Supplementary material 2 *Table B: Supplementation of ecosystem types (ETs) by more differentiated spatially and non-spatially explicit data (system of assignment of biotope and habitat types relevant for nature conservation to ETs*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Main EST** | **Sub EST** | **CLC code** | **CLC-class name** | **Habitat code** | **NATURA 2000 name / HNV farmland types** | **National habitat types by Mengel et al. 2018, Anlage 2[[1]](#endnote-1) used for valuation** |
| 1 Semi-natural open areas | * 1. Natural grassland and heathland | 321 | Natural grassland | 6110\* | Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi | Elements from:  34.01 - 34.07a Xeric, Semi-dry, Steppic, Dry sandy, Heavy-metal grassland, Mat-grass swards, Species-rich grassland on moist sites  35.02 Grassland on wet or damp sites  39.01, 03, 04 Forest and woodland vegetation, Clear-cutting and forest clearing vegetation, Riparian herbaceous fringes or vegetation  64. Snow accumulation areas and snowfield communities  66. Montane swards of the subalpine to alpine zones  67. Tall herbaceous communities of the high montane to alpine zones |
| 6120\* | Xeric sand calcareous grasslands |
| 6130\* | Calaminarian grasslands of the Violetalia calaminariae |
| 6150\* | Siliceous alpine and boreal grasslands |
| 6170\* | Alpine and subalpine calcareous grasslands |
| 6210\* | Semi-natural dry grasslands and scrubland facies on calcareous substrates |
| 6230\* | Species-rich Nardus grasslands, on silicious substrates in mountain areas |
| 6240\* | Sub-Pannonic steppic grasslands |
| 6410\* | Molinia meadows on calcareous, peaty or clayey-silt-laden soils |
| 6430\* | Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels |
| 6440\* | Alluvial meadows of river valleys of the Cnidion dubii |
| 6510\* | Lowland hay meadows |
| 6520\* | Mountain hay meadows |
| 322 | Moors and heathland | 2140 | Decalcified fixed dunes with Empetrum nigrum | Elements from:  10.04 ‚Brown‘ dunes (coastal dune heathland)  10.06 Dune scrubs  34.04 Dry sandy grassland  40. Dwarf-shrub heaths  41. Copses, thickets, scrub, hedges and cultivated woody plants  68. Dwarf-shrub heaths of the subalpine to alpine zones  69. Scrub communities of the sublalpine to alpine zones |
| 2150 | Atlantic decalcified fixed dunes |
| 2160 | Dunes with Hippophaë rhamnoides |
| 2170 | Dunes with Salix repens ssp. argentea |
| 2310 | Dry sand heaths with Calluna and Genista |
| 2320 | Dry sand heaths with Calluna and Empetrum nigrum |
| 2330 | Inland dunes withopen Corynephorus and Agrostis grasslands |
| 4010 | Northern Atlantic wet heaths with Erica tetralix |
| 4030 | European dry heaths |
| 4060 | Alpine and Boreal heaths |
| 4070 | Bushes with Pinus mugo and Rhododendron hirsutum |
| 4080 | Sub-Arctic Salix spp. scrub |
| 40A0 | Subcontinental peri-Pannonic scrub |
| 5110 | Stable xerothermophilous formations with Buxus sempervirens on rock slopes |
| 5130 | Juniperus communis formations on heaths or calcareous grasslands |
| HNV-H | Hedges, scrub including fringe vegetation, and copses |
| 1.2 Wetlands | 411 | Inland marshes | 1340 | Inland salt meadows | Elements from:  08.01 - 05 Salt marshes, brackish reedbeds and tall herb vegetation of the Baltic geolittoral coastal zone  22.01, 03 Seepage and marshy springs, Pooling springs  24.06 Saline inland waters  35.01 Fens and swamps free of woodland  37. Large sedge swamps  38. Reedbeds |
| 7210 | Calcareous fens with Cladium mariscus and species of the Caricion davallianae |
| 7220 | Petrifying springs with tufa formation |
| 7230 | Alkaline fens |
| 7240 | Alpine pioneer formations of the Caricion bicoloris-atrofuscae |
| HNV-S | Sedge and reedbeds, herbaceous waterbody fringes, wetland elements |
| 412 | Peatbogs | 7110 | Active raised bogs | 36.01 - 03a Raised bogs, transition mires and degeneration stages of raised bogs  65. Peatlands of the subalpine to alpine zones |
| 7120 | Degraded raised bogs still capable of natural regeneration |
| 7140 | Transition mires and quaking bogs |
| 7150 | Depressions on peat substrates of the Rhynchosporion |
| 421 | Coastal salt marshes | 1310 | Salicornia and other annuals colonizing mud and sand | 07.01 - 06 Salt marshes of the North Sea |
| 1320 | Spartina swards |
| 1330 | Atlantic salt meadows |
| 1.3 Open spaces with no or little vegetation | 331 | Beaches, dunes and sand plains | 1210 | Annual vegetation of drift lines | 09.02 - 05 Sands, sand, shingle and boulder beaches  10.01 - 03 Foredune, shifting dunes along the shoreline, fixed dunes with grassland  10.05 moist/wet dune valleys, including dune peatland  10.07 Mobile dunes |
| 1220 | Perennial vegetation of stony banks |
| 2110 | Embryonic shifting dunes |
| 2120 | Shifting dunes along the shoreline with Ammophila arenaria |
| 2130 | Fixed coastal dunes with herbaceous vegetation |
| 2190 | Humid dune slacks |
| 332 | Bare rock | 1230\* | Vegetated sea cliffs of the Atlantic and Baltic Coasts | Elements from:  11.01 - 04 Coastal cliffs  32. Rocks, inland cliffs, scree slopes, boulder fields and open areas with sandy or cohesive substrates  53n.11 Walls and stone cairns  62. Open rock of the subalpine to nival zones  63. Scree slopes and gravel banks of the subalpine to alpine zones |
| 8110\* | Siliceous scree of the montane to snow levels |
| 8120\* | Calcareous and calcshist screes of the montane to alpine levels |
| 8150\* | Medio-European upland siliceous screes |
| 8160\* | Medio-European calcareous scree of hill and montane levels |
| 8210\* | Calcareous rocky slopes with chasmophytic vegetation |
| 8220\* | Siliceous rocky slopes with chasmophytic vegetation |
| 8230\* | Siliceous rock with pioneer vegetation of the Sedo-Scleranthion or of the Sedo albi-Veronicion dillenii |
| 333 | Sparsely vegetated areas | 1230-8230\* | partly habitat types of CLC332\* |  |
| 335 | Glaciers and perpetual snow | 8340 | Permanent glaciers | 61. Firn, permanent snow fields and glaciers |
| 2 Forest and grove areas | 2.1 Forest | 311 | Broad-leaved forest | 9110 | Luzulo-Fagetum beech forests | 43. Deciduous and mixed woodlands and forest plantations  70.01 Subalpine sycamore-beech woodland |
| 9120 | Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer |
| 9130 | Asperulo-Fagetum beech forests |
| 9140 | Medio-European subalpine beechwoods with Acer and Rumex arifolius |
| 9150 | Medio-European limestone beechforests of the Cephalanthero-Fagion |
| 9160 | Sub-Atlantic oak-hornbeam forests |
| 9170 | Galio-Carpinetum oak-hornbeam forests |
| 9180 | Tilio-Acerion forests of slopes, screes and ravines |
| 9190 | Old acidophilous oak woods with Quercus robur on sandy plains |
| 91E0 | Alluvial forests with Alnus glutinosa and Fraxinus excelsior |
| 91F0 | Riparian mixed forests of Quercus robur, Ulmus laevis and Ulmus minor, Fraxinus excelsior or Fraxinus angustifolia, along the great rivers |
| 91G0 | Pannonic woods with Quercus petraea and Carpinus betulus |
| 312 | Coniferous forest | 91D0 | Bog woodland | 44. Coniferous woodlands and forest plantations  70.02 - 70.04 Subalpine spruce, larch-Swiss stone pine and larch woodlands |
| 91T0 | Central European lichen Scots pine forests |
| 91U0 | Sarmatic steppe pine forest |
| 9410 | Acidophilous Picea forests of the montane to alpine levels |
| 9420 | Alpine Larix decidua and/or Pinus cembra forests |
| 313 | Mixed forest | 2180 | Wooded dunes of the Atlantic, Continental and Boreal region | 43. Deciduous and mixed woodlands and forest plantations  44. Coniferous woodlands and forest plantations  70 Subalpine woodlands |
| 8110-8230\* | partly habitat types of CLC 332\* |
| 2.2 Grove | 324 | Transitional woodland/shrub |  |  |  |
| 3 Agricultural land | 3.1 Arable land | 211 | Non-irrigated arable land | HNV-Ac | Arable land | 33. Arable land and fallow land  41.07 Tree and hop plantations |
| HNV-Br | Set aside (from arable land) |
| 221 | Vineyards | HNV-Re | Vineyards | 41.08.01 - 02 Vineyards and fallow vineyards |
| 222 | Fruit tree and berry plantations | HNV-Ob | Orchards | 41.06 Sparse orchard  41.07 Tree and hop plantations |
| 3.2 Grassland | 231 | Pasture, meadows and other permanent grasslands under agricultural use | HNV-Gr | Grassland | Elements from:  23.05 Water courses of technical nature  34. Dry grasslands and grasslands of dry to humid sites  35. Grasslands of moist to wet sites  39.03 - 06 Riparian herbaceous fringes or vegetation and ruderal sites  41. Copses, thickets, scrub, hedges and cultivated woody plants |
| HNV-Br | Set aside (from grassland) |
| HNV-R | Ruderal and herbaceous plots and fringes, including tall herbaceous perennials and tall grasses |
| HNV-K | Complex elements |
| HNV-N | Natural stone and other dry stone walls, stone, rock, sand, clay and loess walls |
| 6110- 6520\* | partly habitat types of CLC 321 or CLC 332\* |
| 3.3 Heterogeneous agricultural area | 242 | Complex cultivation patterns | [[2]](#endnote-2) |  |  |
| 243 | Land principally occupied by agriculture, with significant areas of natural vegetation | [[3]](#endnote-3) |  |  |
| 4 Water | 4.1 Streams | 511 | Water courses | 3220 | Alpine rivers and the herbaceous vegetation along their banks | 23. Surface running waters  60.01 - 02 Springs and running waters of the subalpine to alpine zones |
| 3230 | Alpine rivers and their ligneous vegetation with Myricaria germanica |
| 3240 | Alpine rivers and their ligneous vegetation with Salix elaeagnos |
| 3260 | Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation |
| 3270 | Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation |
| HNV-G | Ditches, standing and flowing |
| HNV-W | Waterways, springs, streams including associated alder and ash woodlands up to 5 m breadth |
| 4.2 Inland water bodies | 512 | Water bodies | 3110 | Oligotrophic waters containing very few minerals of sandy plains | Elements from:  22. Springs including the headstream zone  24. Surface standing waters  60.03 Standing waters of the subalpine to alpine zones |
| 3130 | Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea |
| 3140 | Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. |
| 3150 | Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation |
| 3160 | Natural dystrophic lakes and ponds |
| 3180 | Turloughs |
| 3190 | Lakes of gypsum karst |
| HNV-T | Pools, ponds and weirs, eutrophied oxbows up to 1 ha size |
| 4.3 Marine waters | 521 | Coastal lagoons | 1150 | Coastal lagoons | 04. Baltic Sea pelagic zone |
| 1130\* | partly habitat types of CLC522 |
| 522 | Estuaries | 1130\* | Estuaries | 05. Baltic Sea benthic zone  06. Baltic Sea seasonal marine ice  07. and 08. Salt marshes, brackish reedbeds and tall vegetation of the North Sea and the Baltic Sea  09. Sands, sand, shingle and boulder beaches |
| 523 | Sea and ocean | 1110 | Sandbanks which are slightly covered by sea water all the time | Elements from:  01. to 04. North Sea and Baltic Sea pelagic and sublittoral benthic zones |
| 1160 | Large shallow inlets and bays |
| 1170 | Reefs |
| 1140\* | partly habitat types of CLC523 |
| 423 | Intertidal flats | 1140\* | Mudflats and sandflats not covered by seawater at low tide | 02.01 North Sea eulittoral benthic zone (intertidal flats) |
| 5 Settlement and artificial  modified areas | 5.1 Buildings and transportation area | 111 | Continuous urban fabric |  |  | Elements from:  53n.03.01 - 02, 53n.04.01 - 02 Historic city centre, modern city centre, inner city block development |
| 112 | Discontinuous urban fabric |  |  | Elements from:  53n.04.03 - 53.07n Linear development, high rise buildings, villa district, row houses, new developments, village areas |
| 121 | Industrial and commercial units |  |  | 53n.09, 53n.10 Industrial and commercial units, Supply and waste management |
| 122 | Road and rail networks and associated land | HNV-U | Unsurfaced farm lanes/sunken lanes | Elements from:  52. Transport infrastructure and town squares |
| 123 | Port areas |  |  | 52.04.02 Port facilities, quais |
| 124 | Airports |  |  | 52.01.01, 52.01.08n.03 sealed traffic route, well-managed functional grassland |
| 133 | Construction sites |  |  |  |
| 5.2 Mining and dump sites | 131 | Mineral extraction sites |  |  | 32.11.04 - 32.11.08.n mineral workings  36.04 peat workings |
| 132 | Dump sites |  |  | 32.11.01 - 03 + 05 spoil heaps  54. Landfill sites and wastewater wetlands |
| 5.3 Urban vegetated areas | 141 | Green urban area |  |  | Elements from:  51.06n, 51.07n Park and green space |
| 142 | Sport and leisure facilities |  |  | 51.11n sports grounds, playgrounds, recreation areas |

\* Some CLC-types contain less area (regarding the LBM-DE statistics) than the allocated habitats. In such cases, the overmuch area is allocated partially to other CLC types: The overmuch area of CLC 321 (natural grasslands) comes to CLC 231 (pastures, meadows ...); the overmuch area of CLC 423 (intertidal flats) comes to CLC 523 (sea and ocean); the overmuch area of CLC 522 comes to CLC 521. The overmuch area of CLC 332 (bare rock) comes partially to CLC 333 (sparsely vegetated areas); but there are some more area remaining, which will be allocated to CLC 31x (woods and forest).   
The aim is, to find a habitats’ combination for each CLC type that approximates its real composition. The nature conservation values of the allocated NATURA 2000, HNV or national habitat types contribute to the total value of the respecting CLC type. They remain applicable for the ecosystem accounting (e.g. for the condition account) as well.

1. Mengel et al. (2018): Methodik der Eingriffsregelung im bundesweiten Vergleich. Bonn – Bad Godesberg (Bundesamt für Naturschutz) Naturschutz und Biologische Vielfalt Heft 165. [↑](#endnote-ref-1)
2. Zu dieser Kategorie erfolgt keine Zuordnung von HNV- FFH- oder Biotoptypen, weil LBM-DE aktuell keine Flächen in Deutschland ausweist [↑](#endnote-ref-2)
3. Zu dieser Kategorie erfolgt keine Zuordnung von HNV- FFH- oder Biotoptypen, weil LBM-DE aktuell keine Flächen in Deutschland ausweist [↑](#endnote-ref-3)