LOCAL COMPONENT VERIFICATION REPORT

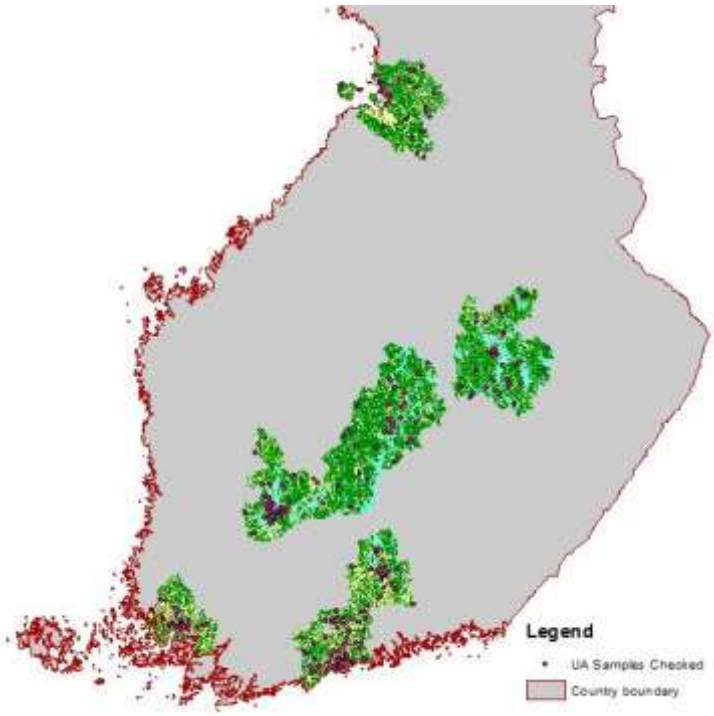
I. Metadata

DATASET	***Urban Atlas status layer 2012***
Country	*Finland*
Institution carrying out the work	*Finnish Environment Institute*
Data preparation	*Iida Autio, iida.autio@ymparisto.fi*
Visual inspection of samples	*Iida Autio, iida.autio@ymparisto.fi*
Evaluation	*Iida Autio, iida.autio@ymparisto.fi*
Reference data provided centrally	IMAGE2012 VHR satellite image mosaic
	GoogleEarth Imagery
In situ data used	National Ortho photo database/The National Land Survey Natural color/black and white ortho photos Resolution: 0.25-0.5m Reference years: 2010-2015 (partial coverages)
	The National Road and Street Database, Digiroad Vector dataset Reference year: 2017 (compared to data from 2011-2013)
	National high resolution Corine Land Cover 2012 National Corine raster dataset Resolution 20x20m
	Corine Land Cover change layers 2000-2006 and 2006-2012 National dataset Resolution 0.5ha
	The Finnish Land Parcel Information System (FLPIS) Based on farming subsidy reports Information of the dominant plant species of the field plots Vector data Reference year: 2011
	Soil Extraction Permits Database Vector data Reference year: constantly updated but data contains information on duration of the permits
	Building and Dwelling register (BDR) Population Information System Vector data Reference year 2015
	Topographic Database/The National Land Survey Compilations of object groups (fields, buildings and peatlands) Vector data Reference year: 2012
	Copernicus high resolution imperviousness layer 2012 (HRL Imperviousness) + Sample polygon data The percentage of soil sealing was calculated for each sample and used to guide the validation of the Urban Fabric (11000) classes
	ESRI/The National Land Survey basemap 1:2500
Notes	Some datasets are newer than the recommended reference year 2012. This has been taken into account while using the data in the validation process.
Software used for verification	LACO-WIKI, (+ GoogleEarth, QGIS 2.18.10), ArcMap 10.5.1, Google street view

Internal quality control done by	Pekka Härmä, pekka.harma@ymparisto.fi; Minna Kallio, minna.kallio@ymparisto.fi
Date and place of writing the report	DD.04.2018, Helsinki

II. Overall characterization of the dataset

DATASET	UA	Urban Atlas status layer 2012
Area covered within country	10.50%	3 553 388 hectares
Number of valid classes appearing in the country	25	
Number of samples selected	250	10 samples/class
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	172	
Overall Accuracy	89,05 %	
Overall Accuracy (CI)	± 0,0402	
CORRECTNESS OF DELINEATION		
Detail of delineation	84,80 %	Correct: 212; Too coarse: 29; Too detailed: 9
Correctness of delineated area	28,00 %	Correct: 70; Unnecessary parts included: 104; Missing parts: 23; Both missing parts and unnecessary parts included: 53
Positional accuracy	59,20 %	Correct: 148; Shifted: 102
OVERVIEW FIGURE OF NATURA 2000 STATUS LAYER		



DATASET	*Urban Atlas status layer 2012*
Country	*Finland*

GENERAL REMARKS ON THE QUALITY OF THE DATASET

The classification of LC/LU is generally accurate. Anyhow, the delineation of polygons is poor and almost half of the sample polygons are shifted beyond the positional accuracy of the data (+/- 5m). Unnecessary areas of wrong classes are often not excluded from the sample polygons. This applies to all LC/LU classes but is most evident in the large rural polygons of agricultural land and forest.

Classification of the urban fabric according to the soil sealing percentage is not consistent with the reference data. There is no clear trend in the misclassifications as denser classes seem to be overestimating and sparser classes underestimating the actual soil sealing.
The road network is often inaccurate and the roads are not where they're supposed to be, especially within the urban area. The roads are correctly classified but their position and shape is not correct and they contain parts that are unnecessary (e.g. small recreational path). Especially this applies to cities. In large intersections with several bridges and slip roads it is often difficult to tell the difference between bigger and smaller roads. The roads do not form a continuous network.

Some misclassifications are consistent throughout the data. Clear cut forests are not recognized by the mapping process and are misclassified as e.g. permanent crops. Arable land miss-interpreted as pastures are in most cases croplands, which are laid in fallow or temporarily growing grass for forage. This is typical rotation system of croplands in Finland.

In general, the delineation of the whole feature layer should be reconsidered. In many cases the FUA extends too far to the rural areas and very large polygons of agricultural land, forest and water systems are included.

SUMMARY STATISTICS OF URBAN ATLAS STATUS LAYER

UA Class	Number of polygons	Area (ha)	%
1110	3237	4011	0,11 %
1121	8311	14661	0,41 %
1122	8619	16619	0,47 %
1123	11207	23588	0,66 %
1124	14442	21930	0,62 %
1130	64291	35323	0,99 %
1210	15696	31159	0,88 %
1221	1129	3117	0,09 %
1222	52140	36773	1,03 %
1223	2086	2584	0,07 %
1230	105	1249	0,04 %
1240	34	2821	0,08 %
1310	1968	11309	0,32 %
1330	508	1303	0,04 %
1340	1130	1005	0,03 %
1410	4476	12117	0,34 %
1420	1800	7666	0,22 %
2100	46512	473109	13,31 %
2200	17	79	0,00 %
2300	24886	117980	3,32 %
2400	0	0	0,00 %
2500	0	0	0,00 %
3100	38745	2126244	59,84 %
3200	11128	80114	2,25 %

3300	90	238	0,01 %
4000	1657	26138	0,74 %
5000	9193	494178	13,91 %
9100	154	8070	0,23 %
SUM	**323561**	**3553388**	**100,00 %**

III. Characterization of the dataset by LC/LU class - UA 2012

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	11100	Continuous Urban Fabric (IMD ≥80%)
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	6	
Class user's accuracy	60,00 %	
Class user's accuracy (CI)	± 0,3201	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	100,00 %	Correct: 10; Too coarse: 0; Too detailed: 0
Correctness of delineated area	40,00 %	Correct: 4; Unnecessary parts included: 5; Missing parts: 0; Both missing parts and unnecessary parts included: 1
Positional accuracy	40,00 %	Correct: 4; Shifted: 6
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11210 and 11230. Delineation is often shifted and the road network inside the polygon is not accurate.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Copernicus high resolution imperviousness layer (HRL Imperviousness)	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is residential areas near city centers in very urban contexts.	
EXAMPLE (typical mistakes / typical appearance):		

Polygon is shifted and the road network is not accurate.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	11210	Discontinuous dense urban fabric (S.L. 50% - 80%)
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	5	
Class user's accuracy	50,00 %	
Class user's accuracy (CI)	± 0,3267	
Class producer's accuracy	88,72 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 1; Too detailed: 0
Correctness of delineated area	10,00 %	Correct: 1; Unnecessary parts included: 6; Missing parts: 2; Both missing parts and unnecessary parts included: 1
Positional accuracy	50,00 %	Correct: 5; Shifted: 5
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11220 and 11230. Features of 14100 are not always excluded from class area. On the other hand, parts of the class area are excluded and misclassified as e.g. 14100. Delineation is often shifted and the road network inside the polygon is not accurate.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); Copernicus high resolution imperviousness layer (HRL Imperviousness)	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is the suburban areas fairly close to city centers. Green urban areas are often bordering the class polygons.	
EXAMPLE (typical mistakes / typical appearance):		

Wrong class code (should be 11230) and parts of the associated land (yards) are excluded (14100).

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	11220	Discontinuous medium density urban fabric (S.L. 30% - 50%)
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	7	
Class user's accuracy	70,00 %	
Class user's accuracy (CI)	± 0,2994	
Class producer's accuracy	47,05 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 1; Too detailed: 0
Correctness of delineated area	40,00 %	Correct: 4; Unnecessary parts included: 6; Missing parts: 0; Both missing parts and unnecessary parts included: 0
Positional accuracy	20,00 %	Correct: 2; Shifted: 8
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11230 and 11240. Delineation is mostly shifted and the road network inside the polygon is not accurate.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); Copernicus high resolution imperviousness layer (HRL Imperviousness)	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is the suburban areas inside cities and also in the denser inhabited areas of the rural areas.	
EXAMPLE (typical mistakes / typical appearance):		

Polygon is shifted and areas of 12100 are in included in the south western corner.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	11230	Discontinuous low density urban fabric (S.L. 10% - 30%)
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	6	
Class user's accuracy	60,00 %	
Class user's accuracy (CI)	± 0,3201	
Class producer's accuracy	46,07 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 0; Too detailed: 1
Correctness of delineated area	20,00 %	Correct: 2; Unnecessary parts included: 6; Missing parts: 0; Both missing parts and unnecessary parts included: 2
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11220. There are several mistakes with roads: some are missing and some are unnecessary in the 11230 area. Features of 31000 are not always excluded from class area.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); Copernicus high resolution imperviousness layer (HRL Imperviousness)	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is residential areas in the suburban area of cities or residential rural areas. Often the areas are in the vicinity of forests and agricultural land.	
EXAMPLE (typical mistakes / typical appearance):		

Some forest is included in the area and the roads in the middle of the polygon should be mapped.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	11240	Discontinuous very low density urban fabric (S.L. < 10%)
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	6	
Class user's accuracy	60,00 %	
Class user's accuracy (CI)	± 0,3201	
Class producer's accuracy	60,12 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	80,00 %	Correct: 8; Too coarse: 2; Too detailed: 0
Correctness of delineated area	20,00 %	Correct: 2; Unnecessary parts included: 5; Missing parts: 1; Both missing parts and unnecessary parts included: 2
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11220 and 11230. Some of the buildings and associated area are often cut out of the polygon (misclassified with e.g. 21000). There are also unnecessary roads within the class area.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); Copernicus high resolution imperviousness layer (HRL Imperviousness); National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is the residential rural areas. Often the areas are in the vicinity of forests and agricultural land.	
EXAMPLE (typical mistakes / typical appearance):		

Arable land is included and 12240 area is left out.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	11300	Isolated structures
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	7	
Class user's accuracy	70,00 %	
Class user's accuracy (CI)	± 0,2994	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	30,00 %	Correct: 3; Too coarse: 7; Too detailed: x
Correctness of delineated area	30,00 %	Correct: 3; Unnecessary parts included: 4; Missing parts: 1; Both missing parts and unnecessary parts included: 2
Positional accuracy	80,00 %	Correct: 8; Shifted: 2
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11240 and 21000. Features of 31000 are not always excluded from class area. Some buildings and associated land are also sometimes left out and misclassified as 31000 and 21000. The delineation is often too coarse.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is the isolated summer cottages and farm buildings in the rural areas. Often the areas are in the vicinity of forests and agricultural land.	
EXAMPLE (typical mistakes / typical appearance):		

Some of the related buildings have been left unnoticed and are included in the surrounding forest.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	12100	Industrial, commercial, public, military and private units
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	98,48 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	100,00 %	Correct: 10; Too coarse: 0; Too detailed: 0
Correctness of delineated area	60,00 %	Correct: 6; Unnecessary parts included: 2; Missing parts: 1; Both missing parts and unnecessary parts included: 1
Positional accuracy	40,00 %	Correct: 4; Shifted: 6
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Generally correctly classified but polygons are mostly shifted. The roads within the class area are often incorrect and unnecessarily divide areas into smaller polygons.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typically the class appears in all parts of the FUA. No military units are included in the sample dataset.	
EXAMPLE (typical mistakes / typical appearance):		

Road network bordering the class is not correct and cuts of part of the associated parking area.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	12210	Fast transit roads and associated land
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	80,00 %	Correct: 8; Too coarse: 0; Too detailed: 2
Correctness of delineated area	80,00 %	Correct: 8; Unnecessary parts included: 0; Missing parts: 2; Both missing parts and unnecessary parts included: 0
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	The class polygon often changes shape in the middle so that it ends up being too narrow for the road. In large intersections with several bridges and slip roads it is often difficult to tell the class apart from 12220. The roads are divided into smaller polygons and do not form a continuous network.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Google street view	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is larger, cross city highways as well as highways entering big cities.	
EXAMPLE (typical mistakes / typical appearance):		

A complex intersection with a possible shift and confusion with 12220.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	12220	Other roads and associated land
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	99,65 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	100,00 %	Correct: 10; Too coarse: 0; Too detailed: 0
Correctness of delineated area	80,00 %	Correct: 8; Unnecessary parts included: 0; Missing parts: 0; Both missing parts and unnecessary parts included: 2
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	The road network is often inaccurate and the roads are not where they're supposed to be. Especially this applies to cities. This is not so visible in the 10 sample polygons but becomes more apparent where 12220 is bordering the urban classes.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	The class appears evenly throughout the FUA and consists of streets, larger roads in the city centers, country roads and smaller paved roads in the rural areas.	
EXAMPLE (typical mistakes / typical appearance):		

In the western end of the polygon, the roads are not accurate.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	12230	Railways and associated land
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	100,00 %	Correct: 10; Too coarse: 0; Too detailed: 0
Correctness of delineated area	70,00 %	Correct: 7; Unnecessary parts included: 2; Missing parts: 1; Both missing parts and unnecessary parts included: 0
Positional accuracy	80,00 %	Correct: 8; Shifted: 2
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	The class polygons are often unnecessarily changing shape (wide/narrow) without consistency with the reference data.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Both inner city and cross city railways.	
EXAMPLE (typical mistakes / typical appearance):		

Unnecessary change of shape in the middle of the sample polygon.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	12300	Port areas
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	8	
Class user's accuracy	80,00 %	
Class user's accuracy (CI)	± 0,2613	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	80,00 %	Correct: 8; Too coarse: 2; Too detailed: 0
Correctness of delineated area	30,00 %	Correct: 3; Unnecessary parts included: 4; Missing parts: 0; Both missing parts and unnecessary parts included: 3
Positional accuracy	60,00 %	Correct: 6; Shifted: 4
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with class 12100. Features of e.g. 14100, 13400, 12100 and 31000 are not always excluded from class area. The road network within the port areas is often inaccurate. The overall delineation of the port areas is not very precise. Also it is difficult to interpret, where the administrative border of the area is.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typically large port areas and dockyards in proximity to the cities.	
EXAMPLE (typical mistakes / typical appearance):		

Typical example of the class.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	12400	Airports
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	8	
Class user's accuracy	80,00 %	
Class user's accuracy (CI)	± 0,2613	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 0; Too detailed: 1
Correctness of delineated area	30,00 %	Correct: 3; Unnecessary parts included: 3; Missing parts: 3; Both missing parts and unnecessary parts included: 1
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 14200 (aerodrome) and 21000. Often areas of the airports are cut out and misclassified to the surrounding classes such as 12100, 13100, 21000, 23000, 31000 and 32000. Roads crossing and surrounding the airport area could often be classified as its associated land as they're more like maintenance roads.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)		
EXAMPLE (typical mistakes / typical appearance):		

Airport and associated areas missing e.g. in the northern edge of the polygon.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	13100	Mineral extraction and dump sites
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	99,79 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	80,00 %	Correct: 8; Too coarse: 2; Too detailed: 0
Correctness of delineated area	20,00 %	Correct: 2; Unnecessary parts included: 1; Missing parts: 2; Both missing parts and unnecessary parts included: 5
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	The class area is often confused with forest: areas of 31000 are not always excluded from class area and some 13100 area is left out of the polygon as 31000. Some of the missing 13100 areas are also misclassified as 50000, 21000, 23000 and 12100.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Soil Extraction Permits Database; National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical class appearance in samples are sand extraction areas.	
EXAMPLE (typical mistakes / typical appearance):		

13100 area is confused with forest.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	13300	Construction sites
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	6	
Class user's accuracy	60,00 %	
Class user's accuracy (CI)	± 0,3201	
Class producer's accuracy	88,61 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	100,00 %	Correct: 10; Too coarse: 0; Too detailed: 0
Correctness of delineated area	10,00 %	Correct: 1; Unnecessary parts included: 6; Missing parts: 1; Both missing parts and unnecessary parts included: 2
Positional accuracy	60,00 %	Correct: 6; Shifted: 4
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 11210, 12100, 12220 and 13400. The road network within and around the polygon area is not accurate.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical construction sites in samples are constructing roads, residential areas and industrial areas.	
EXAMPLE (typical mistakes / typical appearance):		

Wrong delineation, road network inaccurate and incorrect class code.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	13400	Land without current use
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	4	
Class user's accuracy	40,00 %	
Class user's accuracy (CI)	± 0,3201	
Class producer's accuracy	75,52 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	70,00 %	Correct: 7; Too coarse: 1; Too detailed: 2
Correctness of delineated area	10,00 %	Correct: 1; Unnecessary parts included: 8; Missing parts: 1; Both missing parts and unnecessary parts included: 0
Positional accuracy	60,00 %	Correct: 6; Shifted: 4
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 12100, 13300, 14100, 23000 and 32000. Features of 31000 are not always excluded from class area.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; Building and Dwelling Register (BDR); Soil Extraction Permits Database; National high resolution Corine Land Cover 2012; The Finnish Land Parcel Information System (FLPIS)	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Class includes e.g. areas waiting to be built.	
EXAMPLE (typical mistakes / typical appearance):		

Wrong delineation and unnecessary roads. The area will be built, but here no construction is visible.

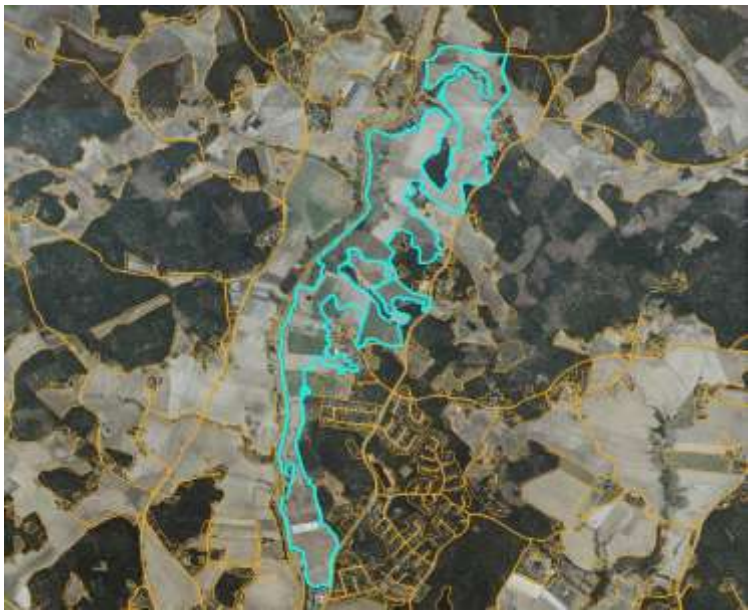
DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	14100	Green urban areas
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	98,37 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	70,00 %	Correct: 7; Too coarse: 3; Too detailed: 0
Correctness of delineated area	30,00 %	Correct: 3; Unnecessary parts included: 2; Missing parts: 1; Both missing parts and unnecessary parts included: 4
Positional accuracy	80,00 %	Correct: 8; Shifted: 2
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Features of urban fabric/artificial areas (e.g. 12100, 12200, 12230) are not always excluded from class area. Often times there are unnecessary roads dividing larger areas of 14100: these roads are only small paths that should be included in to the 14100 area as associated land.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012;	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Habitat of the green urban areas is typically forest. In Finland this class represents suburban natural areas (extending from the surroundings) rather than highly managed urban gardens or castle parks.	
EXAMPLE (typical mistakes / typical appearance):		

In the eastern end, there is a small path unnecessarily classified as road (12220) separating the two 14100 areas.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	14200	Sports and leisure facilities
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	9	
Class user's accuracy	90,00 %	
Class user's accuracy (CI)	± 0,1960	
Class producer's accuracy	95,97 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 1; Too detailed: 0
Correctness of delineated area	30,00 %	Correct: 3; Unnecessary parts included: 2; Missing parts: 3; Both missing parts and unnecessary parts included: 2
Positional accuracy	50,00 %	Correct: 5; Shifted: 5
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with class 21000. Features of 21000 and 31000 are not always excluded from class area. Also 14200 class area is often left out of the polygon and misclassified as e.g. 21000, 31000. Often times shifted.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Marinas are overrepresented in the data. Otherwise quite varied collection of different land uses (e.g. soccer field, golf course, camping/caravan area, kart racing course).	
EXAMPLE (typical mistakes / typical appearance):		

Typical appearance of the class is a marina. Polygon is shifted.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	21000	Arable land (annual crops)
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	7	
Class user's accuracy	70,00 %	
Class user's accuracy (CI)	± 0,2994	
Class producer's accuracy	78,66 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 1; Too detailed: 0
Correctness of delineated area	0,00 %	Correct: 0; Unnecessary parts included: 4; Missing parts: 0; Both missing parts and unnecessary parts included: 6
Positional accuracy	40,00 %	Correct: 4; Shifted: 6
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	The delineation is mostly incorrect as missing and unnecessary parts occur. Features of 23000, 22000, 11300, 32000 and 31000 are not always excluded from class area. Also some 21000 are is left out of the polygon and misclassified as 23000, 11300 and 31000. Not all country roads are included in the road network.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; The Finnish Land Parcel Information System (FLPIS), Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typically large field areas, with fragmented land use (e.g. Arable land, Forests, Herbaceous vegetation association, Isolated structures). Typical crop types are e.g. wheat, barley, oat, sugar beet, cultivated grass for forage and turnip rape.	
EXAMPLE (typical mistakes / typical appearance):		



A typical large, fragmented field area with confusions with neighboring classes.

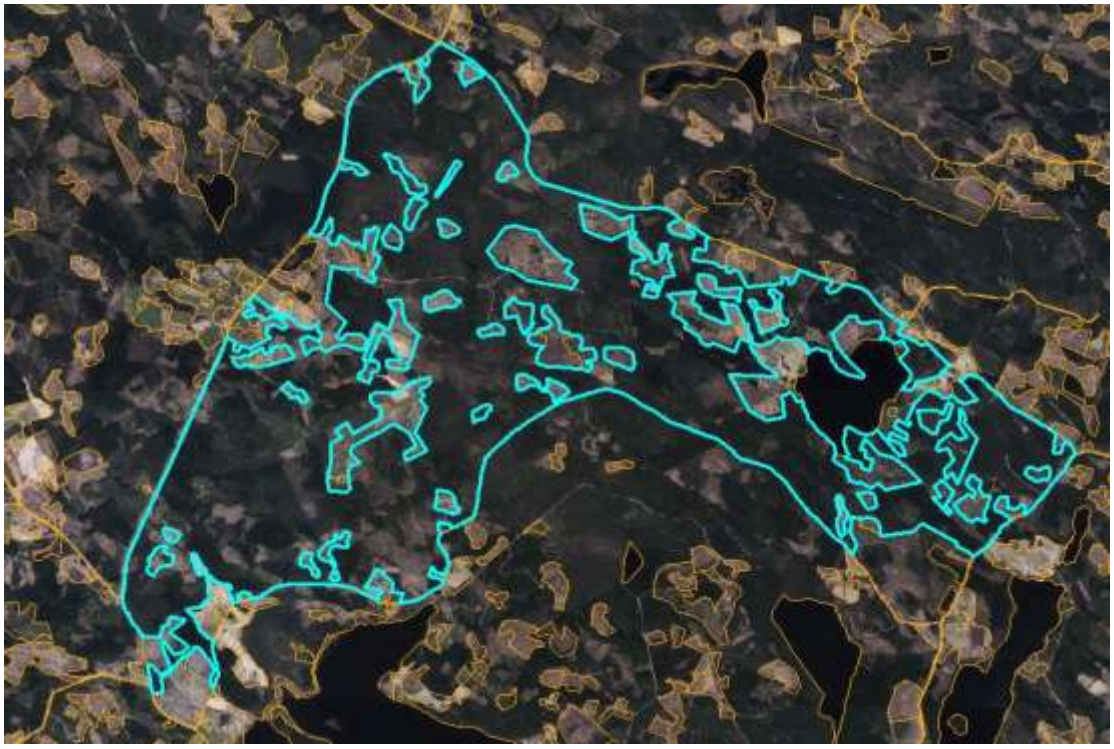
DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	22000	Permanent crops
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	1	
Class user's accuracy	10,00 %	
Class user's accuracy (CI)	± 0,1960	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	80,00 %	Correct: 8; Too coarse: 2; Too detailed: 0
Correctness of delineated area	0,00 %	Correct: 0; Unnecessary parts included: 10; Missing parts: 0; Both missing parts and unnecessary parts included: 0
Positional accuracy	30,00 %	Correct: 3; Shifted: 7
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 21000, 31000 and 14200. In cases where confusion occurs with forest, the area is often clear cut. Where correctly classified as 22000, features of 11300, 21000, 12220 and 31000 are not excluded from the class area.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; The Finnish Land Parcel Information System (FLPIS), Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class in Finland is strawberry fields.	
EXAMPLE (typical mistakes / typical appearance):		

Wrong class and misclassified as 31000 (clear cut).

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	23000	Pastures
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	0	
Class user's accuracy	0,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	0,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	7,00 %	Correct: 7; Too coarse: 3; Too detailed: 0
Correctness of delineated area	0,00 %	Correct: 0; Unnecessary parts included: 10; Missing parts: 0; Both missing parts and unnecessary parts included: 0
Positional accuracy	70,00 %	Correct: 7; Shifted: 3
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 21000, 31000 and 40000. Arable land confused as pastures is mostly field laid in fallow or temporarily growing grass for forage as part of the crop rotation system.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; The Finnish Land Parcel Information System (FLPIS), Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	No correct class was represented in the sample data.	
EXAMPLE (typical mistakes / typical appearance):		

Wrong class: this polygon is half clear cut forest and half a field that is temporarily out of use and growing grass.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	31000	Forests
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	89,95 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 1; Too detailed: 0
Correctness of delineated area	10,00 %	Correct: 1; Unnecessary parts included: 0; Missing parts: 0; Both missing parts and unnecessary parts included: 9
Positional accuracy	40,00 %	Correct: 4; Shifted: 6
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Features of 40000, 21000, 13100, 11300, 32000, 50000 are not always excluded from class area. Also areas of forest are left out and misclassified as 21000, 23000, 11300 and 32000. The forest areas left out of the polygon as other classes are often clear cuts.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class in the samples are very large forest areas with varying densities of forest growth, tree types and habitats. Often large areas of swamp forests are included.	
EXAMPLE (typical mistakes / typical appearance):		



A typical large forest area with misclassifications with e.g. 21000 and 23000.

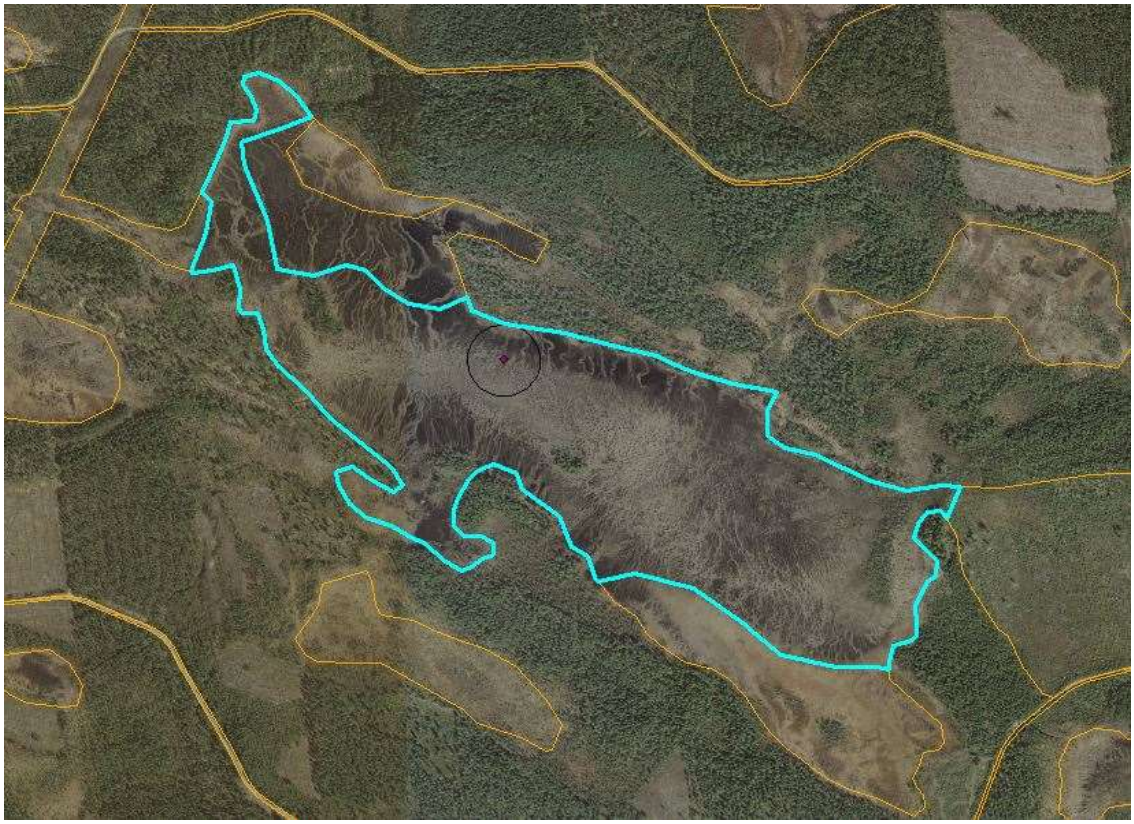
DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	32000	Herbaceous vegetation association
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	0	
Class user's accuracy	0,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	0,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 0; Too detailed: 1
Correctness of delineated area	0,00 %	Correct: 0; Unnecessary parts included: 10; Missing parts: 0; Both missing parts and unnecessary parts included: 0
Positional accuracy	70,00 %	Correct: 7; Shifted: 0
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 31000 and 40000. In Finland, 9/10 of the samples classified as 32000 are forest. These are mostly transitional woodland with mosaics of forest patches of different succession stages (clear cuts and recolonizations). Verification was made difficult by the similar descriptions of the UA classes 3.1. and 3.2. (3.2.: "Vegetation cover more than 50%, ground coverage of trees with height >5 m: <30%, areas with minor / without artificial or agricultural influence." could also be interpreted as transitional forests of class 3.1.) Also, there is an inconsistency with the Corine classification in which the transitional woodlands are classified as 3.2.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	No correct class was represented in the sample data. This class appeared in other class samples as abandoned agricultural land.	
EXAMPLE (typical mistakes / typical appearance):		

Wrong class: mostly forest (partly clear cut).

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	33000	Open spaces with little or no vegetation
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	3	
Class user's accuracy	30,00 %	
Class user's accuracy (CI)	± 0,2994	
Class producer's accuracy	100,00 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	100,00 %	Correct: 10; Too coarse: 0; Too detailed: 0
Correctness of delineated area	20,00 %	Correct: 2; Unnecessary parts included: 7; Missing parts: 0; Both missing parts and unnecessary parts included: 1
Positional accuracy	50,00 %	Correct: 5; Shifted: 5
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with classes 31000, 50000, 40000, 32000 and 13100. Low consistency between the sample dataset and the reference data.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class is beaches.	
EXAMPLE (typical mistakes / typical appearance):		

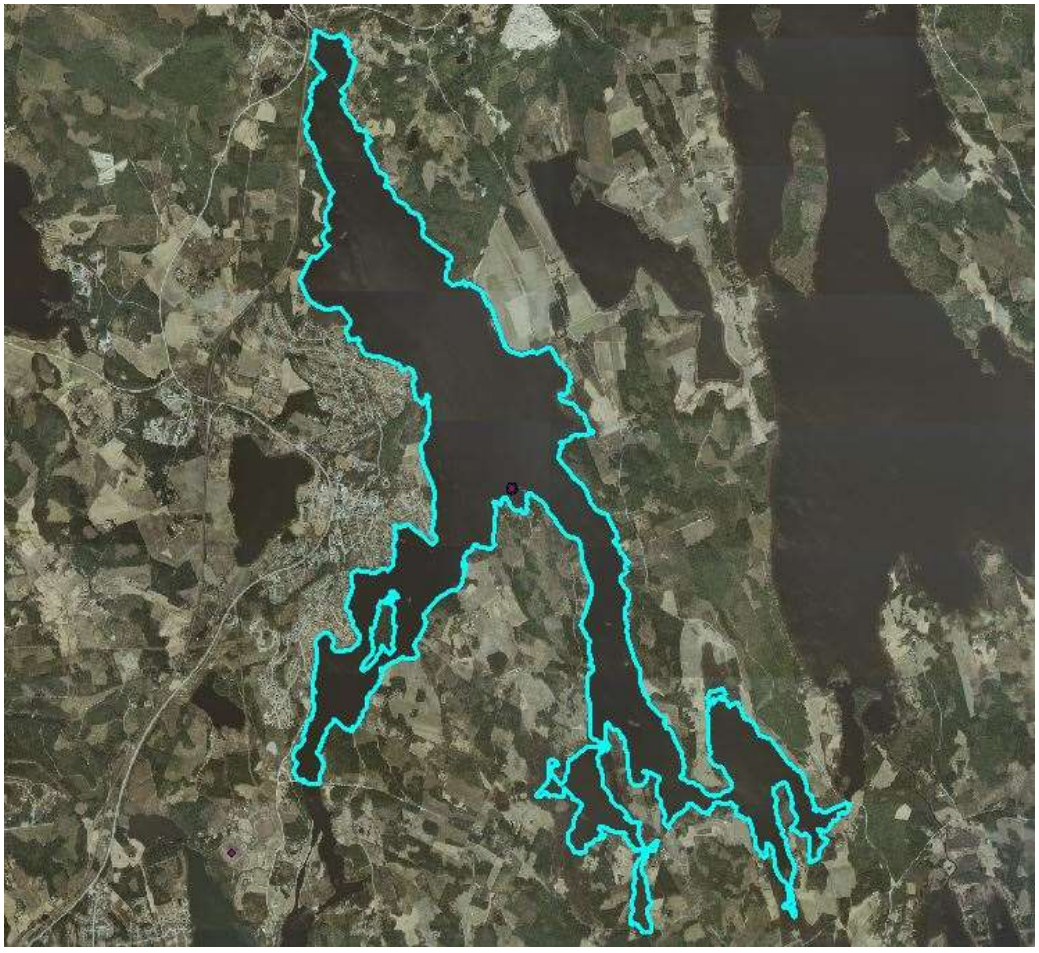
Typical appearance: a sandy beach.

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	40000	Wetlands
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	9	
Class user's accuracy	90,00 %	
Class user's accuracy (CI)	± 0,1960	
Class producer's accuracy	54,26 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	90,00 %	Correct: 9; Too coarse: 0; Too detailed: 1
Correctness of delineated area	10,00 %	Correct: 1; Unnecessary parts included: 1; Missing parts: 5; Both missing parts and unnecessary parts included: 3
Positional accuracy	100,00 %	Correct: 10; Shifted: 0
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	Misclassifications with class 21000. Large areas of wetland are left out of the polygons and misclassified as e.g. 21000, 31000, 50000 and 23000.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; The National Road and Street Database, Digiroad; Topographic Database/The National Land Survey; National high resolution Corine Land Cover 2012; Corine Land Cover change layers 2000-2006 and 2006-2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class in the samples is large peat bogs and freshwater marshes/reed growths by the lakes.	
EXAMPLE (typical mistakes / typical appearance):		



A peat bog with large areas left out of the polygon (misclassified as e.g. 50000, 31000 and 23000).

DATASET	UA	Urban Atlas status layer 2012
LC/LU CLASS	50000	Water bodies
Number of samples selected for the class	10	
CORRECTNESS OF LC/LU CODE		
Number of correctly interpreted samples	10	
Class user's accuracy	100,00 %	
Class user's accuracy (CI)	± 0,0000	
Class producer's accuracy	99,99 %	
Class producer's accuracy (CI)	± 0,0000	
CORRECTNESS OF DELINEATION		
Detail of delineation	70,00 %	Correct: 7; Too coarse: 3; Too detailed: 0
Correctness of delineated area	50,00 %	Correct: 5; Unnecessary parts included: 0; Missing parts: 0; Both missing parts and unnecessary parts included: 5
Positional accuracy	40,00 %	Correct: 4; Shifted: 6
CHARACTERIZATION OF THE CLASS		
Typical mistakes (misclassification, wrong delineation, etc.) describe in detail	The delineation of the coastline is not accurate. Therefore some water is left out and land is included in the polygon. Partly this can be because of the shift.	
Typical reference information used / minimum required for decision	VHR ortho imagery close to year 2012; National high resolution Corine Land Cover 2012	
Typical appearance of the class in samples (habitats, cultivation type, land use etc.)	Typical appearance of the class in sample are large lakes/parts of lakes.	
EXAMPLE (typical mistakes / typical appearance):		



Typical appearance: A large lake area.