

Swiss Soil Information System NABODAT

Swiss Soil Dataset – Documentation Version 6 (April 2022)

Service Centre NABODAT

April 2022

Engaged in Switzerland
for a precious resource

Acknowledgements

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Table of contents

FAQ Swiss Soil Dataset	4
1 Introduction	5
2 Quantity structure of the version 6 (april 2022)	5
3 Data model of the Swiss Soil Dataset	6
3.1 Class Horizon	7
3.2 Class Location	8
3.3 Class Measurement	9
3.4 Class Parent material	10
3.5 Class Profile	10
3.6 Class Project	11
3.7 Class Properties	11
3.8 Class Sample	11
3.9 Class Soil color	12
3.10 Class Soil skeleton	12
3.11 Class Soil surveys	13
3.12 Class Soil types	13
3.13 Class Structure	14
3.14 Class Subtypes	14
4 Bibliography	16
5 Appendix: Data model of the Swiss Soil Dataset Version 6 (april 6)	17

FAQ Swiss Soil Dataset

1 I am interested in a specific sample but cannot find any record of soil depth. Is there an error?

No, there are samples for which no record of soil depth exists due to (1) methodological reasons (e.g. number of earthworms) or (2) because no information on soil depth was recorded in the specialist application NABODAT.

2 What does the Attribute ANONYMIZATION mean?

Some locations are not precisely available to the public and were therefore anonymized. Affected locations (ANONYMIZATION = 1) hold coordinates rounded to 1000m.

Example: 2635489 / 1256878 becomes 2635000 / 1257000 (LV95).

3 I search for data that is not available in the Swiss Soil Dataset. Where can I find it?

For other data, you must contact the respective data owners directly. The Service Centre NABODAT cannot provide any further data than contained in the Swiss Soil Dataset.

4 I found incorrect data. How should I proceed?

Please report your observations to the Service Centre NABODAT via e-mail address:

nabodat@ccsols.ch

5 How are the csv-files encoded?

The csv-files are encoded in UTF-8.

1 Introduction

The Federal Office for the Environment (FOEN) launched in 2012 the Swiss Soil Information System NABODAT for the compilation and harmonisation of Swiss soil data aiming on the availability of such cantonal soil datasets. The information system serves for the national and cantonal soil protection agencies for their daily work and cantonal implementation of soil protection measures. The Service Centre NABODAT is mandated by FOEN to manage the Swiss Soil Information System NABODAT. The Service Centre is responsible for the integration of old and new soil data within the system and the maintenance of the system. The Service Centre maintains and updates the Swiss Soil Dataset for the professional public.

The present technical documentation provides information on the scope and content of the "Swiss Soil Dataset 6 (april 2022)". The main tables, the hierarchical relationships between the tables and the attributes of the dataset are described. For further details on pedological content, we refer the reader to the reference literature (cf. chap. 4).

This dataset was generated with the consensus of the cantonal soil protection offices. It contains **point data** such as soil information gathered at soil profiles or from soil quality surveys. Spatial soil data such as soil maps or raster data are not part of this dataset. The dataset contains the various measurements and soil parameters, soil pollutant data are excluded from the dataset. Most of the data has been collected and measured decades ago. The data are not representative for the entire area of Switzerland. Further information on the Swiss Soil Information System NABODAT is available on the website of Competence Centre for Soils, www.ccsols.ch, under the file [Datenmanagement](#).

2 Quantity structure of the version 6 (april 2022)

The present version 6 of the Swiss Soil Dataset contains soil information for around **33'000 sites**, whose spatial distribution is shown in figure 1. The Swiss Soil Dataset covers mainly soil information from bores and soil profiles collected from soil mapping. The oldest data from soil mapping in this point dataset dates from 1953 to 1996. During this period, at the former Swiss Federal Research Station for Agricultural Crops (FAP) or Agroecology and Agriculture (FAL) (now Agroscope) a national soil mapping service was located and carried out about 330 mapping projects (Grob et al., 2015). The analogue soil profile data could be stored from 2001 onwards. In a second step, they were translated by soil experts into the currently valid Swiss mapping key (FAL, 1997) and finally transferred by the Service Centre NABODAT to the National Soil Information System NABODAT. In addition, the dataset offers further soil data from cantonal implementation of soil protection measures according to the Swiss law regulations and monitoring done by national and cantonal soil protection agencies, which are stored in the system NABODAT.

Since the soil data were mainly collected within individual soil mapping surveys, they are neither representative for most cantons nor for Switzerland. For more detailed soil data (e.g. soil pollutant data) not included in the national dataset, the respective cantonal soil protection offices should be contacted directly. The Swiss Soil Dataset is updated regularly to include new and recently integrated soil data from national and cantonal projects in the system NABODAT and thus made them available in a harmonised format to the public.

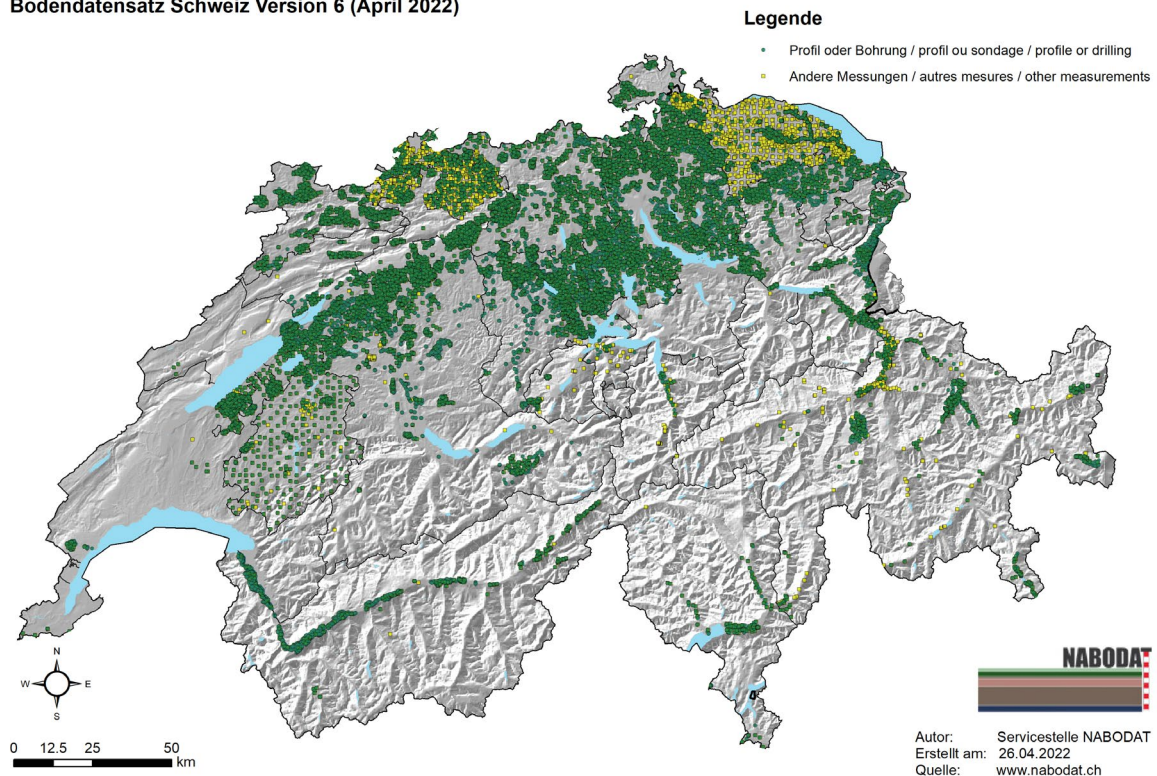


Figure 1: Spatial distribution of the data in the Swiss Soil Dataset Version 6.

3 Data model of the Swiss Soil Dataset

The data model of the Swiss Soil Dataset is based on the data model NABODAT 1.7.1 (Service Centre NABODAT, 2024). For reasons of clarity, the (relational) dataset was divided into 7 tables according to the hierarchy of the data model. Figure 2 gives an overview of the 7 tables, the attributes, and the relations between the tables. The required key attributes are filled redundantly into the corresponding table sheets. A list and explanation of the codes used can be found separately in the last spreadsheet. Each table of the Swiss Soil Dataset consists of several classes and their attributes. The relationship between the classes is symbolized by a diamond:

- ◆ If the diamond is filled, class B can only exist if class A also exists.
Example: Information on the source material can only exist if a site has been created.
- ◇ If diamond is not filled, class B can also exist if class A does not exist.
Example: A location can exist without being assigned to a project.

In addition, the multiplicity (usually "0..1" or "0..*") is used to define how many instances an assigned class can consist of.

- 0..1 The assigned class cannot occur at all or only once.
Example: A site can be assigned to none or one aspect information (class properties).
- 0..* The assigned class cannot occur or can occur any number of times.
Example: No subtypes or any number of subtypes can be assigned to a profile.
For a better readability of the data, all 0..* relationships have been stored in separate table sheets (subtype, soil color, soil structure). The soil survey type was not stored

separately. Here, locations can be listed twice in the table if a location is assigned to several projects and thus possibly to different soil survey types.

For a better readability of the data, all 0..* relationships have been stored in separate table sheets (subtype, soil color, soil structure). The soil survey type was not stored separately, because locations can be listed twice in the table if a location is assigned to several projects and thus possibly to different soil survey types.

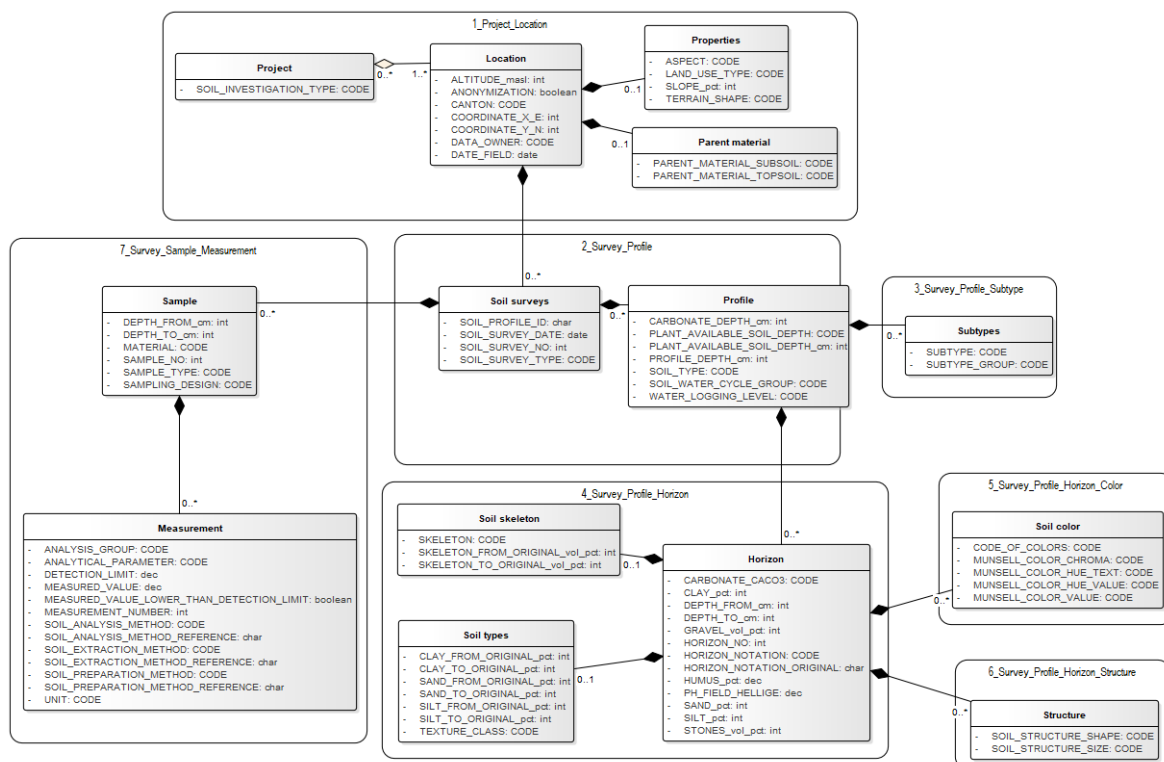


Figure 2: Structure of the dataset in 7 tables. The links between the tables indicate the relationship between the tables.

The following description of all classes according to the data model with the corresponding attributes is sorted alphabetically. In addition to the name of the attribute, the data type (character, integer, code, etc.) is documented and a short description of the contents. For attributes with codes, the corresponding data source is referred to for further information on the code list.

3.1 Class Horizon

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Characterization of the soil horizons

Table 1: Attributes of the Class Horizon

Name	Data type	Description
CARBONATE_CACO3	CODE	Field determination of calcium carbonate (CaCO ₃) content in horizon Source of code list: Profilblatt Nr. 44 (FAL, 1997)
CLAY_pct	int	Estimated clay content in horizon [%]

DEPTH_FROM_cm	int	Upper limit of horizon [cm]
DEPTH_TO_cm	int	Lower limit of horizon [cm]
GRAVEL_vol_pct	int	Estimated gravel content in horizon [Vol.%]
HORIZON_NOTATION_ORIGINAL	char	Original information of horizon notation
HORIZON_NOTATION	CODE	Notation of horizon Source of code list: Profilblatt Nr. 29/30 (FAL, 1997)
HORIZON_NO	int	Number of the soil horizon
HUMUS_pct	dec	Estimated content of humus in horizon [%]
PH_FIELD_HELLIGE	dec	Field determination of pH-level (pH Hellige)
SAND_pct	int	Estimated sand content in horizon [%]
SILT_pct	int	Estimated silt content in horizon [%]
STONES_vol_pct	int	Estimated stone content in horizon [Vol.%]

3.2 Class Location

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Unique description of the location (name, spatial location etc.).

Table 2: Attributes of the Class Location

Name	Data type	Description
ALTITUDE_masl	int	Altitude of location in m.a.s.l. [m]
ANONYMIZATION	boolean	Anonymization of location information: Name of locality, address, property number and GIS address are blanked out. The coordinates are moved to a 1000m grid (2643059/1221782 becomes 2643000/1221000).
CANTON	CODE	Name of the canton, where the location is found Source of code list: Bundesamt für Statistik (BFS)
COORDINATE_X_E	int	Swiss national coordinates from the 1995 national survey (LV95)

COORDINATE_Y_N	int	Swiss national coordinates from the 1995 national survey (LV95)
DATA_OWNER	CODE	Assignment of location to a data owner (client of the NABODAT network)
DATE_FIELD	date	Date of the locations survey

3.3 Class Measurement

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Analysis results of the samples taken from a location survey.

Table 3: Attributes of the Class Measurement

Name	Data type	Description
ANALYSIS_GROUP	CODE	Assignment of the measurement to an analysis group Source of code list: NABODAT
ANALYTICAL_PARAMETER	CODE	Assignment of the measurement to an analytical parameter Source of code list: NABODAT
DETECTION_LIMIT	dec	Detection limit of measurement
MEASUREMENT_NUMBER	int	Number of measurements in case of multiple measurements of the same sample
MEASURED_VALUE	dec	Measured value
MEASURED_VALUE_LOWER_THAN_DETECTION_LIMIT	boolean	Measured Value is lower than the detection limit
SOIL_ANALYSIS_METHOD	CODE	Soil analysis method of measurement Source of code list: NABODAT
SOIL_ANALYSIS_METHOD_REFERENCE	char	Reference method for the soil analysis method of measurement
SOIL_EXTRACTION_METHOD	CODE	Soil extraction method of measurement Source of code list: NABODAT
SOIL_EXTRACTION_METHOD_REFERENCE	char	Reference method for the soil extraction method of measurement
SOIL_PREPARATION_METHOD	CODE	Soil preparation method of measurement Source of code list: NABODAT

SOIL_PREPARATION_METHOD_REFERENCE	char	Reference method for the soil preparation method of measurement
UNIT	CODE	Unit of measured value Source of code list: NABODAT

3.4 Class Parent material

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Parent material of soil formation in sub- and topsoil

Table 4: Attributes of the Class Parent material

Name	Data type	Description
PARENT_MATERIAL_TOPSOIL	CODE	Parent material in topsoil at the location Source of code list: Profilblatt Nr. 62 (FAL, 1997)
PARENT_MATERIAL_SUBSOIL	CODE	Parent material in subsoil at the location Source of code list: Profilblatt Nr. 62 (FAL, 1997)

3.5 Class Profile

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Profile data and profile properties

Table 5: Attributes of the Class Profile

Name	Data type	Description
CARBONATE_DEPTH_cm	int	Limit of present carbonate [cm]
PLANT_AVAILABLE_SOIL_DEPTH	CODE	Classification of the plant available soil depth in profile Source of code list: Profilblatt Nr. 24b (FAL, 1997)
PLANT_AVAILABLE_SOIL_DEPTH_cm	int	Plant available soil depth in profile [cm]
PROFILE_DEPTH_cm	int	Depth of the assessed profile [cm]
SOIL_TYPE	CODE	Soil type at profile location Source of code list: Profilblatt Nr. 16 (FAL, 1997)
SOIL_WATER_CYCLE_GROUP	CODE	Class of soil water cycle defined by the soil mapping guideline Source of code list: Profilblatt Nr. 23 (FAL, 1997)
WATER_LOGGING_LEVEL	CODE	Degree of water logging level according to the levels of the soil water cycle groups

3.6 Class Project

Package: Swiss Soil Dataset
Modified: 16.11.2018
Description: Information on the project in the context of which the site was examined.

Table 6: Attributes of the Class Project

Name	Data type	Description
SOIL_INVESTIGATION_TYPE	CODE	Type of the soil survey Source of code list: NABODAT

3.7 Class Properties

Package: Swiss Soil Dataset
Modified: 16.11.2018
Description: Characterization of the location (topography, land use type, etc.).

Table 7: Attributes of the Class Properties

Name	Data type	Description
ASPECT	CODE	Direction of the location Source of code list: Profilblatt Nr. 59 (FAL, 1997)
LAND_USE_TYPE	CODE	Land use type at the location Source of code list: Profilblatt Nr. 61 (FAL, 1997)
SLOPE_pct	int	Slope in [%]
TERRAIN_SHAPE	CODE	Terrain shape at he location Source of code list: Profilblatt Nr. 26 (FAL, 1997)

3.8 Class Sample

Package: Swiss Soil Dataset
Modified: 16.11.2018
Description: Samples taken as part of a site survey

Table 8: Attributes of the Class Sample

Name	Data type	Description
DEPTH_FROM_cm	int	Upper limit of sample depth [cm]
DEPTH_TO_cm	int	Lower limit of sample depth [cm]

MATERIAL	CODE	Specification of the sampled soil material (litter, mineral soil, etc.) Source of code list: BODAT 4.2
SAMPLING_DESIGN	CODE	Sampling design of the sample material (e.g. profile, area etc.) Source of code list: BODAT 4.2
SAMPLE_NO	int	Number of sample; unique within a survey
SAMPLE_TYPE	CODE	Type of the sample taken Source of code list: BODAT 4.2

3.9 Class Soil color

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Soil color according to Munsell-Standard Soil Color Charts (1967)

Table 9: Attributes of the Class Soil color

Name	Data type	Description
CODE_OF_COLORS	CODE	Code of colors (patches and matrix) according to Munsell-Standard Soil Color Charts Source of code list: Profilblatt Nr. 48-55 (FAL, 1997)
MUNSELL_COLOR_CHROMA	CODE	Chroma according to Munsell-Standard Soil Color Charts Source of code list: Profilblatt Nr. 48-55 (FAL, 1997)
MUNSELL_COLOR_HUE_TEXT	CODE	Color text of Hue according to Munsell-Standard Soil Color Charts Source of code list: Profilblatt Nr. 48-55 (FAL, 1997)
MUNSELL_COLOR_HUE_VALUE	CODE	Color value of Hue according to Munsell-Standard Soil Color Charts Source of code list: Profilblatt Nr. 48-55 (FAL, 1997)
MUNSELL_COLOR_VALUE	CODE	Value according to Munsell-Standard Soil Color Charts Source of code list: Profilblatt Nr. 48-55 (FAL, 1997)

3.10 Class Soil skeleton

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Estimated skeleton content in horizon

Table 10: Attributes of the Class Soil skeleton

Name	Data type	Description
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SKELETON	CODE	Estimated skeleton content in top/subsoil of the profile or in the horizon Source of code list: Profilblatt Nr. 19/20 (FAL, 1997)
SKELETON_TO_ORIGINAL_vol_pct	int	Estimated maximum volume of existent skeleton in top/subsoil of the profile or original information of the horizon [%]
SKELETON_FROM_ORIGINAL_vol_pct	int	Estimated minimum volume of existent skeleton in top/subsoil of the profile or original information of the horizon [%]

3.11 Class Soil surveys

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Central Class, to which both the profile data and the analysis data are linked. The key is uniquely composed of the soil survey number and the profile ID.

Table 11: Attributes of the Class Soil surveys

Name	Data type	Description
SOIL_SURVEY_DATE	date	Date of soil survey
SOIL_SURVEY_NO	int	Number of soil survey; per survey, n-profiles (with the same type of survey) and 1 sampling can be created
SOIL_SURVEY_TYPE	CODE	Type of soil survey (profile type or sampling) Source of code list: Profilblatt Nr. 3 (FAL, 1997, erweitert)
SOIL_PROFILE_ID	char	Unique identification of the profile respectively the sampling per survey Profile = 1..n; Sampling = 0

3.12 Class Soil types

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Classification of estimated texture class in horizon. Categorisation of clay, silt and sand contents in ranges.

Table 12: Attributes of the Class Soil types

Name	Data type	Description
CLAY_FROM_ORIGINAL_pct	int	estimated minimum clay content in top/subsoil of the profile or original information of the horizon [%]

CLAY_TO_ORIGINAL_pct	int	estimated maximum clay content in top/subsoil of the profile or original information of the horizon [%]
SAND_FROM_ORIGINAL_pct	int	estimated minimum sand content in top/subsoil of the profile or original information of the horizon [%]
SAND_TO_ORIGINAL_pct	int	estimated maximum sand content in in top/subsoil of the profile or original information of the horizon [%]
SILT_FROM_ORIGINAL_pct	int	estimated minimum silt content in top/subsoil of the profile or original information of the horizon [%]
SILT_TO_ORIGINAL_pct	int	estimated maximum silt content in top/subsoil of the profile or original information of the horizon [%]
TEXTURE_CLASS	CODE	estimated texture class in top/subsoil of the profile or in the horizon Source of code list: Profilblatt Nr. 21/22 (FAL, 1997)

3.13 Class Structure

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Assesment of the soil structure

Table 13: Attributes of the Class Structure

Name	Data type	Description
SOIL_STRUCTURE_SHAPE	CODE	Shape of the soil structure Source of code list: Profilblatt Nr. 31 (FAL, 1997)
SOIL_STRUCTURE_SIZE	CODE	Size of the soil structure Source of code list: Profilblatt Nr. 32 (FAL, 1997)

3.14 Class Subtypes

Package: Swiss Soil Dataset
 Modified: 16.11.2018
 Description: Subtypes of soil profile

Table 14: Attributes of the Class Subtypes

Name	Data type	Description
SUBTYPE	CODE	Subtype of soil profile Source of code list: Profilblatt Nr. 18 (FAL, 1997)

SUBTYPE_GROUP

CODE

Categorization of subtype into a subtype group
Source of code list: Profilblatt Nr. 18 (FAL, 1997)

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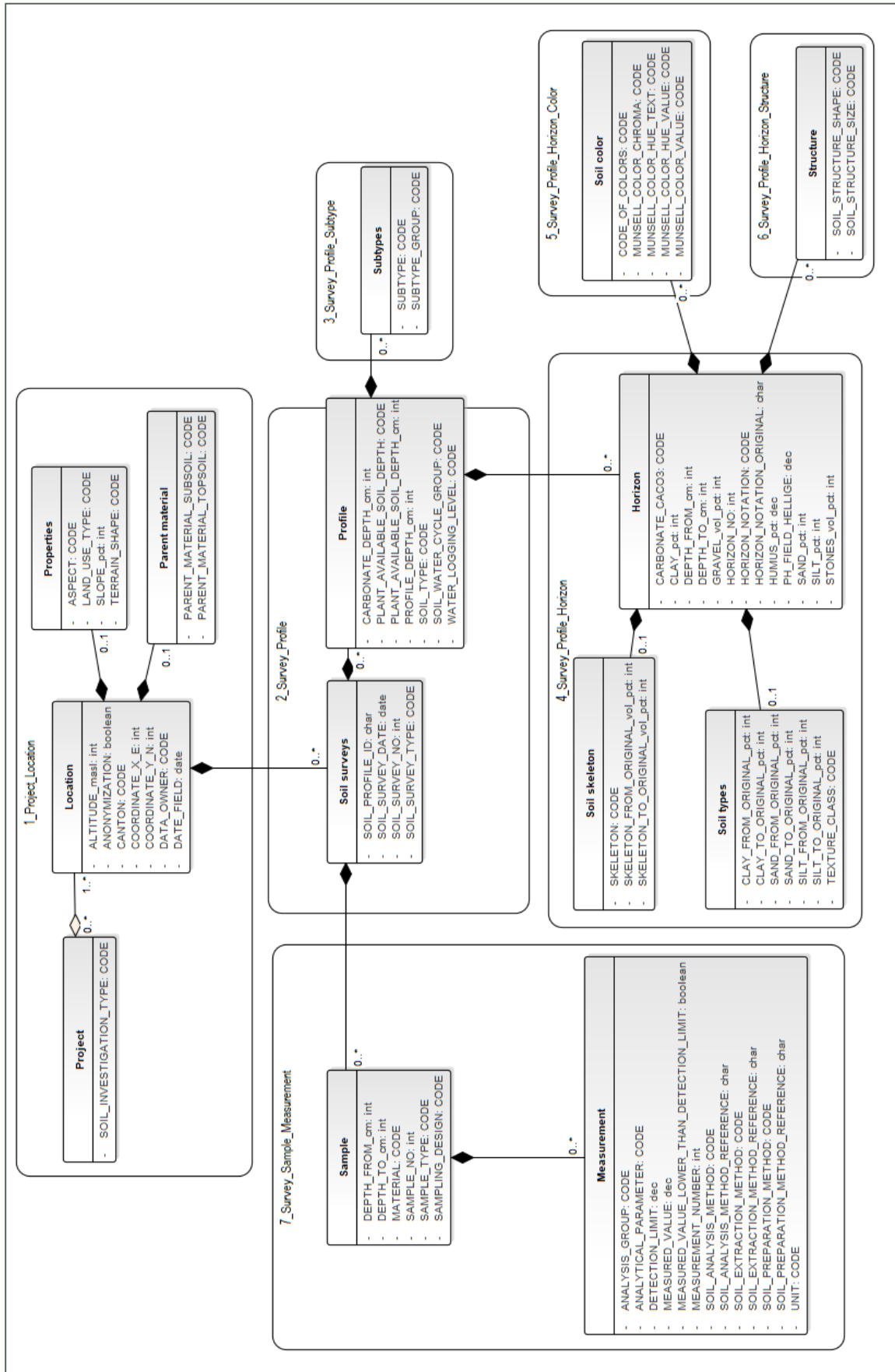
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5 Appendix: Data model of the Swiss Soil Dataset Version 6 (april 6)



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