LANTMÄTERIET

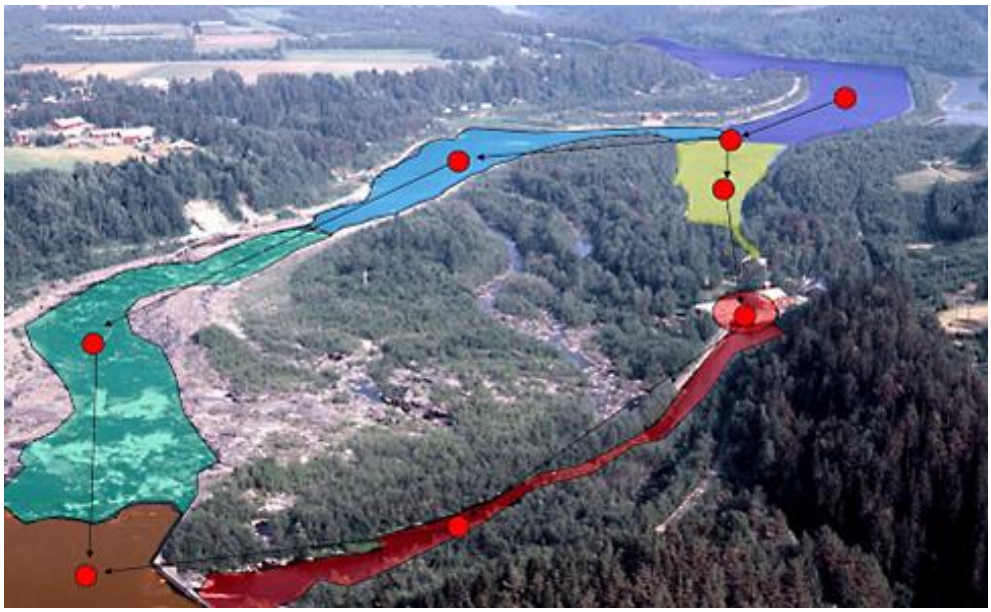
2022-11-16

PRODUCT DESCRIPTION

Hydrography View Service, INSPIRE

DOCUMENT VERSION: 1.1
SERVICE'S INTERFACE VERSION: 1.1

Figure 1. Illustration of a hydrographic network.



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1 General description

Hydrography View Service, INSPIRE is one of Lantmateriets view services for maps and images. The service contains hydrographical information according to the EU-directive INSPIRE's data specification for the theme Hydrography. The information is adapted for viewing in the scale 1:10 000.

1.1 Contents

Hydrography View Service, INSPIRE presents hydrographical information in six separate layers:

- HY.PhysicalWaters.ManMadeObject
- HY.PhysicalWaters.HydroPointOfInterest
- HY.Network
- HY.PhysicalWaters.Wetland
- HY.PhysicalWaters.LandWaterBoundary
- HY.PhysicalWaters.Waterbodies

1.1.1 HY.PHYSICALWATERS.MANMADEOBJECT

The layer contains constructions in or adjacent to a body of water:

- Dam
- Sluice, including water pipe and water chute
- Lock
- Pile fendering
- Jetty
- Pier
- Quay
- Guide jetty
- Dolphin
- Aqueduct

Figure 2. Example in scale 1:15 000.

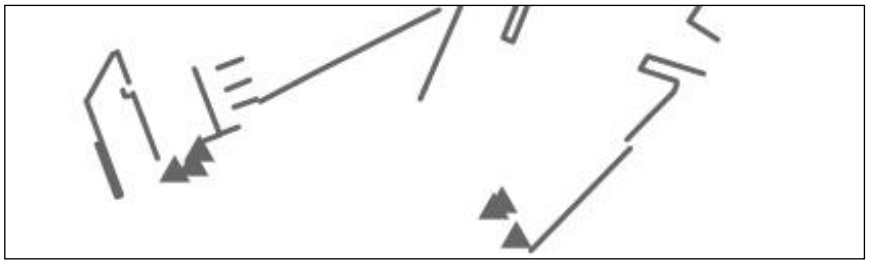


Table 1.Definition of the different object types.

Object type	Definition	Selection
DamOrWeir	A permanent barrier across a watercourse used to dam the water or regulate its flow.	All dams are shown. Earth dams and embankments whose purpose is to lead water in a certain channel are not shown as dams. Constructions creating reflection ponds are not shown.
Sluice	An open, sloping pipe with a gate to regulate the water flow (water chutes and water pipes included).	All water pipes or water chutes included in or connecting to displayed watercourses that are at least 200 meters long are shown.
Lock	A basin with two or a series of gates used to raise or lower vessels when they pass between different levels of water.	Shown in full.
Pile fendering	A construction that prevents or lessens the chock of contact on vessels.	Only shown within NSL areas. Pile fenderings longer than 8 m are shown.
Jetty	A smaller platform, normally anchored to the sea bed, built from the shore out into deeper water. Also intended for docking and mooring of vessels, but also for bathing etc.	Shown completely; minimum dimension for display is 20 m measured from the shoreline. Jetties that follow the shoreline shall not be displayed. In an NSL area the minimum dimension for display is 10 m, measured from the shoreline. Jetties that follow the shoreline shall be displayed.
Pier	A built barrier in the water, mainly to create an area protected against high waves or to prevent direct backwash.	*Pier, boundary*: Groyne/pier at least 6 m wide and at least 10 m long. Only shown within NSL areas. Outside NSL areas they are only shown as shoreline. *Pier, centre line*: All breakwaters/piers narrower than 6 m and longer than 20 m measured from the shoreline are shown.

Object type	Definition	Selection
Quay	Built-up waterside where ships can moor, load and unload goods. It is to its whole length connected to adjacent warehouses.	*Quay, boundary*: Shown as a line which coincides with the shoreline. Only shown within NSL areas. Shown if it is at least 6 m wide. *Quay, centre line*: Only shown within NSL areas. Protruding quays that are longer than 10 m measured from the shoreline and narrower than 6 m are shown. Only quays shown in the Swedish Maritime Administration database are mapped.
Guide jetty	A construction for leading ships in narrow passages, for instance bridge thoroughfares, ferry berths and lock approaches.	Only shown within NSL areas. Guide jetties longer than 8 m are shown. Shown coherently under bridges.
Dolphin	A construction for mooring vessels in docks, consisting of several to each other connected poles, driven into the seabed. Nowadays they are mostly made of concrete.	Dolphin whose surface is less than 12 m² are shown as *Small dolphin*, others as *Normal dolphin*.
Aqueduct	A construction which purpose is to lead a watercourse across an obstacle. The obstacle might be a valley, a road, a railroad or another watercourse.	The aqueducts in Håverud, Kungs Norrby and Ljungsbro are presented.

1.1.2 HY.PHYSICALWATERS.HYDROPOINTOFINTEREST

The layer contains rapids and falls.

Figure 3. Example in scale 1:50 000.

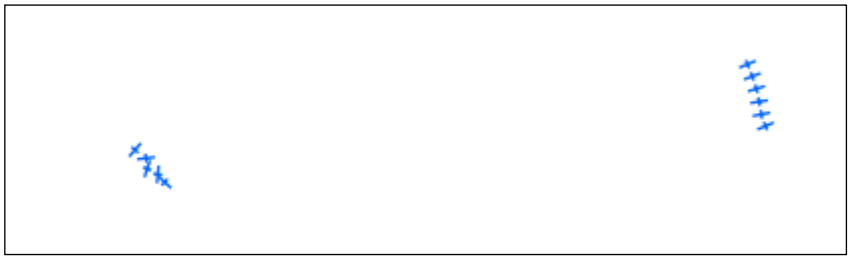


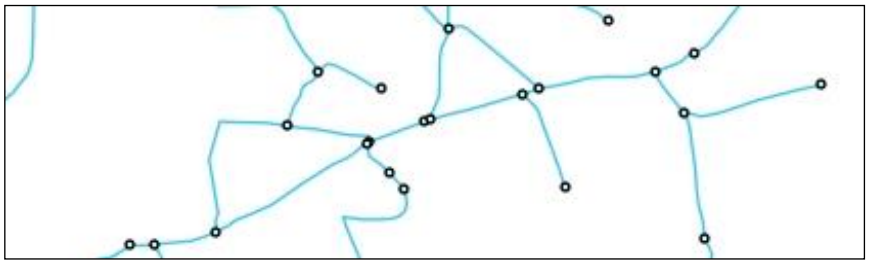
Table 2. Definition of the object types rapids and waterfalls.

Object type	Definition	Selection
Rapids	Part of a watercourse with a faster flow, where the bottom slopes down steeply, but not with the enough breach to form a waterfall.	Displayed in watercourses wider than 6 m (double line) so that the character and navigability of the watercourse are apparent. The minimum length for displaying this is about 50 m.
Falls	Waterfall. Part of a watercourse where the water falls vertically from a height.	Complete display in watercourses that are at least about 20 m wide. In narrow watercourses down to about 6 m, only significant waterfalls are displayed.

1.1.3 HY.NETWORK

The layer contains a geometrical hydrographic network including watercourse links.

Figure 4. Examples in scale 1:10 000.



According to Inspire the hydrographic network should be defined as a geometrical network. The geometrical network postulates a coherent geometry, i.e. there must not be any gaps between lakes and watercourses or between parts of watercourses. Through lakes and broad watercourses that are represented as surfaces (and not as lines) a watercourse link has been created.

The watercourse links and watercourses represented as a line become the links in the network. The nodes are connected in the fork locations.

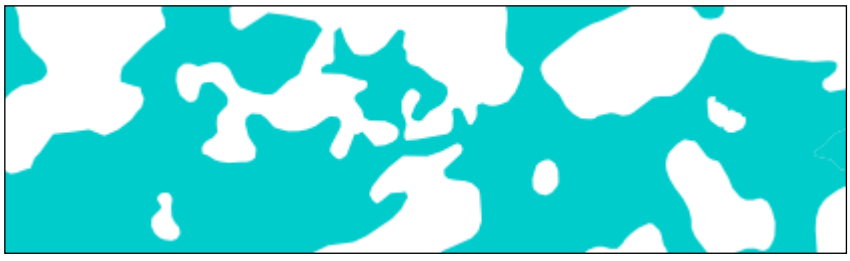
Table 3. Definition of the object types node and WatercourseLink.

Object type	Definition	Selection
Node	HydroNode. A node in a hydrographic network.	
WatercourseLink	A segment of a watercourse in the hydrographic network.	In addition to watercourses, the following objects are also presented: *Centre line:* Fictitious line through water surfaces that are required to build a coherent line network. They always lie in a water surface, never on land. Where they end, they connect to a shoreline, an enclosure and/or another centre line. When they connect to a watercourse or a fictitious centre line, they must also connect to the shoreline. They must always be digitized in the direction of the current. *Centre line, indistinct:* Fictitious line connecting the flow network through other types of surfaces than water. Indistinct centre lines are used to represent watercourses below ground and water flows through for example wetlands and arable lands.

1.1.4 HY.PHYSICALWATERS.WETLAND

The layer contains wetlands.

Figure 5. Examples in scale 1:10 000.



Wetlands are not presented as correctly divided objects, instead they follow the division of the index tiles.

Table 4. Definition of the object type wetland.

Object type	Definition	Selection
Wetland	An area with little drainage or regularly flooded, where the ground is saturated with water and supports vegetation.	The minimum dimension for displaying this is about 2500 m². Dried or ditched bog which has become productive woodland is not classified as wetland. A mere, collection of water or a permanent water-filled flark in wetland is shown as a water surface if the area is sufficiently large, at least 500 m².

1.1.5 HY.PHYSICALWATERS.LANDWATERBOUNDARY

The layer contains landwater boundaries.

Figure 6. Example in the scale 1:15 000.

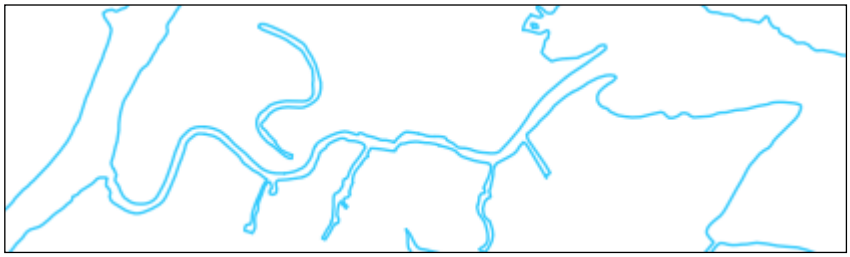


Table 5. Definition of the object type LandWaterBoundary.

Object type	Definition	Selection
LandWater-Boundary	The line where a land mass is in contact with a body of water.	Presented according to the selection of Standing water, see chapter 1.1.6.

1.1.6 HY.PHYSICALWATERS.WATERBODIES

The layer contains lakes and broad watercourses (wider than 6 metres) as surfaces and smaller watercourses (narrower than 6 metres) as lines.

Figure 7. Examples in the scale 1:10 000.

Table 6. Definition of the object types StandingWater and Watercourse.

Object type	Definition	Selection
Standing-Water*	A body of water entirely surrounded by land.	The minimum dimension for display is surfaces greater than about 400 m2 and watercourses at least 6 m wide. Smaller surfaces, such as water-filled sludge basins, settling basins, basins, ponds, tarns and pits may however also be displayed. If possible, the water surface should be shown at normal water level.
Watercourse*	A natural or artificial flowing watercourse (the geometry could be a line or a surface), i.e. a surface water body with significant flow rate, delimited by two connecting water locations.	The shortest distance shown for watercourses not connecting hydrographic map objects (e.g. lakes and wetland) is 250 m. In the coverage area for the Mountain Map 1:50 000 and the Mountain Map 1:100 000, a simplified display is applied.

* Regarding the difference between the surface of a watercourse and the surface of standing water: The surface of the watercourse always has a distinct inclination, hence the water flows in one direction, while the surface of standing water lacks this distinct inclination. The difference in inclination between a surface of a watercourse and a surface of standing water may in some cases however be marginal, the assessment of this is done by SMHI.

1.2 Geographic coverage

The Hydrography View Service, INSPIRE contains hydrographic objects in the whole of Sweden. Objects belonging to the national shoreline can be found around the coast and the major inland lakes. In cases where drainage basins extend beyond national borders, foreign information with limited content is included.

Information about areas where data is available and how these are divided.

1.3 Geographic cut-out

1.3.1 MAIN DRAINAGE BASINS

The main drainage basins are those which are relevant to Sweden, which flow into the sea and which had an area over 200 square kilometres when they were defined. The main drainage basins have been defined by SMHI and have been given a HARO code and usually the name specified on the map for the main river which flow into the sea.

Some of the main drainage basins (113000, 114000, 115000 and 116000) drain from Sweden to Norway and flow into the Skagerrak or the Norwegian Sea.

1.3.2 COASTAL AREAS

SMHI has made a division into 10 coastal areas by merging areas along the coast between the main drainage basins and islands in the sea. The division of islands in the sea has followed selected boundaries between coastal waters in SVAR (The Swedish Water Archive). The areas have been given numbers and names in accordance with the areas in SVAR which define border areas.

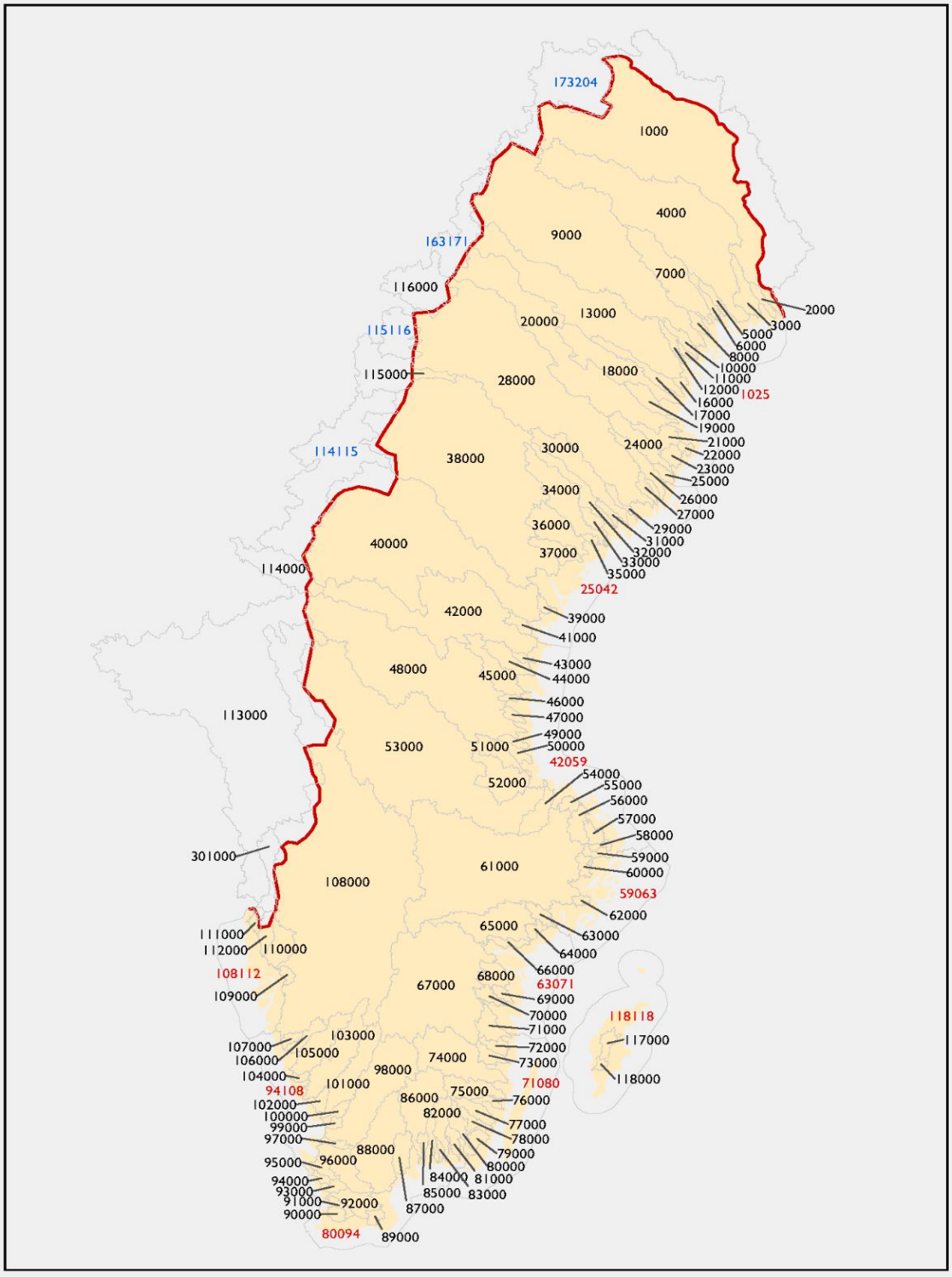
1.3.3 NORWEGIAN PRODUCT AREAS

There are also four defined areas for rivers that flow from Sweden to Norway and into the Norwegian Sea: between Nea and Vefsna, between Vefsna and Rana, Saltdalsvassdraget_Hellemovassdraget and North of Luleälven. The areas have been given numbers and names in accordance with SVAR.

NB! The number of areas, their names, codes and extents may change over time.

1.3.4 THE AREAS' EXTENT, NAME AND NUMBER CODES

Figure 8. The main drainage basins, coastal areas and Norwegian product areas with associated number codes.



MAIN DRAINAGE BASINS

Table 7. The main drainage basins with associated number codes.

HARO	Watercourse	HARO	Watercourse
1000	Torneälven	62000	Tyresån
2000	Keräsjoki	63000	Trosaån
3000	Sangisälven	64000	Svärtaån
4000	Kalixälven	65000	Nyköpingsån
5000	Töreälven	66000	Kilaån
6000	Vitån	67000	Motala ström
7000	Råneälven	68000	Söderköpingsån
8000	Altersundet	69000	Vindån
9000	Luleälven	70000	Storån
10000	Alån	71000	Botorpsströmmen
11000	Rosån	72000	Marströmmen
12000	Alterälven	73000	Virån
13000	Piteälven	74000	Emån
16000	Jävreån	75000	Alsterån
17000	Åbyälven	76000	Snärjebäcken
18000	Byskeälven	77000	Ljungbyån
19000	Kågeälven	78000	Hagbyån
20000	Skellefteälven	79000	Buatorpsån
21000	Bureälven	80000	Lyckebyån
22000	Mångbyån	81000	Nättrabyån
23000	Kålabodaån	82000	Ronnebyån

HARO	Watercourse	HARO	Watercourse
24000	Rickleån	83000	Vierydsån
25000	Dalkarlsån	84000	Bräkneån
26000	Sävarån	85000	Mieån
27000	Tavleån	86000	Mörrumsån
28000	Umeälven	87000	Skräbeån
29000	Hörnån	88000	Helge å
30000	Öreälven	89000	Nybroån
31000	Leduån	90000	Sege å
32000	Lögdeälven	91000	Höje å
33000	Husån	92000	Kävlingeån
34000	Gideälven	93000	Saxån
35000	Idbyån	94000	Råån
36000	Moälven	95000	Vege å
37000	Nätraån	96000	Rönne å
38000	Ångermanälven	97000	Stenån
39000	Gådeån	98000	Lagan
40000	Indalsälven	99000	Genevadsån
41000	Selångersån	100000	Fylleån
42000	Ljungan	101000	Nissan
43000	Gnarpsån	102000	Suseån
44000	Harmångersån	103000	Ätran
45000	Delångersån	104000	Himleån

HARO	Watercourse	HARO	Watercourse
46000	Nianån	105000	Viskan
47000	Norralaån	106000	Rolfsån
48000	Ljusnan	107000	Kungsbackaån
49000	Skärjån	108000	Göta älv
50000	Hamrångeån	109000	Bäveån
51000	Testeboån	110000	Örekilsälven
52000	Gavleån	111000	Strömsån
53000	Dalälven	112000	Enningdalsälven
54000	Tämnarån	113000	Glomma
55000	Forsmarksån	114000	Nea
56000	Olandsån	115000	Vefsna
57000	Skeboån	116000	Rana
58000	Broströmmen	117000	Gothemsån
59000	Norrtäljeån	118000	Snoderån
60000	Åkersström	301000	Haldenvassdraget
61000	Norrström		

COASTAL AREAS

Table 8. The coastal areas with associated number codes.

Area number	Area name
1025	Finland_Dalkarlsån
25042	Dalkarlsån_Ljungan
42059	Ljungan_Norrtäljeån
59063	Norrtäljeån_Trosaån
63071	Trosaån_Botorpsströmmen
71080	Botorpsströmmen_Lyckebyån
80094	Lyckebyån_Råån
94108	Råån_Götaälv
108112	Götaälv_Norge
118118	Gotlands kustområde

NORWEGIAN PRODUCT AREAS

Tabell 9. The Norwegian product areas with associated number codes.

Area number	Area name
114115	Mellan Nea och Vefsna
115116	Mellan Vefsna och Rana
163171	Saltdalsvassdraget_Hellemovassdraget
173204	Norr om Luleälven

1.4 Coordinate system

In plane: See the technical description for the service.

In height: RH 2000.

2 Quality description

For more information about the various quality parameters used in the product description, we refer to HMK Ordlista 2022 och HMK Geodatakvalitet 2017. For terms and definitions of these, we refer to the termdatabasen Ekvator.

2.1 Purpose and utility

Hydrography is the base for many other geographical data, especially for analyses of everything in the landscape with any connection to water. The need for hydrographical data with good geographical levels of description and coherent structure is great in many areas of operations. Good data also contribute to better analyses, primarily in climate-related areas.

Being able to describe water flows in a way that allow GIS-software analyses enables predictions and management of consequences, as well as influence on the environment. Here are some examples of environmental problems where analyses using networked hydrography are of great value:

- The spread of pollution in waterways
- Acidification of lakes and need for lime treatment
- Increase in water levels in the event of flooding in risk areas
- Influence of landscape and water systems in environmentally sensitive areas
- Impact of forestry and infrastructure projects on the landscape

2.2 Data capture

2.2.1 LINEAGE

The initial collection comes from Lantmateriet's digital collection of basic data with photogrammetric methods. Geometries are measured in the scale 1:10 000.

The main drainage basins were created from height data. Network adapted data is created by separating objects with enclosing lines and creating a division among lakes and watercourses. Existing line watercourses are linked to centre lines through water surfaces; digitizing direction corresponds to the direction of flow and unique identities are created. In order to gain a coherent presentation of the hydrography between different countries, it is important that the objects are linked if they cross the national border.

Information on certain objects along the coast and the major lakes such as piers, quays, pile fenderings, guide jetties and dolphins are collected in cooperation with the Swedish Maritime Administration within the National Shoreline project (NSL).

Dams, jetties and piers are also included in collaboration agreements with municipalities. More information about collaboration with municipalities is available at Lantmäteriet's website under Byggnad, Adress, Lägenhet och Topografi.

Sluices, waterfalls and rapids are based on field work from the Economic map and the building up of the Basic Geographic Data (GGD).

2.2.2 NORWEGIAN AND FINNISH DATA IN THE SERVICE

Norwegian data presented in the service derive from download services in the Norwegian Water Resources and Energy Directorate, NVE, in the scale of 1:50 000. However, this does not apply to Norwegian data in the areas of Göta Älv (108000), Dalälven (53000) and Enningdalsälven (112000), which may come either from NVE or SVAR.

Finnish data presented in the service is derive from the services at the Finnish Environment Institute (SYKE).

The Norwegian and the Finnish data have been adjusted to Swedish data in order to create a geometric network with hydrographical objects across the national borders. Only a part of the downloaded Norwegian and Finnish data has been included.

2.3 Maintenance

2.3.1 MAINTENANCE FREQUENCY

Hydrographic objects are updated by Lantmateriet periodically, at different intervals, partly using aerial image interpretation in accordance with aerial photography intervals in the image supply programme and partly through the production plan for the National Shoreline Project (NSL).

The timeliness also depends on earlier mapping through field work, regarding objects that have not changed since then.

The information in this view service will be updated annually.

2.4 Data quality

The quality is presented using the quality parameters described in the standard SS-EN ISO 19157:2013 Geographic information - Data quality.

2.4.1 COMPLETENESS

The requirement for completeness is 100% according to the specification of the object types.

Completeness is very high for lakes, large watercourses and waterfalls.

Streams and rapids have high completeness.

Sluices (including water pipes/water chutes) have low completeness since they are difficult to update.

Piers, quays, pile fenderings and dolphins have very high completeness in NSL areas, where the Swedish Maritime Administration also reviews mapped material. The objects also occur outside NSL areas, but completeness is not checked there. Small dolphins have very high completeness in

NSL areas, where the Swedish Maritime Administration makes completeness checks for these. In other areas, small dolphins are not mapped.

2.4.2 LOGICAL CONSISTENCY

When storing objects in the Lantmateriet database they are first checked for compliance with the established geometric and topological rules and that the information is consistent with OGC (Open Geospatial Consortium) requirements for geometries. Value quantities and detail types are also checked for validity before being entered in the database.

Lakes and large watercourses are surfaces.

Streams and underground watercourses are coherent and connect to lakes and large watercourses, so that complete networks are formed.

Waterfalls, sluices (including water pipes and water chutes) and rapids are independent objects and are not connected to other objects. Piers are checked so that they connect to the shoreline.

2.4.3 THEMATIC ACCURACY

Thematic accuracy between objects is very high for hydrography, except for objects included in NSL. Classification that takes place from measurements of aerial images involves a degree of uncertainty, but thematic accuracy is still considered high for objects included in NSL.

2.4.4 POSITIONAL ACCURACY

Geometrical requirements on positional accuracy depend on the objects' distinctness within a geographically limited area. Concrete objects have higher requirements than objects with diffuse boundaries.

Objects in the water have very high positional accuracy.

The shoreline is measured at normal water level, except in regulated lakes and rivers where it is measured at the maximum damming limit. The position of the shoreline may vary due to different water levels. Updating is only carried out when it is clear that there has been a major lasting change.

The positional accuracy of streams is high in open surfaces but is varied in forest areas where it is difficult to see through the canopy. Large errors regarding streams are gradually being corrected using laser/height data in forest areas. Other hydrographic objects have very high positional accuracy.

Table 10. Positional accuracy for different object types.

Quality area	**Whole Sweden**		
Positional accuracy Absolute accuracy	**Object type**	**Plane (m)**	**Height (m)**
	LandWaterBoundary	5	2
	LandWaterBoundary, blurred	10	2
	Rapids	-	-
	Falls	5	-
	ShorelineConstruction	1 m/2 m*	2 (Quay, Pier)
	DamOrWeir	2	2
	Lock	5	-
	Sluice	5	-
	StandingWater	10	2
	Watercourse	5	-
	Wetland	20	-
	Aqueduct	2	-

For NSL objects, marked with * in the table above, there is a standard requirement that objects in fairways of a certain class must have a positional accuracy of 1 m. It can be difficult to achieve this with stereo mapping and for this reason Lantmateriet has set the requirement at 2 m.

3 Layout and plotting of data

For more information regarding how data is presented, see separate legend.

3.1 Presentation in different scales

In the table below the presentation of the hydrographical information in different scales is described. The scale intervals are approximate and to some extent depend on the client where the map is shown.

Table 11. Plotting of the hydrographic information in different scales.

Layer	Information type	Selection	Scale from	Scale to
HY.PhysicalWaters.ManMadeObject	Point	Dolphin (smaller)	1:1	1:72 000
HY.PhysicalWaters.ManMadeObject	Line	Dolphin (normal)	1:1	1:72 000
HY.PhysicalWaters.ManMadeObject	Line	Dam, lock, sluice including water pipe/water chute), quay, pier, jetty, pile fendering, guide jetty, aqueduct	1:1	1:72 000
HY.PhysicalWaters.HydroPointOfInterest	Line	Rapids and falls	1:1	1:72 000
HY.Network	Line	Watercourse link	1:1	1:72 000
HY.Network	Point	Node	1:1	1:72 000
HY.PhysicalWaters.Wetland	Surface	Wetland	1:1	1:72 000
HY.PhysicalWaters.LandWaterBoundary	Line	Landwater boundary	1:1	1:72 000
HY.PhysicalWaters.Waterbodies	Suface	Standing water and watercourse, width > 6 metres	1:1	1:72 000

Layer	Information type	Selection	Scale from	Scale to
HY.PhysicalWaters.Waterbodies	Line	Water-course, width < 6 metres	1:1	1:72 000

3.2 Information for printing

The maximum image size in the service is 4096*4096 pixels in order to facilitate the printing of map images in a larger paper format and/or in higher resolution. Users of the system are urged to only extract the largest image size as needed in connection with printing, in order to avoid performance issues.