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## [<sup>F1</sup>ANNEX IV

### REQUIREMENTS FOR SPATIAL DATA THEMES LISTED IN ANNEX III TO DIRECTIVE 2007/2/EC

#### Textual Amendments

**F1** Inserted by Commission Regulation (EU) No 1253/2013 of 21 October 2013 amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC as regards interoperability of spatial data sets and services.

### 3. SOIL

#### 3.1. Spatial object types

The following spatial object types are specified for the spatial data theme Soil:

- Derived Soil Profile
- Observed Soil Profile
- Profile Element
- Soil Body
- Soil Derived Object
- Soil Horizon
- Soil Layer
- Soil Plot
- Soil Profile
- Soil Site
- Soil Theme Coverage
- Soil Theme Descriptive Coverage

##### 3.1.1. *Derived Soil Profile (DerivedSoilProfile)*

A non-point-located soil profile that serves as a reference profile for a specific soil type in a certain geographical area.

This type is a sub-type of SoilProfile.

#### Association roles of the spatial object type **DerivedSoilProfile**

Association role	Definition	Type	Voidability
isDerivedFrom	Link to one or more observed soil profiles from which this profile has been derived.	ObservedSoilProfile	voidable

##### 3.1.2. *Observed Soil Profile (ObservedSoilProfile)*

A representation of a soil profile found on a specific location which is described on the basis of observations in a trial pit or with a borehole.

This type is a sub-type of SoilProfile.

#### Association roles of the spatial object type **ObservedSoilProfile**

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Association role	Definition	Type	Voidability
location	The location of an observed profile is the soilplot.	SoilPlot	

### 3.1.3. Profile Element (ProfileElement)

An abstract spatial object type grouping soil layers and / or horizons for functional/operational aims.

This type is abstract.

#### Attributes of the spatial object type ProfileElement

Attribute	Definition	Type	Voidability
inspireId	External object identifier of the spatial object.	Identifier	
particleSizeFraction	Mineral part of the soil, fractioned on the basis of size (diameter), limits of the particles. It indicates how much of the mineral soil material is composed of soil particles of the specified size range.	ParticleSizeFractionType	voidable
profileElementDepthRange	Upper and lower depth of the profile element (layer or horizon) measured from the surface (0 cm) of a soil profile (in cm).	RangeType	
beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	voidable
endLifespanVersion	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	DateTime	voidable

#### Association roles of the spatial object type ProfileElement

Association role	Definition	Type	Voidability
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of...

ANNEX IV

Document Generated: 2024-03-13

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isPartOf	Link to the soil profile which the profile element constitutes.	SoilProfile	
profileElementObservation	Observation of a soil property for characterizing the profile element (layer or horizon).	OM_Observation	voidable

### Constraints of the spatial object type ProfileElement

To fill the featureOfInterest property of the profile element observations of a ProfileElement object, that same ProfileElement object shall be used.

The observedProperty of the profile element observation shall be specified using a value from the ProfileElementParameterNameValue code list.

The result of the profile element observation shall be of one of the following types: Number; RangeType; CharacterString.

#### 3.1.4. Soil Body (SoilBody)

Part of the soil cover that is delineated and that is homogeneous with regard to certain soil properties and/or spatial patterns.

#### Attributes of the spatial object type SoilBody

Attribute	Definition	Type	Voidability
inspireId	External object identifier of the spatial object.	Identifier	
geometry	The geometry defining the boundary of the Soil Body.	GM_MultiSurface	
soilBodyLabel	Label to identify the soil body according to the specified reference framework (metadata).	CharacterString	voidable
beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	voidable
endLifespanVersion	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	DateTime	voidable

#### Association roles of the spatial object type SoilBody

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Association role	Definition	Type	Voidability
isDescribedBy	Link to a derived soil profile that characterizes the soil body, possibly in combination with other derived soil profiles. The association has additional properties as defined in the association class DerivedProfilePresenceInSoilBody.	DerivedSoilProfile	voidable

### 3.1.5. Soil Derived Object (SoilDerivedObject)

A spatial object type for representing spatial objects with soil-related property derived from one or more soil and possibly other non soil properties.

#### Attributes of the spatial object type SoilDerivedObject

Attribute	Definition	Type	Voidability
geometry	The geometry defining the soil derived object.	GM_Object	
inspireId	External object identifier of the spatial object.	Identifier	

#### Association roles of the spatial object type SoilDerivedObject

Association role	Definition	Type	Voidability
isBasedOnSoilDerivedObject	Link to a soil derived object on whose properties the derived value is based.	SoilDerivedObject	voidable
isBasedOnObservedSoilProfile	Link to an observed soil profile on whose properties the derived value is based.	ObservedSoilProfile	voidable
isBasedOnSoilBody	Link to a soil body on whose properties the derived value is based.	SoilBody	voidable
soilDerivedObjectObservation	Observation of a soil property for characterizing the soil derived object.	OM_Observation	voidable

of...

ANNEX IV

Document Generated: 2024-03-13

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### Constraints of the spatial object type **SoilDerivedObject**

To fill the featureOfInterest property of the soil derived object observation, the same SoilDerivedObject object shall be used.

The observedProperty of the soil derived object observation shall be specified using a value from the SoilDerivedObjectParameterNameValue code list.

The result of the soil derived object observation shall be of one of the following types: Number; RangeType; CharacterString.

#### 3.1.6. *Soil Horizon (SoilHorizon)*

Domain of a soil with a certain vertical extension, more or less parallel to the surface and homogeneous for most morphological and analytical characteristics, developed in a parent material layer through pedogenic processes or made up of in-situ sedimented organic residues of up-growing plants (peat).

This type is a sub-type of ProfileElement.

#### Attributes of the spatial object type **SoilHorizon**

Attribute	Definition	Type	Voidability
FAOHorizonNotation	Designation of the soil horizon.	FAOHorizonNotationType	voidable
otherHorizonNotation	Designation of the soil horizon according to a specific classification system.	OtherHorizonNotationType	voidable

#### 3.1.7. *Soil Layer (SoilLayer)*

Domain of a soil with a certain vertical extension developed through non-pedogenic processes, displaying a change in structure and/or composition to possibly over- or underlying adjacent domains, or a grouping of soil horizons or other sub-domains with a special purpose.

This type is a sub-type of ProfileElement.

#### Attributes of the spatial object type **SoilLayer**

Attribute	Definition	Type	Voidability
layerType	Assignment of a layer according to the concept that fits its kind.	LayerTypeValue	
layerRockType	Type of the material in which the layer developed.	LithologyValue	voidable
layerGenesisProcess	Last non-pedogenic process (geologic or anthropogenic) that coined the material composition and	EventProcessValue	voidable

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	internal structure of the layer.		
layerGenesisEnvironment	Setting in which the last non-pedogenic process (geologic or anthropogenic) that coined the material composition and internal structure of the layer took place.	EventEnvironmentValue	voidable
layerGenesisProcessState	Indication whether the process specified in layerGenesisProcess is on-going or ceased in the past.	LayerGenesisProcessStateValue	voidable

### Constraints of the spatial object type SoilLayer

The attributes layerGenesisProcess, layerGenesisEnvironment, layerGenesisProcessState and layerRockType shall only be provided where the layerType is of the value 'geogenic'.

#### 3.1.8. Soil Plot (SoilPlot)

A spot where a specific soil investigation is carried out.

#### Attributes of the spatial object type SoilPlot

Attribute	Definition	Type	Voidability
inspireId	External object identifier of the spatial object.	Identifier	
soilPlotLocation	A reference to a location on the earth; it can be a point location identified by coordinates or a description of the location using text or an identifier.	Location	
soilPlotType	Gives information on what kind of plot the observation of the soil is made on.	SoilPlotTypeValue	
beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	voidable
endLifespanVersion	Date and time at which this version of	DateTime	voidable

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the spatial object was superseded or retired in the spatial data set.		
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### Association roles of the spatial object type SoilPlot

Association role	Definition	Type	Voidability
locatedOn	Link to the soil site on which the soil plot is located or to which the soil plot is belonging.	SoilSite	voidable
observedProfile	Link to the observed soil profile for which the soil plot provides location information.	ObservedSoilProfile	voidable

### 3.1.9. Soil Profile (SoilProfile)

A description of the soil that is characterized by a vertical succession of profile elements.

This type is abstract.

#### Attributes of the spatial object type SoilProfile

Attribute	Definition	Type	Voidability
inspireId	External object identifier of the spatial object.	Identifier	
WRBSoilName	Identification of the soil profile.	WRBSoilNameType	voidable
otherSoilName	Identification of the soil profile according to a specific classification scheme.	OtherSoilNameType	voidable
localIdentifier	Unique identifier of the soil profile given by the data provider of the data set.	CharacterString	voidable
beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	voidable
endLifespanVersion	Date and time at which this version of the spatial object was	DateTime	voidable

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	superseded or retired in the spatial data set.		
validFrom	The time when the phenomenon started to exist in the real world.	DateTime	voidable
validTo	The time from which the phenomenon no longer exists in the real world.	DateTime	voidable

### Association roles of the spatial object type SoilProfile

Association role	Definition	Type	Voidability
isDescribedBy	The profile elements (layers and/or horizons) constituting the soil profile.	ProfileElement	voidable
soilProfileObservation	Observation of a soil property for characterizing the soil profile.	OM_Observation	voidable

### Constraints of the spatial object type SoilProfile

To fill the featureOfInterest property of the soil profile observations of a SoilProfile object, that same SoilProfile object shall be used.

The observedProperty of the soil profile observation shall be specified using a value from the SoilProfileParameterNameValue code list.

The result of the soil profile observation shall be of one of the following types: Number; RangeType; CharacterString.

#### 3.1.10. Soil Site (SoilSite)

An area within a larger survey, study or monitored area, where a specific soil investigation is carried out.

### Attributes of the spatial object type SoilSite

Attribute	Definition	Type	Voidability
inspireId	External object identifier of the spatial object.	Identifier	
geometry	The geometry defining the soil site.	GM_Object	
soilInvestigationPurpose	Indication why a survey was conducted.	SoilInvestigationPurposeValue	



of...

ANNEX IV

Document Generated: 2024-03-13

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beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	voidable
endLifespanVersion	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	DateTime	voidable
validFrom	The time when the phenomenon started to exist in the real world.	DateTime	voidable
validTo	The time from which the phenomenon no longer exists in the real world.	DateTime	voidable

#### Association roles of the spatial object type SoilSite

Association role	Definition	Type	Voidability
isObservedOnLocation	Link to a location(s) where the soil site has been investigated.	SoilPlot	voidable
soilSiteObservation	Observation of a soil property for characterizing the soil site.	OM_Observation	voidable

#### Constraints of the spatial object type SoilSite

To fill the featureOfInterest property of the soil site observations of a SoilSite object, that same SoilSite object shall be used.

The observedProperty of the soil site observation shall be specified using a value from the SoilSiteParameterNameValue code list.

The result of the soil site observation shall be of one of the following types: Number; RangeType; CharacterString.

The result of the soil site observation shall be of type SoilObservationResult.

##### 3.1.11. Soil Theme Coverage (SoilThemeCoverage)

A spatial object type that holds values for a property based on one or more soil and possibly non soil parameters within its spatial, temporal or spatiotemporal domain.

This type is a sub-type of RectifiedGridCoverage.

#### Attributes of the spatial object type SoilThemeCoverage

Attribute	Definition	Type	Voidability
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beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	
endLifespanVersion	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	DateTime	
domainExtent	The attribute domainExtent shall contain the extent of the spatiotemporal domain of the coverage. Extents may be specified in both space and time.	EX_Extent	
validTimeFrom	The ValidTime specifies the time window for which measurements have been captured to calculate the thematic soil property relevant for that period. The start time defines when the period began.	Date	voidable
validTimeTo	The ValidTime specifies the time window for which measurements have been captured to calculate the thematic soil property relevant for that period. The end time defines when the period stopped.	Date	voidable
soilThemeParameter	A soil-related property (soil theme) that is represented by this coverage.	SoilThemeParameterType	

#### Association roles of the spatial object type SoilThemeCoverage

Association role	Definition	Type	Voidability
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isDescribedBy	This association allows for a certain SoilThemeCoverage to have a related Coverage which does not have a meaning without the base coverage.	SoilThemeDescriptiveCoverage	Coverage
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### Constraints of the spatial object type SoilThemeCoverage

The rangeSet values shall be of one of the following types: Number; RangeType; CharacterString.

#### 3.1.12. Soil Theme Descriptive Coverage (SoilThemeDescriptiveCoverage)

A spatial object type that is associated to the soil theme coverage and holds additional information on values of a property of the soil theme coverage.

This type is a sub-type of RectifiedGridCoverage.

#### Attributes of the spatial object type SoilThemeDescriptiveCoverage

Attribute	Definition	Type	Voidability
beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	
endLifespanVersion	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	DateTime	
domainExtent	The attribute domainExtent shall contain the extent of the spatiotemporal domain of the coverage. Extents may be specified in both space and time.	EX_Extent	
soilThemeDescriptiveParameter	Descriptive property for the soil-related property (soil theme) that is represented by its associated SoilThemeCoverage.	SoilThemeDescriptiveParameterType	

#### Association roles of the spatial object type SoilThemeDescriptiveCoverage

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Association role	Definition	Type	Voidability
isDescribing	This association allows for a certain SoilThemeCoverage to have a related Coverage which does not have a meaning without the base coverage.	SoilThemeCoverage	

### Constraints of the spatial object type SoilThemeDescriptiveCoverage

The rangeSet values shall be of one of the following types: Number; RangeType; CharacterString.

#### 3.2. Data types

##### 3.2.1. Derived Profile Presence In Soil Body (DerivedProfilePresenceInSoilBody)

Data type indicating the percentage range (expressed by a lower and upper boundary) occupied by the derived profile in the soil body.

This type is an association class.

#### Attributes of the data type DerivedProfilePresenceInSoilBody

Attribute	Definition	Type	Voidability
derivedProfilePercentageRange	Range that defines the minimum and maximum percentage of the area of the soil body represented by a specific derived soil profile.	RangeType	voidable

##### 3.2.2. FAO Horizon Notation Type (FAOHorizonNotationType)

A classification of a horizon according to the Horizon classification system specified in *Guidelines for soil description, 4th edition*, Food and Agriculture Organization of the United Nations, Rome, 2006.

#### Attributes of the data type FAOHorizonNotationType

Attribute	Definition	Type	Voidability
FAOHorizonDiscontinuity	Number used to indicate a discontinuity in the horizon notation.	Integer	
FAOHorizonMaster	Symbol of the master part of the horizon notation.	FAOHorizonMasterValue	
FAOPrime	A prime and double prime may be used to	FAOPrimeValue	

of...

ANNEX IV

Document Generated: 2024-03-13

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	connotate the master horizon symbol of the lower of two (prime) or three (double prime) horizons having identical Arabic-numeral prefixes and letter combinations.		
FAOHorizonSubordinate	Designations of subordinate distinctions and features within the master horizons and layers are based on profile characteristics observable in the field and are applied during the description of the soil at the site.	FAOHorizonSubordinateValue	
FAOHorizonVertical	Order number of the vertical subdivision in the horizon notation.	Integer	
isOriginalClassification	Boolean value to indicate whether the FAO horizon notation was the original notation to describe the horizon.	Boolean	

### 3.2.3. Other Horizon Notation Type (*OtherHorizonNotationType*)

A classification of a soil horizon according to a specific classification system.

#### Attributes of the data type **OtherHorizonNotationType**

Attribute	Definition	Type	Voidability
horizonNotation	Notation characterizing the soil horizon according to a specified classification system.	OtherHorizonNotationTypeValue	
isOriginalClassification	Boolean value to indicate whether the specified horizon notation system was the original notation system to describe the horizon.	Boolean	

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### 3.2.4. Other Soil Name Type (*OtherSoilNameType*)

An identification of the soil profile according to a specific classification scheme.

#### Attributes of the data type **OtherSoilNameType**

Attribute	Definition	Type	Voidability
soilName	Name of the soil profile according to a specific classification scheme.	OtherSoilNameTypeValue	
isOriginalClassification	Boolean value to indicate whether the specified classification scheme was the original classification scheme to describe the profile.	Boolean	

### 3.2.5. Particle Size Fraction Type (*ParticleSizeFractionType*)

Share of the soil that is composed of mineral soil particles of the size within the size range specified.

#### Attributes of the data type **ParticleSizeFractionType**

Attribute	Definition	Type	Voidability
fractionContent	Percentage of the defined fraction.	Number	
fractionParticleSizeRange	Upper and lower limit of the particle size of the defined fraction (expressed in $\mu\text{m}$ ).	RangeType	

### 3.2.6. Range Type (*RangeType*)

A range value defined by an upper limit and a lower limit.

#### Attributes of the data type **RangeType**

Attribute	Definition	Type	Voidability
upperValue	Value defining the upper limit of a specific property.	Real	
lowerValue	Value defining the lower limit of a specific property.	Real	
uom	The unit of measure that is used to express	UnitOfMeasure	

of...

ANNEX IV

Document Generated: 2024-03-13

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the values of the range.		
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### Constraints of the data type RangeType

At least one of the values shall not be empty.

#### 3.2.7. Soil Theme Descriptive Parameter Type (SoilThemeDescriptiveParameterType)

A data type providing a descriptive property for the soil-related property (soil theme) that is represented by its associated SoilThemeCoverage.

#### Attributes of the data type SoilThemeDescriptiveParameterType

Attribute	Definition	Type	Voidability
soilThemeDescriptiveParameterName	Name of the parameter to provide extra information on the values of the related SoilThemeCoverage.	CharacterString	
uom	The unit of measure that is used to express the soilThemeDescriptiveParameter.	UnitOfMeasure	

#### 3.2.8. Soil Theme Parameter Type (SoilThemeParameterType)

A soil-related property (soil theme) that is represented by this coverage. It is composed of a parameter name coming from a code list SoilDerivedObjectParameterNameValue and a Unit of Measure used for expressing that parameter.

#### Attributes of the data type SoilThemeParameterType

Attribute	Definition	Type	Voidability
soilThemeParameterName	Name of the parameter represented by the soilThemeCoverage.	SoilDerivedObjectParameterNameValue	
uom	the unit of measure that is used to express the soilThemeParameter.	UnitOfMeasure	

#### 3.2.9. WRB Qualifier Group Type (WRBQualifierGroupType)

A data type to define the group of a qualifier and its possible specifier(s), its place and position with regard to the World Reference Base (WRB) Reference Soil Group (RSG) it belongs to according to *World reference base for soil resources 2006, first update 2007*, World Soil Resources Reports No. 103, Food and Agriculture Organization of the United Nations, Rome, 2007.

#### Attributes of the data type WRBQualifierGroupType

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Attribute	Definition	Type	Voidability
qualifierPlace	Attribute to indicate the placement of the Qualifier with regard to the WRB reference soil group (RSG). The placement can be in front of the RSG i.e. 'prefix' or it can be behind the RSG i.e. 'suffix'.	WRBQualifierPlaceValue	
qualifierPosition	Number to indicate the position of a qualifier with regard to the WRB reference soil group (RSG) it belongs to and with regard to its placement to that (RSG) i.e. as a prefix or a suffix.	Integer	
WRBqualifier	Name element of WRB, second level of classification.	WRBQualifierValue	
WRBspecifier	Code that indicates the degree of expression of a qualifier or the depth range to which the qualifier applies.	WRBSpecifierValue	

### 3.2.10. WRB Soil Name Type (WRBSoilNameType)

An identification of the soil profile according to the *World reference base for soil resources 2006, first update 2007*, World Soil Resources Reports No. 103, Food and Agriculture Organization of the United Nations, Rome, 2007.

#### Attributes of the data type WRBSoilNameType

Attribute	Definition	Type	Voidability
WRBQualifierGroup	The group of a qualifier and its possible specifier(s), its place and position with regard to the WRBReferenceSoilGroup it belongs to.	WRBQualifierGroupType	
WRBReferenceSoilGroup	First level of classification of the World Reference	WRBReferenceSoilGroupValue	



of...

ANNEX IV

Document Generated: 2024-03-13

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	Base for Soil Resources.		
isOriginalClassification	Boolean value to indicate whether the WRB classification system was the original classification system to describe the soil profile.	Boolean	

### Association roles of the data type WRBSoilNameType

Association role	Definition	Type	Voidability
over	An association to indicate that in the WRB classification a soil profile covers another developed, older soil.	WRBSoilNameType	

### 3.3. Code lists

#### 3.3.1. FAO Horizon Master (FAOHorizonMasterValue)

A code list of the master part of the horizon designation.

The allowed values for this code list comprise only the values specified in *Guidelines for soil description, 4<sup>th</sup> edition*, Food and Agriculture Organization of the United Nations, Rome, 2006, pp. 67-77.

#### 3.3.2. FAO Horizon Subordinate (FAOHorizonSubordinateValue)

A code list of designations of subordinate distinctions and features within the master horizons and layers which are based on profile characteristics observable in the field and are applied during the description of the soil at the site.

The allowed values for this code list comprise only the values specified in *Guidelines for soil description, 4<sup>th</sup> edition*, Food and Agriculture Organization of the United Nations, Rome, 2006, pp. 67-77.

#### 3.3.3. FAO Prime (FAOPrimeValue)

A prime and double prime may be used to connote the master horizon symbol of the lower of two (prime) or three (double prime) horizons having identical Arabic-numeral prefixes and letter combinations.

The allowed values for this code list comprise only the values specified in *Guidelines for soil description, 4<sup>th</sup> edition*, Food and Agriculture Organization of the United Nations, Rome, 2006, pp. 67-77.

#### 3.3.4. Other Horizon Notation Type (OtherHorizonNotationTypeValue)

A classification of a soil horizon according to a specific classification system.

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The allowed values for this code list comprise any values defined by data providers.

### 3.3.5. *Other Soil Name Type (OtherSoilNameTypeValue)*

An identification of the soil profile according to a specific classification scheme.

The allowed values for this coded list comprise any values defined by data providers.

### 3.3.6. *Layer Genesis Process State (LayerGenesisProcessStateValue)*

An indication whether the process specified in layerGenesisProcess is ongoing or has ceased.

The allowed values for this code list comprise only the values specified in the table below.

#### **Values for the code list LayerGenesisProcessStateValue**

<b>Value</b>	<b>Name</b>	<b>Definition</b>
ongoing	on-going	The process has started in the past and is still active.
terminated	terminated	The process is no longer active.

### 3.3.7. *Layer Type (LayerTypeValue)*

A classification of a layer according to the concept that fits the purpose.

The allowed values for this code list comprise only the values specified in the table below.

#### **Values for the code list LayerTypeValue**

<b>Value</b>	<b>Name</b>	<b>Definition</b>
depthInterval	depth interval	Fixed depth range where soil is described and/or samples are taken.
geogenic	geogenic	Domain of the soil profile composed of material resulting from the same, non-pedogenic process, e.g. sedimentation, that might display an unconformity to possible over- or underlying adjacent domains.
subSoil	subsoil	Natural soil material below the topsoil and overlying the unweathered parent material.
topSoil	topsoil	Upper part of a natural soil that is generally dark coloured and has a higher content of organic matter and nutrients when compared to the (mineral) horizons below excluding the humus layer.

of...

ANNEX IV

Document Generated: 2024-03-13

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### 3.3.8. Profile Element Parameter Name (ProfileElementParameterNameValue)

Properties that can be observed to characterize the profile element.

The allowed values for this code list comprise the values specified in the table below and narrower values defined by data providers.

This code list is hierarchical.

#### Values for the code list ProfileElementParameterNameValue

Value	Name	Definition	Parent value
chemicalParameter	chemical parameter	Chemical parameters observed to characterize the profile element.	
physicalParameter	physical parameter	Physical parameters observed to characterize the profile element.	
biologicalParameter	biological parameter	Biological parameters observed to characterize the profile element.	
organicCarbonContent	organic carbon content	Portion of the soil measured as carbon in organic forms, excluding living macro and mesofauna and living plant tissue.	chemicalParameter
nitrogenContent	nitrogen content	total nitrogen content in the soil, including both the organic and inorganic forms.	chemicalParameter
pHValue	pH value	pH value of the profile element.	chemicalParameter
cadmiumContent	cadmium content	Cadmium content of the profile element.	chemicalParameter
chromiumContent	chromium content	Chromium content of the profile element.	chemicalParameter
copperContent	copper content	Copper content of the profile element.	chemicalParameter
leadContent	lead content	Lead content of the profile element.	chemicalParameter
mercuryContent	mercury content	Mercury content of the profile element.	chemicalParameter

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nickelContent	nickel content	Nickel content of the profile element.	chemicalParameter
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### 3.3.9. Soil Derived Object Parameter Name (SoilDerivedObjectParameterNameValue)

Soil-related properties that can be derived from soil and other data.

The allowed values for this code list comprise the values specified in the table below and narrower values defined by data providers.

This code list is hierarchical.

#### Values for the code list SoilDerivedObjectParameterNameValue

Value	Name	Definition	Parent value
chemicalParameter	chemical parameter	Chemical parameters that can be derived from other soil data.	
physicalParameter	physical parameter	Physical parameters that can be derived from other soil data.	
biologicalParameter	biological parameter	Biological parameters that can be derived from other soil data.	
potentialRootDepth	potential root depth	Potential depth of the soil profile where roots develop (in cm).	physicalParameter
availableWaterCapacity	available water capacity	Amount of water that a soil can store that is usable by plants, based on the potential root depth.	physicalParameter
carbonStock	carbon stock	The total mass of carbon in soil for a given depth.	chemicalParameters
waterDrainage	water drainage	Natural water drainage class of the soil profile.	physicalParameter
organicCarbonContent	organic carbon content	Portion of the soil measured as carbon in organic form, excluding living macro and mesofauna and living plant tissue.	chemicalParameter
nitrogenContent	nitrogen content	Total nitrogen content in the soil, including both the organic and inorganic forms.	chemicalParameter

of...

ANNEX IV

Document Generated: 2024-03-13

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pHValue	pH value	pH value of the soil derived object.	chemicalParameter
cadmiumContent	cadmium content	Cadmium content of the soil derived object.	chemicalParameter
chromiumContent	chromium content	Chromium content of the soil derived object.	chemicalParameter
copperContent	copper content	Copper content of the soil derived object.	chemicalParameter
leadContent	lead content	Lead content of the soil derived object.	chemicalParameter
mercuryContent	mercury content	Mercury content of the soil derived object.	chemicalParameter
nickelContent	nickel content	Nickel content of the soil derived object.	chemicalParameter
zincContent	zinc content	Zinc content of the soil derived object.	chemicalParameter

### 3.3.10. Soil Investigation Purpose (SoilInvestigationPurposeValue)

A code list of possible values indicating the reasons for conducting a survey.

The allowed values for this code list comprise only the values specified in the table below.

#### Values for the code list SoilInvestigationPurposeValue

Value	Name	Definition
generalSoilSurvey	general soil survey	Soil characterisation with unbiased selection of investigation location.
specificSoilSurvey	specific soil survey	Investigation of soil properties at locations biased by a specific purpose.

### 3.3.11. Soil Plot Type (SoilPlotTypeValue)

A code list of terms specifying on what kind of plot the observation of the soil is made.

The allowed values for this code list comprise only the values specified in the table below.

#### Values for the code list SoilPlotTypeValue

Value	Name	Definition
borehole	borehole	Penetration into the sub-surface with removal of soil/rock material by using, for instance, a hollow tube-

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		shaped tool, in order to carry out profile descriptions, sampling and/or field tests.
sample	sample	Excavation where soil material is removed as a soil sample without doing any soil profile description.
trialPit	trial pit	Excavation or other exposition of the soil prepared to carry out profile descriptions, sampling and/or field tests.

### 3.3.12. Soil Profile Parameter Name (SoilProfileParameterNameValue)

Properties that can be observed to characterize the soil profile.

The allowed values for this code list comprise the values specified in the table below and narrower values defined by data providers.

This code list is hierarchical.

#### Values for the code list SoilProfileParameterNameValue

Value	Name	Definition	Parent value
chemicalParameter	chemical parameter	Chemical parameters observed to characterize the soil profile.	
physicalParameter	physical parameter	Physical parameters observed to characterize the soil profile.	
biologicalParameter	biological parameter	Biological parameters observed to characterize the soil profile.	
potentialRootDepth	potential root depth	Potential depth of the soil profile where roots develop (in cm).	physicalParameter
availableWaterCapacity	available water capacity	Amount of water that a soil can store that is usable by plants, based on the potential root depth.	physicalParameter
carbonStock	carbon stock	The total mass of carbon in soil for a given depth.	chemicalParameters

of...

ANNEX IV

Document Generated: 2024-03-13

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waterDrainage	water drainage	Natural internal water drainage class of the soil profile.	physicalParameter
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### 3.3.13. Soil Site Parameter Name (SoilSiteParameterNameValue)

Properties that can be observed to characterize the soil site.

The allowed values for this code list comprise the values specified in the table below and narrower values defined by data providers.

#### Values for the code list SoilSiteParameterNameValue

Value	Name	Definition
chemicalParameter	chemical parameter	Chemical parameters observed to characterize the soil site.
physicalParameter	physical parameter	Physical parameters observed to characterize the soil site.
biologicalParameter	biological parameter	Biological parameters observed to characterize the soil site.

### 3.3.14. WRB Qualifier Place (WRBQualifierPlaceValue)

A code list of values indicating the placement of the Qualifier with regard to the WRB reference soil group (RSG). The placement can be in front of the RSG i.e. 'prefix' or it can be behind the RSG i.e. 'suffix'.

The allowed values for this code list comprise only the values 'prefix' and 'suffix', according to the naming rules specified in *World reference base for soil resources 2006, first update 2007*, World Soil Resources Reports No. 103, Food and Agriculture Organization of the United Nations, Rome, 2007.

### 3.3.15. WRB Qualifiers (WRBQualifierValue)

A code list of possible qualifiers of the World Reference Base for Soil Resources.

The allowed values for this code list comprise only the values specified in *World reference base for soil resources 2006, first update 2007*, World Soil Resources Reports No. 103, Food and Agriculture Organization of the United Nations, Rome, 2007.

### 3.3.16. WRB Reference Soil Group (RSG) (WRBReferenceSoilGroupValue)

A code list of possible reference soil groups (i.e. first level of classification of the World Reference Base for Soil Resources).

The allowed values for this code list comprise only the values specified in *World reference base for soil resources 2006, first update 2007*, World Soil Resources Reports No. 103, Food and Agriculture Organization of the United Nations, Rome, 2007.

### 3.3.17. WRB Specifiers (WRBSpecifierValue)

A code list of possible specifiers.

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The allowed values for this code list comprise only the values specified in *World reference base for soil resources 2006, first update 2007*, World Soil Resources Reports No. 103, Food and Agriculture Organization of the United Nations, Rome, 2007.

### 3.4. Theme-specific Requirements

- (1) The values of the first level hierarchical code lists ProfileElementParameterNameValue, SoilDerivedObjectParameterNameValue, SoilProfileParameterNameValue, SoilSiteParameterNameValue (chemicalParameter, biologicalParameter, physicalParameter) serve only the purpose of structuring; only the lower-level values shall be used.
- (2) When an additional descriptive parameter for the soil derived object is needed, the parameter attribute of the OM\_Observation spatial object type shall be used.
- (3) Only one Other Horizon Notation Type classification shall be used for a dataset.
- (4) Only one Other Soil Name Type classification shall be used for a dataset.

### 3.5. Layers

#### Layers for the spatial data theme Soil

Layer Name	Layer Title	Spatial object type
SO.SoilBody	Soils	SoilBody
SO.ObservedSoilProfile	Observed Soil Profiles	ObservedSoilProfile, SoilPlot
SO.SoilSite	Soil Sites	SoilSite
SO. <CodeListValue> <sup>a</sup>	<human readable name>	SoilDerivedObject (basePhenomenon: SoilDerivedObjectParameterNameValue)
Example: SO. OrganicCarbonContent	Example: Organic Carbon Content	
SO.<CodeListValue>Coverage <sup>b</sup>	<human readable name>	SoilThemeCoverage (soilThemeParameter / soilThemeParameterName: SoilDerivedObjectParameterNameValue)
Example: SO. OrganicCarbonContentCoverage	Example: Organic Carbon Content Coverage	

**a** One layer shall be made available for each code list value, in accordance with Art. 14(3).

**b** One layer shall be made available for each code list value, in accordance with Art. 14(3).]



**Changes to legislation:**

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**Changes and effects yet to be applied to the whole legislation item and associated provisions**

- Annex 1 para. 8.1.3.1 words inserted by [S.I. 2018/1338 reg. 13\(10\)\(c\)\(ii\)](#)
- Annex 1 para. 8.1.3.1 words inserted by [S.I. 2018/1338 reg. 13\(10\)\(c\)\(iii\)](#)
- Annex 1 para. 7.3.3.1 words omitted by [S.I. 2018/1338 reg. 13\(10\)\(a\)](#)
- Annex 1 para. 8.1.3.2 words omitted by [S.I. 2018/1338 reg. 13\(10\)\(d\)\(i\)](#)
- Annex 1 para. 8.1.3.2 words omitted by [S.I. 2018/1338 reg. 13\(10\)\(d\)\(ii\)](#)
- Annex 1 para. 8.1.1.1 words substituted by [S.I. 2018/1338 reg. 13\(10\)\(b\)](#)
- Annex 1 para. 8.1.3.1 words substituted by [S.I. 2018/1338 reg. 13\(10\)\(c\)\(i\)](#)
- Annex 2 para. 1.3.4(2) omitted by [S.I. 2018/1338 reg. 13\(11\)\(b\)](#)
- Annex 2 para. 2.2(2) omitted by [S.I. 2018/1338 reg. 13\(11\)\(c\)](#)
- Annex 2 para. 3.1.1 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(d\)](#)
- Annex 2 para. 6.1.4 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(k\)](#)
- Annex 2 para. 7.6.1.6 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(l\)](#)
- Annex 2 para. 7.9.1 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(n\)](#)
- Annex 2 para. 8.7.1 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(o\)\(i\)](#)
- Annex 2 para. 9.4.1 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(s\)\(ii\)](#)
- Annex 2 para. 9.4.5 words omitted by [S.I. 2018/1338 reg. 13\(11\)\(t\)](#)
- Annex 2 heading words substituted by [S.I. 2018/1338 reg. 13\(11\)\(a\)](#)
- Annex 2 para. 3.3.4 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(e\)\(i\)](#)
- Annex 2 para. 3.3.4 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(e\)\(ii\)](#)
- Annex 2 para. 4.2.1.2 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(f\)](#)
- Annex 2 para. 4.4(1) words substituted by [S.I. 2018/1338 reg. 13\(11\)\(g\)](#)
- Annex 2 para. 5.2.4 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(h\)](#)
- Annex 2 para. 5.3.2 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(i\)](#)
- Annex 2 para. 6.1 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(j\)](#)
- Annex 2 para. 7.7.1.15 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(m\)](#)
- Annex 2 para. 8.7.1 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(o\)\(ii\)](#)
- Annex 2 para. 8.7.2 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(p\)](#)
- Annex 2 para. 8.7.4 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(q\)](#)
- Annex 2 para. 9.1.1 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(r\)](#)
- Annex 2 para. 9.4.1 words substituted by [S.I. 2018/1338 reg. 13\(11\)\(s\)\(i\)](#)
- Art. 2(2) words substituted by [S.I. 2018/1338 reg. 13\(3\)\(a\)](#)
- Art. 2(3) words substituted by [S.I. 2018/1338 reg. 13\(3\)\(b\)](#)
- Art. 2(20) words substituted by [S.I. 2018/1338 reg. 13\(3\)\(c\)](#)
- Art. 2(39)(40) inserted by [S.I. 2018/1338 reg. 13\(3\)\(d\)](#)
- Annex 3 heading words substituted by [S.I. 2018/1338 reg. 13\(12\)\(a\)](#)
- Annex 3 para. 1.7.5 point (3) words substituted by [S.I. 2018/1338 reg. 13\(12\)\(b\)](#)
- Annex 4 para. 1.5 point (2) omitted by [S.I. 2018/1338 reg. 13\(13\)\(b\)](#)
- Annex 4 para. 16.2.3 word inserted by [S.I. 2018/1338 reg. 13\(13\)\(p\)\(i\)](#)
- Annex 4 para. 18.4.8 word omitted by [S.I. 2018/1338 reg. 13\(13\)\(u\)\(ii\)](#)
- Annex 4 para. 4.7.1.1 word substituted by [S.I. 2018/1338 reg. 13\(13\)\(c\)\(i\)](#)
- Annex 4 para. 4.7.1.1 word substituted by [S.I. 2018/1338 reg. 13\(13\)\(c\)\(ii\)](#)
- Annex 4 para. 4.7.1.3.1 word substituted by [S.I. 2018/1338 reg. 13\(13\)\(e\)\(iii\)](#)
- Annex 4 para. 18.4.8 word substituted by [S.I. 2018/1338 reg. 13\(13\)\(u\)\(i\)](#)
- Annex 4 para. 5.1.5 words inserted by [S.I. 2018/1338 reg. 13\(13\)\(h\)](#)
- Annex 4 para. 10.3.2 words inserted by [S.I. 2018/1338 reg. 13\(13\)\(k\)](#)
- Annex 4 para. 11.3.1 words inserted by [S.I. 2018/1338 reg. 13\(13\)\(l\)\(iii\)\(bb\)](#)
- Annex 4 para. 11.3.1 words inserted by [S.I. 2018/1338 reg. 13\(13\)\(l\)\(vii\)\(aa\)](#)
- Annex 4 para. 17.4.2 words inserted by [S.I. 2018/1338 reg. 13\(13\)\(q\)\(i\)\(aa\)](#)
- Annex 4 para. 17.4.2 words inserted by [S.I. 2018/1338 reg. 13\(13\)\(q\)\(i\)\(bb\)](#)

- Annex 4 para. 17.4.2 words inserted by S.I. 2018/1338 reg. 13(13)(q)(ii)
- Annex 4 para. 17.4.3 words inserted by S.I. 2018/1338 reg. 13(13)(r)(ii)(bb)
- Annex 4 para. 18.4.2 words inserted by S.I. 2018/1338 reg. 13(13)(s)(ii)
- Annex 4 para. 4.7.1.2 words omitted by S.I. 2018/1338 reg. 13(13)(d)(i)
- Annex 4 para. 4.7.1.2 words omitted by S.I. 2018/1338 reg. 13(13)(d)(ii)
- Annex 4 para. 4.7.3.4 words omitted by S.I. 2018/1338 reg. 13(13)(f)
- Annex 4 para. 11.3.1 words omitted by S.I. 2018/1338 reg. 13(13)(l)(iv)
- Annex 4 para. 11.3.1 words omitted by S.I. 2018/1338 reg. 13(13)(l)(v)
- Annex 4 para. 11.3.1 words omitted by S.I. 2018/1338 reg. 13(13)(l)(vi)
- Annex 4 para. 11.3.1 words omitted by S.I. 2018/1338 reg. 13(13)(l)(vii)(bb)
- Annex 4 para. 11.4.1 point (3)(b) words omitted by S.I. 2018/1338 reg. 13(13)(m)
- Annex 4 para. 13.2.1.1 words omitted by S.I. 2018/1338 reg. 13(13)(n)
- Annex 4 para. 13.3 point (3) words omitted by S.I. 2018/1338 reg. 13(13)(o)
- Annex 4 para. 16.2.3 words omitted by S.I. 2018/1338 reg. 13(13)(p)(ii)
- Annex 4 para. 17.4.3 words omitted by S.I. 2018/1338 reg. 13(13)(r)(i)
- Annex 4 para. 18.4.7 words omitted by S.I. 2018/1338 reg. 13(13)(t)
- Annex 4 para. 19.1 words omitted by S.I. 2018/1338 reg. 13(13)(v)
- Annex 4 para. 11.3.1 words omitted by S.I. 2018/1338 reg. 13(13)(l)(ix)
- Annex 4 heading words substituted by S.I. 2018/1338 reg. 13(13)(a)
- Annex 4 para. 4.7.1.3.1 words substituted by S.I. 2018/1338 reg. 13(13)(e)(i)
- Annex 4 para. 4.7.1.3.1 words substituted by S.I. 2018/1338 reg. 13(13)(e)(ii)
- Annex 4 para. 4.8 point (4) words substituted by S.I. 2018/1338 reg. 13(13)(g)(i)
- Annex 4 para. 4.8 point (5) words substituted by S.I. 2018/1338 reg. 13(13)(g)(ii)
- Annex 4 para. 6.9.1.1 words substituted by S.I. 2018/1338 reg. 13(13)(i)
- Annex 4 para. 9.1 point (1) words substituted by S.I. 2018/1338 reg. 13(13)(j)(i)
- Annex 4 para. 9.1 point (2) words substituted by S.I. 2018/1338 reg. 13(13)(j)(ii)
- Annex 4 para. 11.3.1 words substituted by S.I. 2018/1338 reg. 13(13)(l)(i)
- Annex 4 para. 11.3.1 words substituted by S.I. 2018/1338 reg. 13(13)(l)(ii)
- Annex 4 para. 11.3.1 words substituted by S.I. 2018/1338 reg. 13(13)(l)(iii)(aa)
- Annex 4 para. 11.3.1 words substituted by S.I. 2018/1338 reg. 13(13)(l)(viii)
- Annex 4 para. 17.4.3 words substituted by S.I. 2018/1338 reg. 13(13)(r)(ii)(aa)
- Annex 4 para. 18.4.2 words substituted by S.I. 2018/1338 reg. 13(13)(s)(i)
- Annex 4 para. 18.4.8 words substituted by S.I. 2018/1338 reg. 13(13)(u)(iii)
- Annex 7 para. 2 words substituted by S.I. 2018/1338 reg. 13(14)