

# Geology introduction

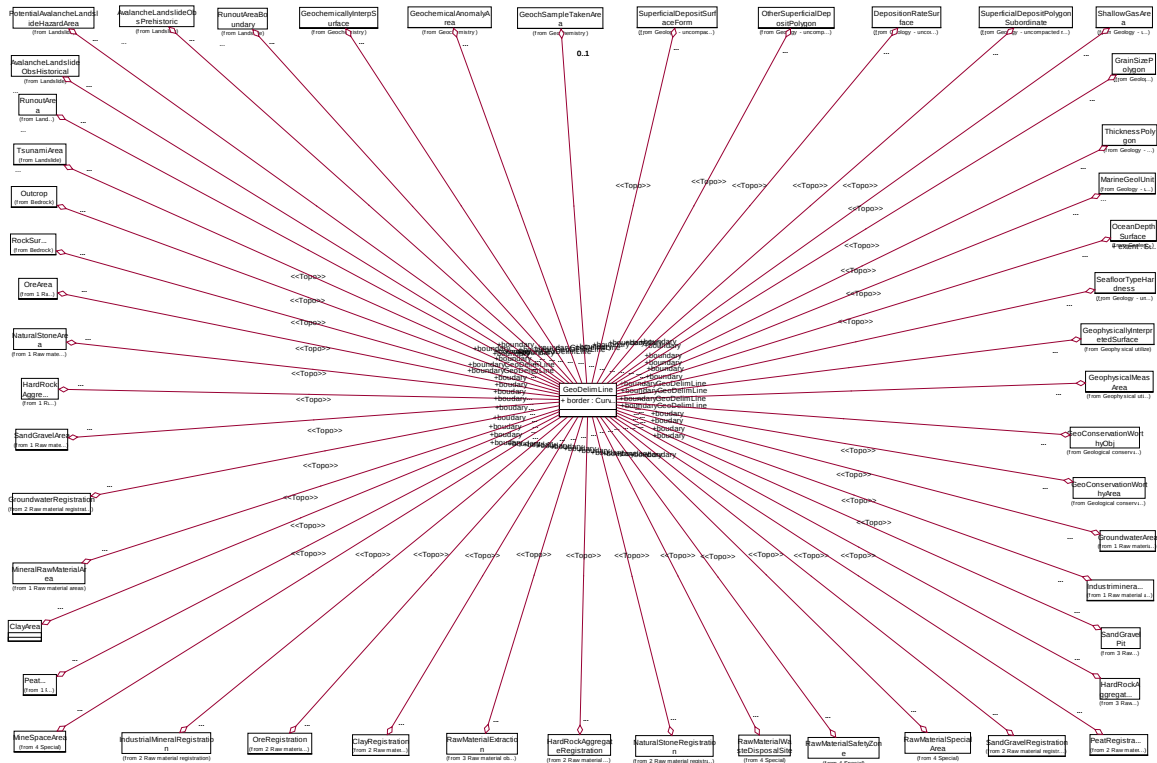


Norwegian Mapping Authority  
[gerd.mardal@statkart.no](mailto:gerd.mardal@statkart.no)

## Table of contents

|         |                                          |    |
|---------|------------------------------------------|----|
| 1.1     | Application schema .....                 | 3  |
| 1.2     | Description .....                        | 5  |
| 1.2.1   | GeoDelimLine .....                       | 5  |
| 1.2.2   | CodeLists .....                          | 10 |
| 1.2.2.1 | <<CodeList>> GeologicAge .....           | 10 |
| 1.2.2.2 | <<CodeList>> TypeOfGeolFindings .....    | 15 |
| 1.2.2.3 | <<CodeList>> DatingMethod.....           | 16 |
| 1.2.2.4 | <<CodeList>> GeolThematicAdjustment..... | 17 |
| 1.2.2.5 | <<CodeList>> GeolValueAssessment.....    | 17 |
| 1.2.2.6 | <<CodeList>> ThematicQuality .....       | 18 |

## 1.1 Application schema



## Codelists

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div> <div>&lt;&lt;CodeList&gt;&gt;</div> <div>TypeOfGeolFindings</div> <div> + Not specified = 0<br/> + Certain identification/observation = 1<br/> + Uncertain identification/observation = 2<br/> + Constructed/construed delimitation/boundary = 3<br/> + Geophysically interpreted boundary = 4<br/> + Delimitation with poor visibility in the terrain = 5<br/> + Transitional boundary = 6<br/> + Interpreted delimitation/registration = 7<br/> + Object or part of object interpreted from aerial photos = 8<br/> + Observation with uncertain geographic location = 9<br/> + Delimitation not based upon geology = 10<br/> + Delimitation based upon/bounded by sampling = 21<br/> + Delimitation based upon/bounded by seismic data = 22<br/> + Delimitation based upon/bounded by detailed depth data = 23<br/> + Delimitation based upon/bounded by backscatter data/side scan sonar = 24<br/> + Delimitation based upon/bounded by sampling and acoustic data/methods = 25<br/> + Delimitation based upon/bounded by acoustic data/methods = 26<br/> + Delimitation based upon/bounded by more than one method/data types = 27<br/> + Delimitation based upon/bounded by underwater still photography and/or video = 28<br/> + Delimitation based upon/bounded by acoustic data/methods verified by sampling, photography, etc = 29 </div> </div> | <div> <div>&lt;&lt;CodeList&gt;&gt;</div> <div>DatingMethod</div> <div> + Uspesifisert = 1<br/> + Ar40/Ar39 = 10<br/> + K/Ar = 11<br/> + Os/Re = 12<br/> + Pb/Pb = 13<br/> + Rb/Sr = 14<br/> + Sm/Nd = 15<br/> + U/Pb = 16<br/> + U/Th = 17<br/> + 14C = 18<br/> + Cs137 = 19<br/> + Pb210 = 20<br/> + Fission track = 30<br/> + Fossil = 40<br/> + Biostratigraphy = 41<br/> + Paleomag = 50<br/> + Thermoluminescence = 60<br/> + OSL = 70<br/> + Tephrochronology = 80 </div> </div> | <div> <div>&lt;&lt;CodeList&gt;&gt;</div> <div>GeologicAge</div> </div>                                                                              |
| <div> <div>&lt;&lt;CodeList&gt;&gt;</div> <div>ThematicQuality</div> <div> + Highest possible positional and thematic accuracy = Særdeles god<br/> + High positional and thematic accuracy, high resolution and little generalisation = Meget god<br/> + Good positional and thematic accuracy, good resolution but somewhat generalised = God<br/> + Low positional and thematic accuracy, low resolution; generalisation = Nokså god<br/> + Very low positional and thematic accuracy; strongly generalised = Noe dårlig<br/> + Very low positional and thematic accuracy, very low resolution and generalised to a great degree = Dårlig </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <div> <div>&lt;&lt;CodeList&gt;&gt;</div> <div>GeolValueAssessment</div> <div> + Very important occurrence = 1<br/> + Important occurrence = 2<br/> + Parts of the occurrence are important = 3<br/> + The whole or parts may be important = 4<br/> + Of little importance = 5<br/> + Not assessed/classified = 6 </div> </div>                                                                                                                                                         | <div> <div>&lt;&lt;CodeList&gt;&gt;</div> <div>GeolThematicAdjustment</div> <div> + Non-adjusted themes = 0<br/> + Adjusted themes = 1 </div> </div> |

## 1.2 Description

### 1.2.1 GeoDelimLine

| No   | Name/<br>Role name                                 | Description                                                                        | Obligation/<br>Condition | Maximum<br>Occurrence | Type                          | Constraint |
|------|----------------------------------------------------|------------------------------------------------------------------------------------|--------------------------|-----------------------|-------------------------------|------------|
| 1    | Class<br>GeoDelimLine                              | general<br>delimitation of<br>geological object                                    |                          |                       |                               |            |
| 1.1  | border                                             | course following<br>the transition<br>between different<br>real world<br>phenomena | 1                        | 1                     | CurveWithQuality              |            |
| 1.2  | Role<br>(unnamed) RockSurface                      |                                                                                    | 0                        | 1                     | RockSurface                   |            |
| 1.3  | Role<br>(unnamed) Outcrop                          |                                                                                    | 0                        | 1                     | Outcrop                       |            |
| 1.4  | Role<br>(unnamed)<br>GroundwaterArea               |                                                                                    | 0                        | 1                     | GroundwaterArea               |            |
| 1.5  | Role<br>(unnamed)<br>IndustrimineralOmr            |                                                                                    | 0                        | 1                     | IndustrimineralOmr            |            |
| 1.6  | Role<br>(unnamed)<br>NaturalStoneArea              |                                                                                    | 0                        | 1                     | NaturalStoneArea              |            |
| 1.7  | Role<br>(unnamed) OreArea                          |                                                                                    | 0                        | 1                     | OreArea                       |            |
| 1.8  | Role<br>(unnamed) ClayArea                         |                                                                                    | 0                        | 1                     | ClayArea                      |            |
| 1.9  | Role<br>(unnamed) PeatArea                         |                                                                                    | 0                        | 1                     | PeatArea                      |            |
| 1.10 | Role<br>(unnamed)<br>MineralRawMaterialArea        |                                                                                    | 0                        | 1                     | MineralRawMaterialArea        |            |
| 1.11 | Role<br>(unnamed)<br>HardRockAggregateArea         |                                                                                    | 0                        | 1                     | HardRockAggregateArea         |            |
| 1.12 | Role<br>(unnamed)<br>SandGravelArea                |                                                                                    | 0                        | 1                     | SandGravelArea                |            |
| 1.13 | Role<br>(unnamed)<br>IndustrialMineralRegistration |                                                                                    | 0                        | 1                     | IndustrialMineralRegistration |            |
| 1.14 | Role<br>(unnamed)<br>SandGravelRegistration        |                                                                                    | 0                        | 1                     | SandGravelRegistration        |            |
| 1.15 | Role<br>(unnamed)<br>PeatRegistration              |                                                                                    | 0                        | 1                     | PeatRegistration              |            |
| 1.1  | Role                                               |                                                                                    | 0                        | 1                     | ClayRegistration              |            |

|          |                                                         |  |   |   |                                        |  |
|----------|---------------------------------------------------------|--|---|---|----------------------------------------|--|
| 6        | (unnamed)<br>ClayRegistration                           |  |   |   | n                                      |  |
| 1.1<br>7 | Role<br>(unnamed)<br>GroundwaterRegistration            |  | 0 | 1 | GroundwaterR<br>egistration            |  |
| 1.1<br>8 | Role<br>(unnamed)<br>NaturalStoneRegistration           |  | 0 | 1 | NaturalStoneR<br>egistration           |  |
| 1.1<br>9 | Role<br>(unnamed)<br>HardRockAggregateRegi<br>stration  |  | 0 | 1 | HardRockAggr<br>egateRegistrati<br>on  |  |
| 1.2<br>0 | Role<br>(unnamed)<br>OreRegistration                    |  | 0 | 1 | OreRegistratio<br>n                    |  |
| 1.2<br>1 | Role<br>(unnamed)<br>MineSpaceArea                      |  | 0 | 1 | MineSpaceAre<br>a                      |  |
| 1.2<br>2 | Role<br>(unnamed)<br>RawMaterialWasteDispos<br>alSite   |  | 0 | 1 | RawMaterialW<br>asteDisposalSi<br>te   |  |
| 1.2<br>3 | Role<br>(unnamed)<br>RawMaterialSafetyZone              |  | 0 | 1 | RawMaterialSa<br>fetyZone              |  |
| 1.2<br>4 | Role<br>(unnamed)<br>RawMaterialSpecialArea             |  | 0 | 1 | RawMaterialSp<br>ecialArea             |  |
| 1.2<br>5 | Role<br>(unnamed)<br>SandGravelPit                      |  | 0 | 1 | SandGravelPit                          |  |
| 1.2<br>6 | Role<br>(unnamed)<br>HardRockAggregateExtra<br>ction    |  | 0 | 1 | HardRockAggr<br>egateExtractio<br>n    |  |
| 1.2<br>7 | Role<br>(unnamed)<br>RawMaterialExtraction              |  | 0 | 1 | RawMaterialEx<br>traction              |  |
| 1.2<br>8 | Role<br>(unnamed)<br>OtherSuperficialDepositP<br>olygon |  | 0 | 1 | OtherSuperfici<br>alDepositPolyg<br>on |  |
| 1.2<br>9 | Role<br>(unnamed)<br>ThicknessPolygon                   |  | 0 | 1 | ThicknessPoly<br>gon                   |  |
| 1.3<br>0 | Role<br>(unnamed)<br>DepositionRateSurface              |  | 0 | 1 | DepositionRat<br>eSurface              |  |
| 1.3<br>1 | Role<br>(unnamed)<br>SeafloorTypeHardness               |  | 0 | 1 | SeafloorTypeH<br>ardness               |  |
| 1.3<br>2 | Role<br>(unnamed)<br>ShallowGasArea                     |  | 0 | 1 | ShallowGasAr<br>ea                     |  |
| 1.3      | Role                                                    |  | 0 | 1 | GrainSizePoly                          |  |

|          |                                                                |  |   |   |                                               |  |
|----------|----------------------------------------------------------------|--|---|---|-----------------------------------------------|--|
| 3        | (unnamed)<br>GrainSizePolygon                                  |  |   |   | gon                                           |  |
| 1.3<br>4 | Role<br>(unnamed)<br>SuperficialDepositSurface<br>Form         |  | 0 | 1 | SuperficialDep<br>ositSurfaceFor<br>m         |  |
| 1.3<br>5 | Role<br>(unnamed)<br>MarineGeolUnit                            |  | 0 | 1 | MarineGeolUni<br>t                            |  |
| 1.3<br>6 | Role<br>(unnamed)<br>OceanDepthSurface                         |  | 0 | 1 | OceanDepthS<br>urface                         |  |
| 1.3<br>7 | Role<br>(unnamed)<br>SuperficialDepositPolygo<br>nSubordinate  |  | 0 | 1 | SuperficialDep<br>ositPolygonSu<br>bordinate  |  |
| 1.3<br>8 | Role<br>(unnamed)<br>GeochemicallyInterpSurfa<br>ce            |  | 0 | 1 | Geochemically<br>InterpSurface                |  |
| 1.3<br>9 | Role<br>(unnamed)<br>GeochSampleTakenArea                      |  | 0 | 1 | GeochSample<br>TakenArea                      |  |
| 1.4<br>0 | Role<br>(unnamed)<br>GeochemicalAnomalyAre<br>a                |  | 0 | 1 | GeochemicalA<br>nomalyArea                    |  |
| 1.4<br>1 | Role<br>(unnamed)<br>GeophysicallyInterpreted<br>Surface       |  | 0 | 1 | GeophysicallyI<br>nterpretedSurf<br>ace       |  |
| 1.4<br>2 | Role<br>(unnamed)<br>GeophysicalMeasArea                       |  | 0 | 1 | GeophysicalM<br>easArea                       |  |
| 1.4<br>3 | Role<br>(unnamed)<br>GeoConservationWorthy<br>Area             |  | 0 | 1 | GeoConservati<br>onWorthyArea                 |  |
| 1.4<br>4 | Role<br>(unnamed)<br>GeoConservationWorthy<br>Obj              |  | 0 | 1 | GeoConservati<br>onWorthyObj                  |  |
| 1.4<br>5 | Role<br>(unnamed)<br>PotentialAvalancheLandsl<br>ideHazardArea |  | 0 | 1 | PotentialAvala<br>ncheLandslide<br>HazardArea |  |
| 1.4<br>6 | Role<br>(unnamed)<br>RunoutAreaBoundary                        |  | 0 | 1 | RunoutAreaBo<br>undary                        |  |
| 1.4<br>7 | Role<br>(unnamed)<br>AvalancheLandslideObsH<br>istorical       |  | 0 | 1 | AvalancheLan<br>dslideObsHisto<br>rical       |  |
| 1.4<br>8 | Role<br>(unnamed)                                              |  | 0 | 1 | AvalancheLan<br>dslideObsPrehi                |  |

|          |                                  |  |   |   |             |  |
|----------|----------------------------------|--|---|---|-------------|--|
|          | AvalancheLandslideObsPrehistoric |  |   |   | storic      |  |
| 1.4<br>9 | Role<br>(unnamed) TsunamiArea    |  | 0 | 1 | TsunamiArea |  |
|          | Role<br>(unnamed) RunoutArea     |  | 0 | 1 | RunoutArea  |  |



## 1.2.2 CodeLists

### 1.2.2.1 <<CodeList>> GeologicAge

| Nr   | Code name                    | Definition/Description                                                                                                                                             | Code |
|------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1    | CodeList<br>GeologicAge      | the age of a rock tells how long ago it was formed. Name of geological period/epoch for the period of time in which a geological stratigraphic sequence was formed |      |
| 1.1  | Subatlantic                  | FF-present - 2500 C14 years BP                                                                                                                                     | 1    |
| 1.2  | Late Holocene                | FF-present - 2500 C14 years BP                                                                                                                                     | 5    |
| 1.3  | Sub-Boreal                   | FF-2500 - 5000 C14 years BP                                                                                                                                        | 10   |
| 1.4  | Atlantic                     | FF-5000 - 8000 C14 years BP                                                                                                                                        | 15   |
| 1.5  | Middle Holocene              | FF-2500 - 8000 C14 years BP                                                                                                                                        | 20   |
| 1.6  | Boreal                       | FF-8000 - 9000 C14 years BP                                                                                                                                        | 25   |
| 1.7  | Pre-Boreal                   | FF-9000 - 10000 C14 years BP                                                                                                                                       | 30   |
| 1.8  | Early Holocene               | FF-8000 – 10000 C14 years BP                                                                                                                                       | 35   |
| 1.9  | Holocene                     | FF-present – 10000 years BP                                                                                                                                        | 40   |
| 1.10 | Younger Dryas                | FF-10000 – 11000 C14 years BP                                                                                                                                      | 45   |
| 1.11 | Allerød                      | FF-11000 – 12000 C14 years BP                                                                                                                                      | 50   |
| 1.12 | Elder Dryas                  | FF-12000 – 12200 C14 years BP                                                                                                                                      | 55   |
| 1.13 | Bølling                      | FF-12000 – 13000 C14 years BP                                                                                                                                      | 60   |
| 1.14 | Late Weichsel, C14 yearBP    | 10000 - 24000 C14 år BP                                                                                                                                            | 65   |
| 1.15 | Late Weichsel, calender year | 11500 - 27000 Kalenderår BP                                                                                                                                        | 70   |
| 1.16 | Middle Weichselian           | FF-27000 – 74000 calendar years BP                                                                                                                                 | 75   |
| 1.17 | Early Weichselian            | FF-74000 – 117000 calendar years BP                                                                                                                                | 80   |
| 1.18 | Weichselian                  | FF-11500 – 117000 calendar years BP                                                                                                                                | 85   |
| 1.19 | Eemian                       | FF-117000 – 130000 calendar years BP                                                                                                                               | 90   |
| 1.20 | Late Pleistocene             | FF-11500 – 130000 calendar years BP                                                                                                                                | 95   |
| 1.21 | Saalian (Drenthe)            | FF-0.13 – 0.19 million years BP                                                                                                                                    | 100  |
| 1.22 | Wacken                       | FF-0.19 – 0.25 million years BP                                                                                                                                    | 105  |
| 1.23 | Fuhne                        | FF-0.25 – 0.30 million years BP                                                                                                                                    | 110  |
| 1.24 | Reinsdorf                    | FF-0.30 – 0.34 million years BP                                                                                                                                    | 115  |
| 1.25 | Cool phase                   | FF-0.34 – 0.35 million years BP                                                                                                                                    | 120  |
| 1.26 | Holstein                     | FF-0.35 – 0.43 million years BP                                                                                                                                    | 125  |
| 1.27 | Elster 1, 2 and 3            | FF-0.43 – 0.56 million years BP                                                                                                                                    | 130  |
| 1.28 | Cromerian                    | FF-0.56 – 0.73 million years BP                                                                                                                                    | 135  |

|      |                    |                                        |     |
|------|--------------------|----------------------------------------|-----|
| 1.29 | Middle Pleistocene | FF-0.13 – 0.73 million years BP        | 140 |
| 1.30 | Bavelian           | FF-0.73 – approx. 1.0 million years BP | 145 |
| 1.31 | Menapian           | FF-1.0 – 1.1 million years BP          | 150 |
| 1.32 | Waalian            | FF-1.1 – 1.3 million years BP          | 155 |
| 1.33 | Eburonian          | FF-1.3 – 1.7 million years BP          | 160 |
| 1.34 | Tiglian            | FF-1.7 – 2.2 million years BP          | 165 |
| 1.35 | Praetiglian        | FF-2.2 – 2.5 million years BP          | 170 |
| 1.36 | Early Pleistocene  | FF-0.73 – 2.5 million years BP         | 175 |
| 1.37 | Pleistocene        | FF-0.01 – 2.5 million years BP         | 180 |
| 1.38 | QUATERNARY         | FF-present – 2.5 million years BP      | 200 |
| 1.39 | Piacenzian         | FF-1.64 - 3.6 million years BP         | 205 |
| 1.40 | Late Pliocene      | FF-1.64 - 3.6 million years BP         | 210 |
| 1.41 | Zanclean           | FF-3.6 - 5.3 million years BP          | 215 |
| 1.42 | Early Pliocene     | FF-3.4 - 5.3 million years BP          | 220 |
| 1.43 | PLIOCENE           | FF-1.64 - 5.5 million years BP         | 225 |
| 1.44 | Messinian          | FF-5.3 - 7.1 million years BP          | 230 |
| 1.45 | Tortonian          | FF-7.1 - 11.2 million years BP         | 235 |
| 1.46 | Late Miocene       | FF-5.3 - 11.2 million years BP         | 240 |
| 1.47 | Serravallian       | FF-11.2 - 14.8 million years BP        | 245 |
| 1.48 | Middle Miocene     | FF-11.2 - 16.4 million years BP        | 250 |
| 1.49 | Langhian           | 13.8 - 16 million years BP             | 255 |
| 1.50 | Burdigalian        | 16 - 20 million years BP               | 260 |
| 1.51 | Aquitanian         | FF-20.5 - 23.8 million years BP        | 265 |
| 1.52 | Early Miocene      | FF-16.4 - 23.8 million years BP        | 270 |
| 1.53 | MIOCENE            | FF-5.3 - 23.8 million years BP         | 275 |
| 1.54 | NEOGENE            | FF-1.8 - 23.8 million years BP         | 280 |
| 1.55 | Chattian           | FF-23.8 - 28.5 million years BP        | 285 |
| 1.56 | Late Oligocene     | FF-23.8 - 28.5 million years BP        | 290 |
| 1.57 | Rupelian           | FF-28.5 - 33.7 million years BP        | 295 |
| 1.58 | Early Oligocene    | FF-28.5 - 33.7 million years BP        | 300 |
| 1.59 | OLIGOCENE          | FF-23.8 - 33.7 million years BP        | 305 |
| 1.60 | Priabonian         | FF-33.7 - 37.0 million years BP        | 310 |
| 1.61 | Late Eocene        | FF-33.7 - 37.0 million years BP        | 315 |
| 1.62 | Bartonian          | 37.0 - 41.3 million years BP           | 320 |
| 1.63 | Lutetian           | FF-41.3 - 49.0 million years BP        | 325 |

|      |                  |                                   |     |
|------|------------------|-----------------------------------|-----|
| 1.64 | Middle Eocene    | FF-37.0 - 49.0 million years BP   | 330 |
| 1.65 | Ypresian         | FF-49.0 - 54.8 million years BP   | 335 |
| 1.66 | Early Eocene     | FF-49.0 - 54.8 million years BP   | 340 |
| 1.67 | EOCENE           | FF-33.7 - 54.8 million years BP   | 345 |
| 1.68 | Thanetian        | FF-54.8 - 57.9 million years BP   | 350 |
| 1.69 | Selandian        | FF-57.9 - 61.0 million years BP   | 355 |
| 1.70 | Late Paleocene   | 54.8 - 65.5 million years BP      | 360 |
| 1.71 | Danian           | FF-61.0 - 65.0 million years BP   | 365 |
| 1.72 | Early Paleocene  | FF-61.0 - 65.0 million years BP   | 370 |
| 1.73 | PALEOCENE        | FF-54.8 - 65 million years BP     | 375 |
| 1.74 | Paleogene        | FF-23.8 - 65 million years BP     | 380 |
| 1.75 | TERTIARY         | FF-1.8 - 65 million years BP      | 385 |
| 1.76 | CENOZOIC         | FF-0.01 - 65.0 million years BP   | 390 |
| 1.77 | Maastrichtian    | FF-65.0 - 71.3 million years BP   | 395 |
| 1.78 | Campanian        | FF-71.3 - 83.5 million years BP   | 400 |
| 1.79 | Santonian        | FF-83.5 - 85.8 million years BP   | 405 |
| 1.80 | Coniacian        | FF-85.8 - 89.0 million years BP   | 410 |
| 1.81 | Turonian         | FF-89.0 - 93.5 million years BP   | 415 |
| 1.82 | Cenomanian       | FF-93.5 - 98.9 million years BP   | 420 |
| 1.83 | Late Cretaceous  | FF-65.0 - 98.9 million years BP   | 425 |
| 1.84 | Albian           | FF-98.9 - 112.2 million years BP  | 430 |
| 1.85 | Aptian           | FF-112.2 - 121 million years BP   | 435 |
| 1.86 | Barremian        | FF-121 - 127 million years BP     | 440 |
| 1.87 | Hauterivian      | FF-127 - 132 million years BP     | 445 |
| 1.88 | Valanginian      | FF-132 - 136.5 million years BP   | 450 |
| 1.89 | Ryazan           | FF-136.5 - 142 million years BP   | 455 |
| 1.90 | Early Cretaceous | FF-98.9 - 142 million years BP    | 460 |
| 1.91 | CRETACEOUS       | FF-65 - 142 million years BP      | 465 |
| 1.92 | Kimmeridgian     | FF-150.7 - 154.1 million years BP | 475 |
| 1.93 | Oxfordian        | FF-154.1 - 159.4 million years BP | 480 |
| 1.94 | Late Jurassic    | FF-142.0 - 159.4 million years BP | 485 |
| 1.95 | Callovian        | FF-159.4 - 164.4 million years BP | 490 |
| 1.96 | Bathonian        | FF-164.4 - 169.2 million years BP | 495 |
| 1.97 | Bajocian         | 167.7 - 171.6 million years BP    | 500 |
| 1.98 | Aalenian         | 171.6 - 175.6 million years BP    | 505 |

|       |                              |                                                                  |     |
|-------|------------------------------|------------------------------------------------------------------|-----|
| 1.99  | Middle Jurassic              | FF-159.4 - 180.1 million years BP                                | 510 |
| 1.100 | Toarcian                     | FF-180.1 - 189.6 million years BP                                | 515 |
| 1.101 | Pliensbachian                | 183 - 189.6 million years BP                                     | 520 |
| 1.102 | Sinemurian                   | FF-195.3 - 201.9 million years BP                                | 525 |
| 1.103 | Hettangian                   | FF-201.9 - 205.7 million years BP                                | 530 |
| 1.104 | Early Jurassic               | FF-180.1 - 205.7 million years BP                                | 535 |
| 1.105 | JURASSIC                     | FF-142 - 205.7 million years BP                                  | 540 |
| 1.106 | Rhaetian                     | FF-205.7 - 209.6 million years BP                                | 545 |
| 1.107 | Norian                       | FF-209.6 - 220.7 million years BP                                | 550 |
| 1.108 | Carnian                      | FF-220.7 - 227.4 million years BP                                | 555 |
| 1.109 | Late Triassic                | FF-205.7 - 227.4 million years BP                                | 560 |
| 1.110 | Ladinian                     | FF-227.4 - 234.3 million years BP                                | 565 |
| 1.111 | Anisian                      | FF-234.3 - 241.7 million years BP                                | 570 |
| 1.112 | Middle Triassic              | FF-227.4 - 241.7 million years BP                                | 575 |
| 1.113 | Olenekian                    | FF-241.7 - 244.8 million years BP                                | 580 |
| 1.114 | Induan                       | FF-244.8 - 248.2 million years BP                                | 585 |
| 1.115 | Early Triassic               | FF-241.7 - 248.2 million years BP                                | 590 |
| 1.116 | TRIASSIC                     | FF-205.7 - 248.2 million years BP                                | 595 |
| 1.117 | MESOZOIC                     | FF-65.0 - 248.2 million years BP                                 | 600 |
| 1.118 | Tatarian                     | 248.2 - 252.1 million years BP Unit name abandoned, see ICS 2004 | 605 |
| 1.119 | Ufimian-Kazanian             | 252.1 - 256.0 million years BP Unit name abandoned, see ICS 2004 | 610 |
| 1.120 | Late Permian                 | FF-248.2 - 256.0 million years BP                                | 615 |
| 1.121 | Kungurian                    | 256 - 260 million years BP Unit name abandoned, see ICS 2004     | 620 |
| 1.122 | Artinskian                   | 260 - 269 million years BP Unit name abandoned, see ICS 2004     | 625 |
| 1.123 | Sakmarian                    | 284.4 - 294.6 million years BP                                   | 630 |
| 1.124 | Asselian                     | FF-282 - 290 million years BP                                    | 635 |
| 1.125 | Early Permian                | 270 - 299 million years BP                                       | 640 |
| 1.126 | PERMIAN                      | FF-248.5 - 290.0 million years BP                                | 645 |
| 1.127 | Gzhelian                     | FF-290.0 - 296.5 million years BP                                | 650 |
| 1.128 | Kasimovian                   | FF-296.5 - 303 million years BP                                  | 655 |
| 1.129 | Moscovian                    | FF-303 - 311 million years BP                                    | 660 |
| 1.130 | Bashkirian                   | FF-311 - 323 million years BP                                    | 665 |
| 1.131 | Carboniferous, Pennsylvanian | FF-290 - 323 million years BP                                    | 670 |
| 1.132 | Serpukhovian                 | FF-323 - 327 million years BP                                    | 675 |
| 1.133 | Viséan                       | FF-327 - 342 million years BP                                    | 680 |

|       |                              |                                                              |     |
|-------|------------------------------|--------------------------------------------------------------|-----|
| 1.134 | Tournaisian                  | 345.3 - 359.2 million years BP                               | 685 |
| 1.135 | Carboniferous, Mississippian | FF-323 - 354 million years BP                                | 690 |
| 1.136 | CARBONIFEROUS                | FF-290 - 354 million years BP                                | 695 |
| 1.137 | Famennian                    | FF-354 - 364 million years BP                                | 700 |
| 1.138 | Frasnian                     | FF-364 - 370 million years BP                                | 705 |
| 1.139 | Late Devonian                | FF-254 - 370 million years BP                                | 710 |
| 1.140 | Givetian                     | FF-370 - 380 million years BP                                | 715 |
| 1.141 | Eifelian                     | FF-380 - 391 million years BP                                | 720 |
| 1.142 | Middle Devonian              | FF-370 - 391 million years BP                                | 725 |
| 1.143 | Emsian                       | FF-391 - 400 million years BP                                | 730 |
| 1.144 | Pragian                      | FF-400 - 412 million years BP                                | 735 |
| 1.145 | Lochkovian                   | FF-412 - 417 million years BP                                | 740 |
| 1.146 | Early Devonian               | FF-391 - 417 million years BP                                | 745 |
| 1.147 | DEVONIAN                     | FF-354 - 417 million years BP                                | 750 |
| 1.148 | Pridoli                      | FF-417 - 419 million years BP                                | 755 |
| 1.149 | Ludlow                       | FF-419 - 423 million years BP                                | 760 |
| 1.150 | Late Silurian                | FF-417 - 423 million years BP                                | 765 |
| 1.151 | Wenlock                      | FF-423 - 428 million years BP                                | 770 |
| 1.152 | Llandovery                   | FF-428 - 443 million years BP                                | 775 |
| 1.153 | Early Silurian               | FF-428 - 443 million years BP                                | 780 |
| 1.154 | SILURIAN                     | FF-417 - 443 million years BP                                | 785 |
| 1.155 | Ashgill                      | 443 - 449 million years BP Unit name abandoned, see ICS 2004 | 790 |
| 1.156 | Caradocian                   | 449 - 458 million years BP Unit name abandoned, see ICS 2004 | 795 |
| 1.157 | Late Ordovician              | FF-443 - 458 million years BP                                | 800 |
| 1.158 | Llandeilo (now Darriwilian?) | 458 - 464 million years BP Unit name abandoned, see ICS 2004 | 805 |
| 1.159 | Llanvirn (now Dapingian?)    | 464 - 470 million years BP Unit name abandoned, see ICS 2004 | 810 |
| 1.160 | Middle Ordovician            | 458 - 470 million years BP                                   | 815 |
| 1.161 | Arenig                       | 470 - 485 million years BP Unit name abandoned, see ICS 2004 | 820 |
| 1.162 | Tremadocian                  | FF-485 - 495 million years BP                                | 825 |
| 1.163 | Early Ordovician             | FF-470 - 495 million years BP                                | 830 |
| 1.164 | ORDOVICIAN                   | FF-443 - 495 million years BP                                | 835 |
| 1.165 | Late Cambrian                | FF-495 - 505 million years BP                                | 840 |
| 1.166 | Middle Cambrian              | FF-505 - 518 million years BP                                | 845 |
| 1.167 | Lenian                       | 518 - 524 million years BP Unit name abandoned, see ICS 2004 | 850 |
| 1.168 | Atdabanian                   | 524 - 530 million years BP Unit name abandoned, see ICS 2004 | 855 |

|       |                   |                                 |     |
|-------|-------------------|---------------------------------|-----|
| 1.169 | Tommotian         | FF-530 - 534 million years BP   | 860 |
| 1.170 | Nemakit-Daldynian | FF-534 - 545 million years BP   | 865 |
| 1.171 | Early Cambrian    | FF-518 - 545 million years BP   | 870 |
| 1.172 | CAMBRIAN          | FF-495 - 545 million years BP   | 875 |
| 1.173 | PALEOZOIC         | FF-248.5 - 545 million years BP | 880 |
| 1.174 | VENDIAN           | FF-545 - 650 million years BP   | 885 |
| 1.175 | Late Riphean      | FF-650 - 1000 million years BP  | 890 |
| 1.176 | Neoproterozoic    | FF-545 - 1000 million years BP  | 895 |
| 1.177 | Middle Riphean    | FF-1000 - 1400 million years BP | 900 |
| 1.178 | Paleo proterozoic | 1600 - 2500 million years       | 905 |
| 1.179 | RIPHEAN           | 650 - 1600 million years BP     | 910 |
| 1.180 | Mesoproterozoic   | 1000 - 1600 million years BP    | 915 |
| 1.181 | Early Archean     | FF-3400 - 4000 million years BP | 920 |
| 1.182 | ARCHEAN           | FF-2500 - 4000 million years BP | 925 |
| 1.183 | PRISCOAN          | FF-4000 - 4500 million years BP | 930 |
| 1.184 | PRECAMBRIAN       | FF-545 - 4500 million years BP  | 935 |

### 1.2.2.2 <<CodeList>> TypeOfGeolFindings

| Nr  | Code name                                               | Definition/Description                                                                                                                                                                            | Code |
|-----|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 2   | CodeList<br>TypeOfGeolFindings                          | with what certainty a geological object has been identified in the terrain, or on which method the identification/registration is based                                                           |      |
| 2.1 | Not specified                                           |                                                                                                                                                                                                   | 0    |
| 2.2 | Certain identification/observation                      | FF-The delimitation or registration of the object has been identified or observed in the field                                                                                                    | 1    |
| 2.3 | Uncertain identification/observation                    | FF-Not identified/observed, presumed delimitation/registration of object                                                                                                                          | 2    |
| 2.4 | Constructed/construed delimitation/boundary             | Randomly placed delimitation; very uncertain. Is used for example sub-sea or under glacier surfaces                                                                                               | 3    |
| 2.5 | Geophysically interpreted boundary                      | FF-Delimitation based upon geophysical indications                                                                                                                                                | 4    |
| 2.6 | Delimitation with poor visibility in the terrain        | FF-Based upon generalised interpretation of objects with small mutual variations (e.g., the distinction between a thin humus covering and exposed rock, or between two very similar types of rock | 5    |
| 2.7 | Transitional boundary                                   | FF-Where there is a gradual transition between two types of rock, soil types, etc.                                                                                                                | 6    |
| 2.8 | Interpreted delimitation/registration                   | Delimitations of geological objects or parts of objects which have emerged through generalisation, ??(combined interpretation/interpretive combination) or aggregation                            | 7    |
| 2.9 | Object or part of object interpreted from aerial photos |                                                                                                                                                                                                   | 8    |

|      |                                                                                                 |                                                                                                       |    |
|------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----|
| 2.10 | Observation with uncertain geographic location                                                  |                                                                                                       | 9  |
| 2.11 | Delimitation not based upon geology                                                             | Der f.eks. en administrativ grense eller kystkontur har bidratt til avgrensing av et geologisk objekt | 10 |
| 2.12 | Delimitation based upon/bounded by sampling                                                     |                                                                                                       | 21 |
| 2.13 | Delimitation based upon/bounded by seismic data                                                 |                                                                                                       | 22 |
| 2.14 | Delimitation based upon/bounded by detailed depth data                                          | Delimitation by using a multi-beam echo sounder and/or interferometric sonar                          | 23 |
| 2.15 | Delimitation based upon/bounded by backscatter data/side scan sonar                             |                                                                                                       | 24 |
| 2.16 | Delimitation based upon/bounded by sampling and acoustic data/methods                           |                                                                                                       | 25 |
| 2.17 | Delimitation based upon/bounded by acoustic data/methods                                        |                                                                                                       | 26 |
| 2.18 | Delimitation based upon/bounded by more than one method/data types                              |                                                                                                       | 27 |
| 2.19 | Delimitation based upon/bounded by underwater still photography and/or video                    |                                                                                                       | 28 |
| 2.20 | Delimitation based upon/bounded by acoustic data/methods verified by sampling, photography, etc |                                                                                                       | 29 |

### 1.2.2.3 <<CodeList>> DatingMethod

| Nr  | Code name                | Definition/Description                                                              | Code |
|-----|--------------------------|-------------------------------------------------------------------------------------|------|
| 3   | CodeList<br>DatingMethod | method used to determine the age of rocks, sediments, minerals and organic material |      |
| 3.1 | Uspesifisert             |                                                                                     | 1    |
| 3.2 | Ar40/Ar39                | The argon/argon method                                                              | 10   |
| 3.3 | K/Ar                     | The potassium/argon method                                                          | 11   |
| 3.4 | Os/Re                    | The osmium/renium method                                                            | 12   |
| 3.5 | Pb/Pb                    | The lead/lead method                                                                | 13   |
| 3.6 | Rb/Sr                    | The rubidium/strontium method                                                       | 14   |

|      |                    |                                                                                                                |    |
|------|--------------------|----------------------------------------------------------------------------------------------------------------|----|
| 3.7  | Sm/Nd              | The samarium/neodymium method                                                                                  | 15 |
| 3.8  | U/Pb               | The uranium/lead method                                                                                        | 16 |
| 3.9  | U/Th               | The uranium/thorium method                                                                                     | 17 |
| 3.10 | <sup>14</sup> C    | <sup>14</sup> C dating (radiocarbon dating)                                                                    | 18 |
| 3.11 | Cs137              | The cesium-137 method                                                                                          | 19 |
| 3.12 | Pb210              | The lead-210 method                                                                                            | 20 |
| 3.13 | Fission track      | Dating by the fact that radioactive minerals decay and produce fission tracks in surrounding minerals/material | 30 |
| 3.14 | Fossil             | Lead fossil                                                                                                    | 40 |
| 3.15 | Biostratigraphy    | Dating by means of fossils                                                                                     | 41 |
| 3.16 | Paleomag           | Paleomagnetism                                                                                                 | 50 |
| 3.17 | Thermoluminescence | Dating based upon measurement of flaws in the lattice structure of the crystals                                | 60 |
| 3.18 | OSL                | Optically stimulated luminescence                                                                              | 70 |
| 3.19 | Tephrochronology   |                                                                                                                | 80 |

#### 1.2.2.4 <<CodeList>> GeolThematicAdjustment

| Nr  | Code name                          | Definition/Description                                                                      | Code |
|-----|------------------------------------|---------------------------------------------------------------------------------------------|------|
| 4   | CodeList<br>GeolThematicAdjustment | adjustment/change of an automatic classification of geological ??themes/topics              |      |
| 4.1 | Non-adjusted themes                | There are derived themes in accordance with standard classification of main theme           | 0    |
| 4.2 | Adjusted themes                    | FF-Derived theme has been adjusted in accordance with standard classification of main theme | 1    |

#### 1.2.2.5 <<CodeList>> GeolValueAssessment

| Nr  | Code name                             | Definition/Description                                                                                                    | Code |
|-----|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------|
| 5   | CodeList<br>GeolValueAssessment       | how important a geological resource or registration is with a view to potential economic utilisation now or in the future |      |
| 5.1 | Very important occurrence             |                                                                                                                           | 1    |
| 5.2 | Important occurrence                  |                                                                                                                           | 2    |
| 5.3 | Parts of the occurrence are important |                                                                                                                           | 3    |
| 5.4 | The whole or parts may be important   |                                                                                                                           | 4    |
| 5.5 | Of little importance                  |                                                                                                                           | 5    |
| 5.6 | Not assessed/classified               |                                                                                                                           | 6    |

**1.2.2.6 <<CodeList>> ThematicQuality**

| Nr  | Code name                                                                                        | Definition/Description                                                                                                                                                                                                                                                                                                                        | Code         |
|-----|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 6   | CodeList<br>ThematicQuality                                                                      | the quality of the registration mapping of a geological thematic subject) validated in relation to the actual conditions in nature,, position accuracy and . the preferred scale of the cartographic representation.                                                                                                                          |              |
| 6.1 | Highest possible positional and thematic accuracy                                                | The geological observation/registration is georeferenced with the highest possible positional and thematic accuracy for direct use in municipal development plans (Scale under 1:20.000)                                                                                                                                                      | Særdeles god |
| 6.2 | High positional and thematic accuracy, high resolution and little generalisation                 | Registration based upon what for nature information must be regarded as being of high positional and thematic accuracy (+/- 20 m) High resolution and little generalisation. Can be used in land use part of municipal master plan. The minimum unit of area is 0.05-0,1 hectare (~scale 1: 20.000)                                           | Meget god    |
| 6.3 | Good positional and thematic accuracy, good resolution but somewhat generalised                  | Registration georeferenced with accuracy in the terrain of +/- 50 m, acceptable for overview information at the municipal level (land use plans). The minimum unit of area is approx. 0.2 hectare for important themes, approx. 0.5 hectare for others (~scale 1:50.000)                                                                      | God          |
| 6.4 | Low positional and thematic accuracy, low resolution; generalisation                             | Registration with low resolution (+/- 100 m); generalisation has been performed, often based upon interpretation of aerial photos. The minimum unit of area rendered is approx. 1 hectare for important themes, approx. 2 hectares for the others. Can with reservations be used as overview information a municipal level (~scale 1:100.000) | Nokså god    |
| 6.5 | Very low positional and thematic accuracy; strongly generalised                                  | Intended for general maps at very small scales. Smallest unit of area is approx. 100 hectares. Area of application is land overview and overview of large regions (~scale > 1:250.000).                                                                                                                                                       | Noe dårlig   |
| 6.6 | Very low positional and thematic accuracy, very low resolution and generalised to a great degree | Registration based upon overview mapping at small scale. Very low resolution (+/- 250 m) and may contain a great degree of generalisation. The minimum unit of area is approx. 6 hectares. Should only be used for regional overviews (~scale 1:250.000)                                                                                      | Dårlig       |