to stagnic conditions	**t**	Illuvial accumulation of clay
h	Accumulation of organic matter	**u**	Urban and other man-made materials
j	Jarosite accumulation	**w**	Development of colour or structure in B (only used with B)
k	Accumulation of pedogenetic carbonates	**z**	Pedogenetic accumulation of salts more soluble than gypsum
l	Capillary fringe mottling (gleying)		

3.15.3. Vertical subdivisions [HOR-VER]

A horizon or layer designated by a single combination of letter symbols can be subdivided using arabic numerals following the letters. Within a C, for example, successive layers could be C1, C2, C3, etc.; or if the lower part is gleyed and the upper part is not, the designations could be C1-C2-Cg1-Cg2 or C-Cg1-Cg2.

4. Additional information, not recorded in the field

4.1. High tide and low tide [HT; LT]

The high tide and the low tide before or after the auger observation is noticed. Also the reference tidal station used for the values should be indicated.

Example: LW: 14:22
HW: 20:26
Reference station: Prosperpolder

4.2. Elevation [ELEV]

The elevation or altitude (m) of the site relative to sea level should be obtained as accurately as possible, preferably measured by the trimble or the teodolite. Information from detailed topographic maps can substitute field measurements.

4.3. Description status [DESC-STA]

The status of the description refers to the quality of the soil description and accompanying analytical data.
The following distinctions are made:

DS1 Reference auger description: All essential elements or details are complete. The accuracy and reliability of the description, sampling and analysis permit the full characterization of all soil horizons to a depth of 125 cm, or down to a C horizonif shallower.

DS2 Standard auger description. No essential elements are missing from the description, sampling or analysis. The profile depth is 80 cm or more, or down to a C horizon.

DS3 Basic auger description: Certain relevant elements are missing from the description, insufficient samples were taken, or the reliability of the analytical data does not permit a complete characterization of the soil. However, the description may still be useful for specific purposes and provides a satisfactory indication of the nature of the soil.

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APPENDIX A: Field recording forms

Chap-ter	Reporting category title	Reporting category code	AUGER OBSERVATIONS: REFERENCE LEVEL (1/3)
1.1	Site name	[PLOT]	
1.2	Observation no.	[P-NO]	
1.3	Date and time	[DATE]	
		[TIME]	
1.4	Author(s)	[AUT]	
1.5	Profile coordinates	[LAT]	
		[LONG]	
2.1.1	Present weather	[WETH-PR]	
2.2.1	Meso-scale landform	LND-FRM	
2.2.2	Slope form	[SLP-FRM]	
2.4	Human influence	[HUM-INF]	
2.5	External drainage	[EXT-DRA]	
2.11.1	Surface cover	[STO-COV]	
2.11.2	Size classes	[STO-SIZE]	
2.12.1	Type erosion	[ERO]	

Additional information related to the site description:

AUGER OBSERVATIONS: REFERENCE LEVEL (2/3)			Plot no. [PLOT]:			Auger no. [P-NO]:	
Chap-ter	Reporting category title	code	Field observations (mineral horizons): H1	H2	H3	H4	H5
3.1.2	**Horizon** -depth	[D-HOR-L]					
3.1.3	-distinctness	[HOR-DIST]					
3.3	**Soil colour** -moist	[M-COL]					
	-dry	[D-COL]					
	-wet	[W-COL]					
3.4.1	**Mottling** -colour	[MOT-COL]					
3.4.2	-abundance	[MOT-ABU]					
3.4.3	-size	[MOT-SIZE]					
3.4.4	-contrast	[MOT-CNT]					
3.4.5	-boundary	[MOT-BDR]					
3.5.1	**Reducing** conditions	[RED]					
3.5.2	Reductimorphic colours	[COL-REDU]					
	Oximorphic colours	[COL-OXIM]					
3.6	Texture class	[TEX-CLAS]					
3.7.1	**Gravel** -abundance	[GRAVEL-ABU]					
3.7.2	-size	[GRAVEL-SIZE]					
3.7.3	-shape	[GRAVEL-SHP]					
3.7.4	-weathering	[GRAVEL-WTH]					
3.8.1	**Concistence** -dry	[D-CONS]					
3.8.2	-moist	[M-CONS]					
3.8.3	-wet, stickiness	[W-CONS-S]					
	-wet, plasticity	[W-CONS-PL]					

AUGER OBSERVATIONS: REFERENCE LEVEL (3/3)			Plot no. [PLOT]:			Auger no. [P-NO]:	
Chap-ter	Reporting category title	code	Field observations (mineral horizons): H1	H2	H3	H4	H5
3.9.1	**Cementation** -type	[CEM-TYP]					
3.9.2	-degree	[CEM-DEG]					
3.10.1	**Nodules** -type	[NOD-TYP]					
3.10.2	-abundance	[NOD-ABU]					
3.10.3	Size	[NOD-SIZE]					
3.10.4	Shape	[NOD-SHP]					
3.10.5	Hardness	[NOD-HARD]					
3.10.6	Colour	[NOD-COL]					
3.11	**Roots-** Abundance						
3.11.1	-very fine	[ROO1-ABU]					
	-fine	[ROO2-ABU]					
	-medium	[ROO3-ABU]					
	-coarse	[ROO4-ABU]					
3.11.2	Effective rooting depth	[ROO-D]					
3.12	**Carbonates -**presence	[CAR-PR]					
3.13	**Man-made materials**	[MMM]					
3.14	**Transported material**	[HTM]					
3.15.1	**Master symbols**	[HOR-MAS]					
3.15.2	**Subordinate symbol**	[HOR-SOR]					
3.15.3	**Vertical subdivision**	[HOR-VER]					
3.18.5	**Discontinuities**	[HOR-DISC]					
	Soil sample taken:	[SAMPLE-LAB]					

Additional information related to the site description:

Chap-ter	Reporting category title	Reporting category code	AUGER OBSERVATIONS: STANDARD LEVEL (1/3)
1.1	Site name	[PLOT]	
1.2	Observation no.	[P-NO]	
1.3	Date and time	[DATE]	
		[TIME]	
1.4	Author(s)	[AUT]	
1.5	Profile coordinates	[LAT]	
		[LONG]	
2.2.1	Meso-scale landform	LND-FRM	
2.4	Human influence	[HUM-INF]	
2.5	External drainage	[EXT-DRA]	
2.11.1	Surface cover	[STO-COV]	
2.11.2	Size classes	[STO-SIZE]	

Additional information related to the site description:

AUGER OBSERVATIONS: STANDARD LEVEL (2/3)			Plot no. [PLOT]:			Auger no. [P-NO]:	
Chap-	Reporting category		Field observations (mineral horizons):				
ter	title	code	H1	H2	H3	H4	H5
3.1.2	**Horizon** -depth	[D-HOR-L]					
3.1.3	-distinctness	[HOR-DIST]					
3.3	**Soil colour** -moist	[M-COL]					
	-dry	[D-COL]					
	-wet	[W-COL]					
3.4.1	**Mottling** -colour	[MOT-COL]					
3.4.2	-abundance	[MOT-ABU]					
3.4.4	-contrast	[MOT-CNT]					
3.5.1	**Reducing** conditions	[RED]					
3.7.1	**Gravel** -abundance	[GRAVEL-ABU]					
3.7.2	-size	[GRAVEL-SIZE]					
3.8.1	**Concistence** -dry	[D-CONS]					
3.8.2	-moist	[M-CONS]					
3.8.3	-wet, stickiness	[W-CONS-S]					
	-wet, plasticity	[W-CONS-PL]					
3.9.2	**Cemention** -degree	[CEM-DEG]					

AUGER OBSERVATIONS: STANDARD LEVEL (3/3)			Plot no. [PLOT]:			Auger no. [P-NO]:	
Chap-ter	Reporting category title	code	Field observations (mineral horizons): H1	H2	H3	H4	H5
3.10.1	**Nodules** -type	[NOD-TYP]					
3.10.2	-abundance	[NOD-ABU]					
3.10.5	Hardness	[NOD-HARD]					
3.10.6	Colour	[NOD-COL]					
3.11	**Roots- Abundance**						
3.11.1	-very fine	[ROO1-ABU]					
	-fine	[ROO2-ABU]					
	-medium	[ROO3-ABU]					
	-coarse	[ROO4-ABU]					
3.12	**Carbonates -**presence	[CAR-PR]					
3.15.1	**Master** symbols	[HOR-MAS]					
	Soil sample taken:	[SAMPLE-LAB]					

Additional information related to the site description:

Chap-ter	Reporting category title	Reporting category code	AUGER OBSERVATIONS: BASIC LEVEL (1/1)				
1.1	Site name	[PLOT]					
1.2	Observation no.	[P-NO]					
1.3	Date and time	[DATE]					
		[TIME]					
1.4	Author(s)	[AUT]					
1.5	Profile coordinates	[LAT]					
		[LONG]					
2.2.1	Meso-scale landform	LND-FRM					
2.5	External drainage	[EXT-DRA]					
2.11.1	Surface cover	[STO-COV]					
2.11.2	Size classes	[STO-SIZE]					
	title	**code**	**H1**	**H2**	**H3**	**H4**	**H5**
3.1.2	**Horizon** -depth	[D-HOR-L]					
3.3	**Soil colour** -moist	[M-COL]					
	-dry	[D-COL]					
	-wet	[W-COL]					
3.4.1	**Mottling** -colour	[MOT-COL]					
3.4.2	-abundance	[MOT-ABU]					
3.5.1	**Reducing** conditions	[RED]					
3.7.1	**Gravel** -abundance	[GRAVEL-ABU]					
3.9.2	**Cementation** -degree	[CEM-DEG]					
3.10.2	**Nodules** -abundance	[NOD-ABU]					
3.10.6	-colour	[NOD-COL]					
3.11	**Roots** -Abundance						
3.11.1	-very fine	[ROO1-ABU]					
	-fine	[ROO2-ABU]					
	-medium	[ROO3-ABU]					
	-coarse	[ROO4-ABU]					
3.15.1	**Master** symbols	[HOR-MAS]					
	Soil sample taken:	[SAMPLE-LAB]					

Additional information related to the site description:

Chap-ter	Reporting category title	Reporting category code	AUGER OBSERVATIONS: TIDAL MUD FLAT (1/2)
1.1	Site name	[PLOT]	
1.2	Observation no.	[P-NO]	
1.3	Date and time	[DATE]	
		[TIME]	
1.4	Author(s)	[AUT]	
1.5	Profile coordinates	[LAT]	
		[LONG]	
2.1.1	Present weather	[WETH-PR]	
2.2.1	Meso-scale landform	LND-FRM	
2.2.2	Slope form	[SLP-FRM]	
2.2.3	Slope orientation	[SLP-ORI]	
2.3.1	General surface topo.	[MUD-MOR]	
	Depth depressions	[DEP-D]	
	Diameter depressions	[DEP-SIZE]	
	Ripples general morp.	[RIP-MOR]	
	Ripples abundance	[RIP-ABU]	
	Ripples height	[RIP-ELEV]	
	Ripples wideness	[RIP-WID]	
	Ripples length	[RIP-LGT]	
2.3.2	Special surface morp.	[MUD-SMOR]	
	Rill mark size	[RILL-SIZE]	
	Rill mark length	[RILL-LGT]	
	Rill mark distance	[RILL-DIS]	
	Micro cliff height	[MCLIF-ELEV]	
	Micro cliff position	[MCLIF-LOCA]	
2.4	Human influence	[HUM-INF]	
2.5	External drainage	[EXT-DRA]	
2.11.1	Stones -surface cover	[STO-COV]	
2.11.2	Stones, size classes	[STO-SIZE]	
2.12.1	Type erosion	[ERO]	

Additional information related to the site description:

AUGER OBSERVATIONS: TIDAL MUD FLAT (2/2)			Plot no. [PLOT]:			Auger no. [P-NO]:	
Chap-ter	Reporting category title	code	Field observations (mineral horizons): H1	H2	H3	H4	H5
3.1.2	**Horizon** -depth	[D-HOR-L]					
3.3	**Soil colour** -moist	[M-COL]					
	-dry	[D-COL]					
	-wet	[W-COL]					
3.4.1	**Mottling** -colour	[MOT-COL]					
3.4.2	-abundance	[MOT-ABU]					
3.5.1	**Reducing** conditions	[RED]					
3.5.2	Reductimorphic colours	[COL-REDU]					
	Oximorphic colours	[COL-OXIM]					
3.7.1	**Gravel** -abundance	[GRAVEL-ABU]					
3.9.2	**Cementation** -degree	[CEM-DEG]					
3.10.2	**Nodules** -abundance	[NOD-ABU]					
3.10.6	Colour	[NOD-COL]					
3.12	**Carbonates -**presence	[CAR-PR]					
3.15.1	**Master** symbols	[HOR-MAS]					
	Soil sample taken:	[SAMPLE-LAB]					

Additional information related to the site description: