LANTMÄTERIET

2023-03-03

PRODUCT DESCRIPTION

Hydrography Download Service

DOCUMENT VERSION: 2.3
SERVICE'S INTERFACE VERSION: 1.1

Figure 1. Illustration of a hydrographic network.

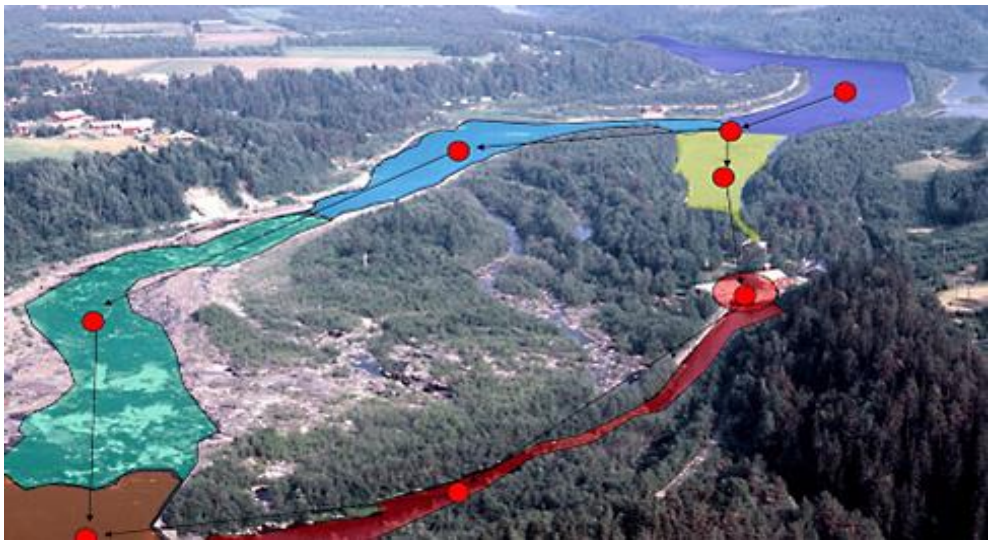


Table of contents

1 General description

1.1 Contents

This document describes the contents of the product Hydrography Download Service and how it is structured on delivery. The Hydrography Download Service contains hydrographic information structured according to INSPIRE data specifications and the Swedish water standard SS637008:2015, such as lakes and watercourses together with associated information relating to these, for instance rapids, dams and waterfalls. The service also includes a geometric network in accordance with INSPIRE and a logical network in accordance with the Swedish water standard.

The service consists of 4 themes: logical networks in accordance with the Swedish water standard, physical waters in accordance with the Swedish water standard, geometric networks in accordance with INSPIRE and physical waters in accordance with Inspire. As a fifth choice there is a history file containing the changes that have occurred since the previous version of the product.

Data are nationwide, divided into main drainage basins, coastal areas and Norwegian product areas. Due to the amount of data, deliveries are made of one main drainage basin, coastal area or Norwegian product area per download.

The service contains hydrographic objects in the whole of Sweden. There are objects belonging to the national shoreline around the coast and the major inland lakes. In cases where drainage basins extend beyond national borders, foreign information with limited content is included. Foreign data is stored in separate files and can be viewed together with Swedish data.

1.2 Geographic coverage

The Hydrography Download Service contains hydrographic objects in the whole of Sweden. In cases where drainage basins extend beyond national borders, foreign information with limited content is included.

Information about areas where data is available.

1.3 Geographic cut-out

1.3.1 MAIN DRAINAGE BASINS

The main drainage basins are those which are relevant to Sweden, which flow to 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.

Observe that shorelines adjacent to the sea and enclosures adjacent to the sea are presented in the coastal areas and not in the main drainage basins.

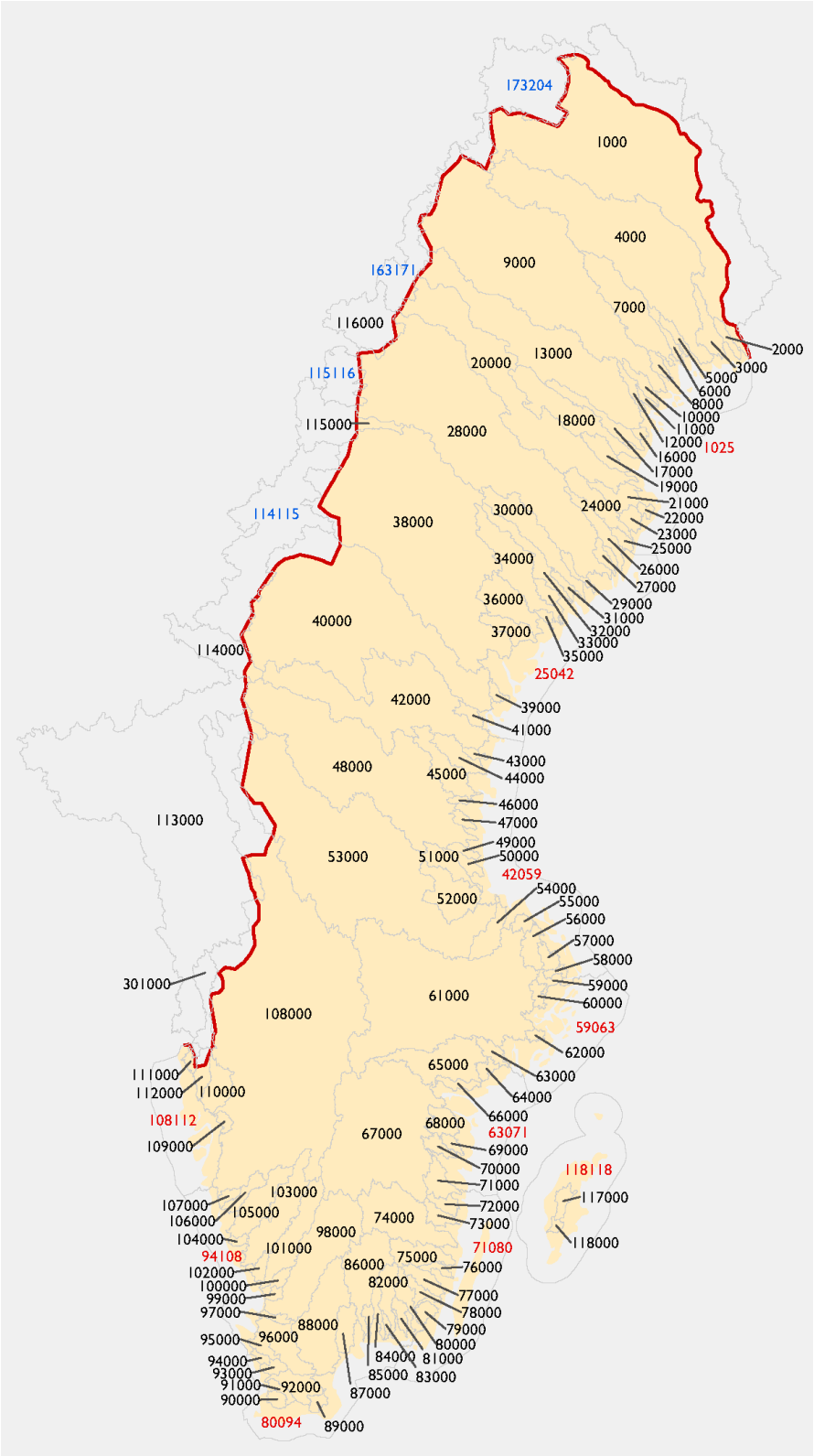
1.3.3 NORWEGIAN PRODUCT AREAS

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 2. Main drainage basins, coastal areas and Norwegian product areas with associated number codes.



MAIN DRAINAGE BASINS

Table 1. 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 2. 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	Gotland coastal area

NORWEGIAN PRODUCT AREAS

Table 3. Norwegian product areas with associated number codes.

Area number	Area name
114115	Between Nea and Vefsna
115116	Between Vefsna and Rana
163171	Saltdalsvassdraget_Hellemovassdraget
173204	North of Luleälven

1.4 Coordinate system

In plane: EPSG:3006 (SWEREF 99 TM), EPSG:4258 (SWEREF 99 latitud and longitude).

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

Networking of hydrography considerably increases its benefits to society. 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

The combination of different data, such as hydrographic and height information, also contribute to better analyses, primarily in climate-related areas. When Sweden and other EU countries supply data according to Inspire specifications, it becomes easier to carry out different types of environmental modelling and environmental analyses of large areas and across national borders.

2.2 Data capture

2.2.1 LINEAGE

The initial collection comes from Lantmäteriet'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.

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

2.3 Maintenance

2.3.1 MAINTENANCE FREQUENCY

Hydrographic objects are updated by Lantmäteriet 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 information in this download service will be updated annually from 2021 onward.

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.

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 Lantmäteriet 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.

The tolerance in Lantmäteriets databases is 0,002 m. If the tolerance is better in the users own systems, gaps less than 0,002 m might emerge between hydro lines. To avoid errors in the network due to these gaps, the users can increase the tolerance in their systems and thereby avoid these gaps to occur.

2.4.3 THEMATIC ACCURACY

Thematic accuracy between objects is very high for hydrography, with exception of 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 varies 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 4. Positional accuracy for different object types.

Quality area	The whole of Sweden		
Positional accuracy **Absolute Accuracy** Absolute accuracy	**ObjectType/Feature-Type**	**Planimetric (metres)**	**Height (metres)**
	Crossing	2	-
	DamOrWeir	2	2
	Falls	5	-
	LandWaterBoundary	5	2
	LandWaterBound-ary, blurred	10	2
	Lock	5	-
	Rapids	-	-
	ShorelineConstruc-tion	1 m/2* m	2
	Sluice	5	-
	StandingWater	10	2
	Watercourse	5	-
	Wetland	20	-

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 Lantmäteriet has set the requirement at 2 m.

3 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.

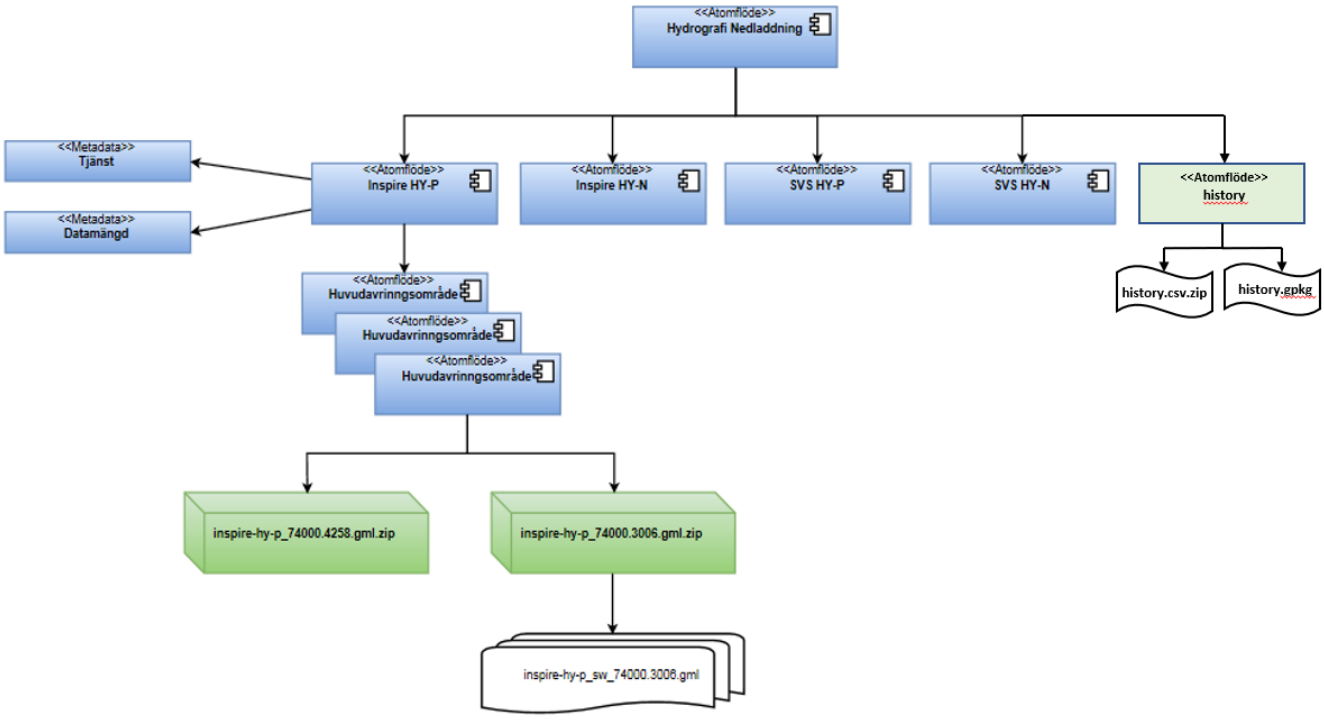
Finnish data presented in the service is derive from the services at the Finnish Environment Institute (SYKE).

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.

4 Contents of the delivery

4.1 Folder structure at delivery

Figure 3.Folder structure at delivery.



4.2 Delivery format

Delivery is made in GML v3.2. The corresponding flow for INSPIRE HY-P applies to all 4 flows.

4.2.1 SET OF FILES AND CONTENTS

The service consists of a flow, which in turn has sub-flows for each theme, giving a total of 4 themes.

- geometric network in accordance with INSPIRE
- logical network in accordance with the Swedish water standard
- physical waters in accordance with INSPIRE
- physical waters in accordance with the Swedish water standard

First the theme is selected, then a main drainage basin, a coastal area or a Norwegian product area and finally the coordinate system. Downloaded data is received in a zipped file.

The zip files are named: (standard)-(theme)_(haro).(reference system).(delivery format).zip.

(standard): can be inspire or svs.

(theme): can be hy-p (physical) or hy-n (network).

(haro): is the area number of the main drainage basin.

(reference system): EPSG:3006 (SWEREF 99 TM) or EPSG:4258 (SWEREF 99 latitude and longitude).

For hy-p, the zip files contain a GML file for each object type and nationality, i.e. a GML file for each object type containing Swedish data, a GML file for each object type containing Norwegian data and a GML file for each object type containing Finnish data.

For hy-n, the object types are packaged in one file, including the network in Swedish, Norwegian and Finnish parts.

As a fifth choice, in addition to the four themes mentioned above, a history file can be downloaded. It contains the changes that have occurred since the previous version of the product. The history comprises the lakes, watercourses (lines and polygons), centre lines and indistinct centre lines where there have been changes in the geometries. Here are the identities of new, removed and changed objects presented.

Note that the product according to Swedish water standard in some cases may lack Norwegian or Finnish GML files for the object type MainRiver even though there are Norwegian or Finnish GML files for the object type RiverReach. This is because objects that cross the national border, in this case MainRiver, are coded with Swedish nationality and are thus found in the Swedish GML file.

4.2.2 HOW TO DOWNLOAD DATA

The service is primarily developed for a machine-to-machine interface, a common web reader can normally not handle atom feeds. If you don't have access to such an interface, you can however use some web readers if you install an extension.

For Firefox you can download the extension below, which enables you to load down the product directly from the web reader:https://addons.mozilla.org/sv-SE/firefox/addon/feed-preview/.

1) Open the technical description for Hydrography Download Service, copy the link containing the access point (for Produktion) and then paste it into your web reader.
2) First choose the theme you are interested in, then the area you want to download, and last the coordinate system you want the data to be presented in.
3) Fill in your log-in information.
4) Unpack the zip-file you have downloaded.
5) Open the GML-files using a software that can read GML-files, for example QGIS.

A script is also available on the product web page, in order to facilitate download of all main drainage basins in one of the themes or all main drainage basins in all themes.

4.3 Description of the history file

The history file can be downloaded as a zipped csv-file or a GeoPackage-file.

The history file contains the following columns:

- Objektid: Identity of an object that existed in the previous product release but was changed in this release. As identities, aceid is used for watercourses (lines) and centre lines, vattenytaid is used for watercourses (polygons) and lakes.
- Objekttyp: Type av object; watercourse, lake, centre line or centre line indistinct.
- Haroid: Identity of the main drainage basin in which the object lies.
- Vattenytaid: Identity of the watercourse (polygon) or the lake in which the object lies (in case the object is a centre line).
- Vattendragsid: Identity of the main branch the object belongs to.
- Event: Type of event
    - GeometryChanged – the geometry has changed.
    - Split – the object has been split and new/resulting id's are shown in Affectedids.
    - Merge – the object has been merged and new/resulting id's are shown in Affectedids.
    - Deleted – the object has been deleted.

    - NewObject – new object since the previous product release, which hasn't been created via for example Split.
    - NewIDForGeometry – in some cases the object has been given a new id without changing.
    - GeometryChangedNewID – in some cases the object has been given a new id when the geometry has changed.
- Changefromdate: Previous time a change was made.
- Changetodate: Latest time a change was made.
- Affectedids: New/resulting object id's that have occurred due to an event.
- OBJECTID: A counter only existing in the GeoPackage file, not to be confused with Objektid here above.

In some cases, events regarding the same object can occupy more than one row.

4.4 Handling of identities in the product

When a new object is introduced into the data set it receives a new ID. When an object is divided into two, one object keeps its ID while the other object receives a new ID. When objects are merged together, the merged object keeps one of the objects ID.

The attribute BeginLifeSpanVersion of an object receives a new date whenever a new object is introduced or when the geometry or an attribute of an existing object is changed.

Also note that the same object identity (localId and gml_Id) on some RiverReach may occur in more than one main drainage basin.

4.5 Deviations from INSPIRE and the Swedish water standard in the product

The following deviations have been made from the specifications for INSPIRE and the Swedish water standard.

- Wetlands are not presented as correctly divided objects, instead they follow the division of the index tiles.
- To be able to combine data from INSPIRE and the Swedish water standard, Namespace for both services is stated as SE.LM.HY without an object type.

The following deviations also apply to INSPIRE:

- In cases where we have an attribute containing lists that do not require at least one element (0..*) and which also have no values to map to, such as GeographicalName, we have decided not to include any elements in the list (empty list = []). This is the most logical way to describe a list where data is missing. We thus exclude non-mapped elements in these cases without stating any reason why they are not presented. This implementation is also technically compatible with the schema.

- The attribute HydroId is not generally presented in the products. It is however presented as vattenytaid for watercourses (surfaces) and lakes (Watercourse polygon and StandingWater), in order to achieve a connection between watercourse links (WatercourseLink via the attribute relatedHydroObject) and these objects.

The following deviations also apply to the Swedish water standard.

- As a rule, we do not present the attribute HydroID in the water standard, but we specify this attribute in RiverReach, where HydroId contains the identity (vattenytaid) of the lake in which a centre line lies.
- In the logical network, watercourse surfaces and their IDs have been replaced with centre lines and their aceid (a unique guid for database objects) for better analysis capabilities. The network therefore consists of watercourses (line objects, including indistinct centre lines), centre lines in watercourse surfaces, and lakes.

For more information regarding included objects and attributes in the product, refer to INSPIRE knowledge base and Swedish Institute for Standards (SIS).

4.6 Object types Inspire/Swedish water standard

Table 5. Object types in INSPIRE and the Swedish water standard.

	INSPIRE v3.1		**Swedish water standard**
-cr	Crossing	-cr	Crossing
-dw	DamOrWeir	-dw	DamOrWeir
-fa	Falls	-fa	Falls
		-gs	GlacierSnowfield
-lo	Lock	-lo	Lock
-ra	Rapids	-ra	Rapids
-wc	Watercourse	-rr	RiverReach
		-wss	WaterSubSystem
		-mr	MainRiver
-lw	LandWaterBoundary	-shl	Shoreline
-sl	Sluice	-sl	Sluice

	INSPIRE v3.1		Swedish water standard
-cr	Crossing	-cr	Crossing
-sw	StandingWater	-sw	Standing Water
-sc	ShorelineConstruction		
-wl	Wetland	-wl	WetlandWaterBody
		-ol	OutFlowLocation
-n	Inspire Network		
		-n	SVS Network

4.6.1 INSPIRE NETWORK

Figure 4. INSPIRE Network.

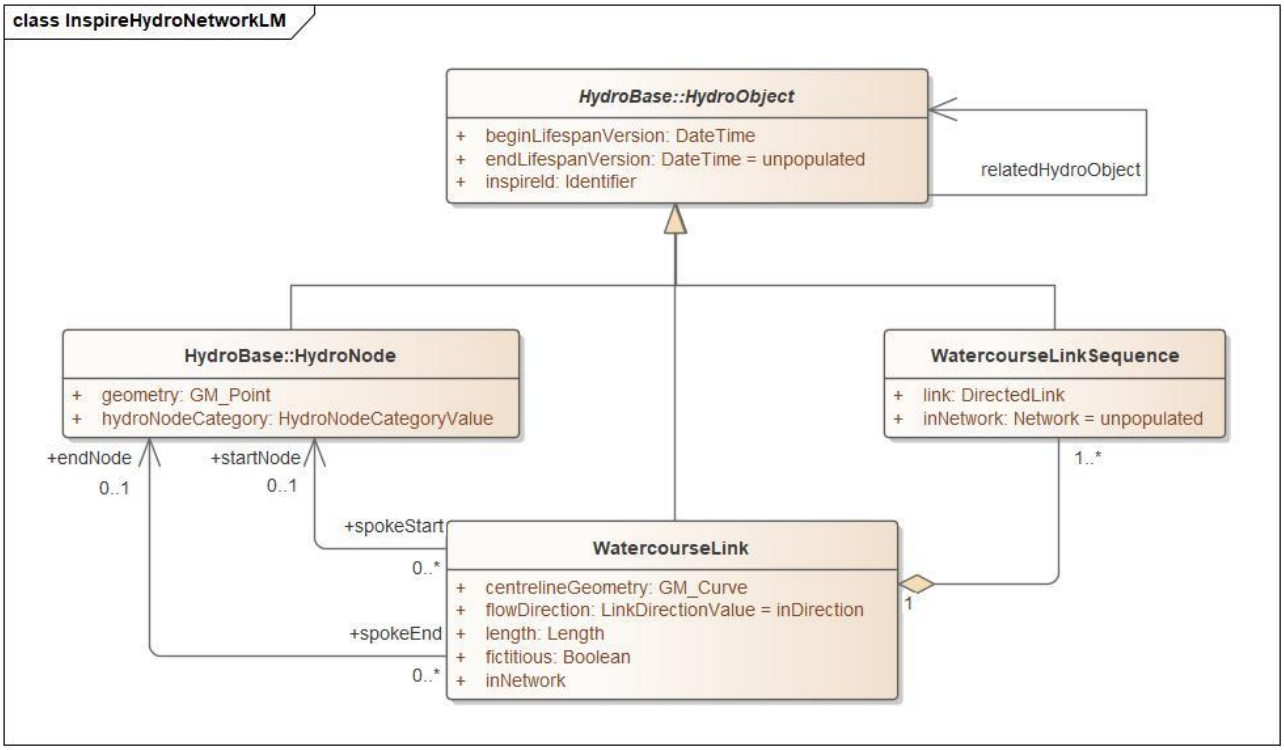


Table 6. Object types and attributes in the INSPIRE Network.

Object type/Description	**Attribute/Description**
HydroObject (Abstract) An identity basis for real-world hydrographic objects (including artificial).	+ BeginLifespanVersion: Time when the geometry or any of the attributes of the object was changed. + inspireId: Identifier + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). As identifier, vattendragsid is used for WatercourseLinkSequence and aceid is used for other objects.
HydroNode A node in a hydrographic network.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geometry: Geometry (point). + inNetwork: unpopulated. + hydroNodeCategory: unpopulated. + spokestart: Outgoing link (WatercourseLink). + spokeEnd: Incoming link (WatercourseLink).
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
WatercourseLink A segment of a watercourse in the hydrographic network, consisting of watercourses (lines), centre lines or indistinct centre lines. The INSPIRE network is a geometrical network with nodes and links. Single "loose" objects are not represented in the network or in this object, those watercourses are presented in the object Watercourse. *Centre lines*: Fictive lines through water surfaces that are required to build a coherent line network. They are always 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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + centrelineGeometry: Geometry (curve). + flowDirection: "inDirection". + length: Length in metres. + fictitious: "false" for watercourse, "true" for centre line in lake surface, centre line in watercourse surface and indistinct centre line. + inNetwork: unpopulated. + relatedHydroObject: Only presented for centre lines. Link to the lake (StandingWater) or watercourse surface (Watercourse polygon), via vattenytaid, in which a centre line lies. (A related hydrographic object representing the same real-world entity). + endNode: The link's end node (HydroNode). + startNode: The link's start node (HydroNode).

Object type/Description	Attribute/Description
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.	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
WatercourseLinkSequence A sequence of watercourse links that represent a route without branches through a hydrographic network. Single “loose” objects are not represented in the network or in this object, those watercourses are presented in the object Watercourse.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + inNetwork: unpopulated. + relatedHydroObject: unpopulated. + hydroid: unpopulated. + link: link to all the WatercourseLink included in the sequence, so that they are in correct order in the network. + direction: ”+”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.

4.6.2 INSPIRE PHYSICAL WATERS

Figure 5. INSPIRE Physical waters.

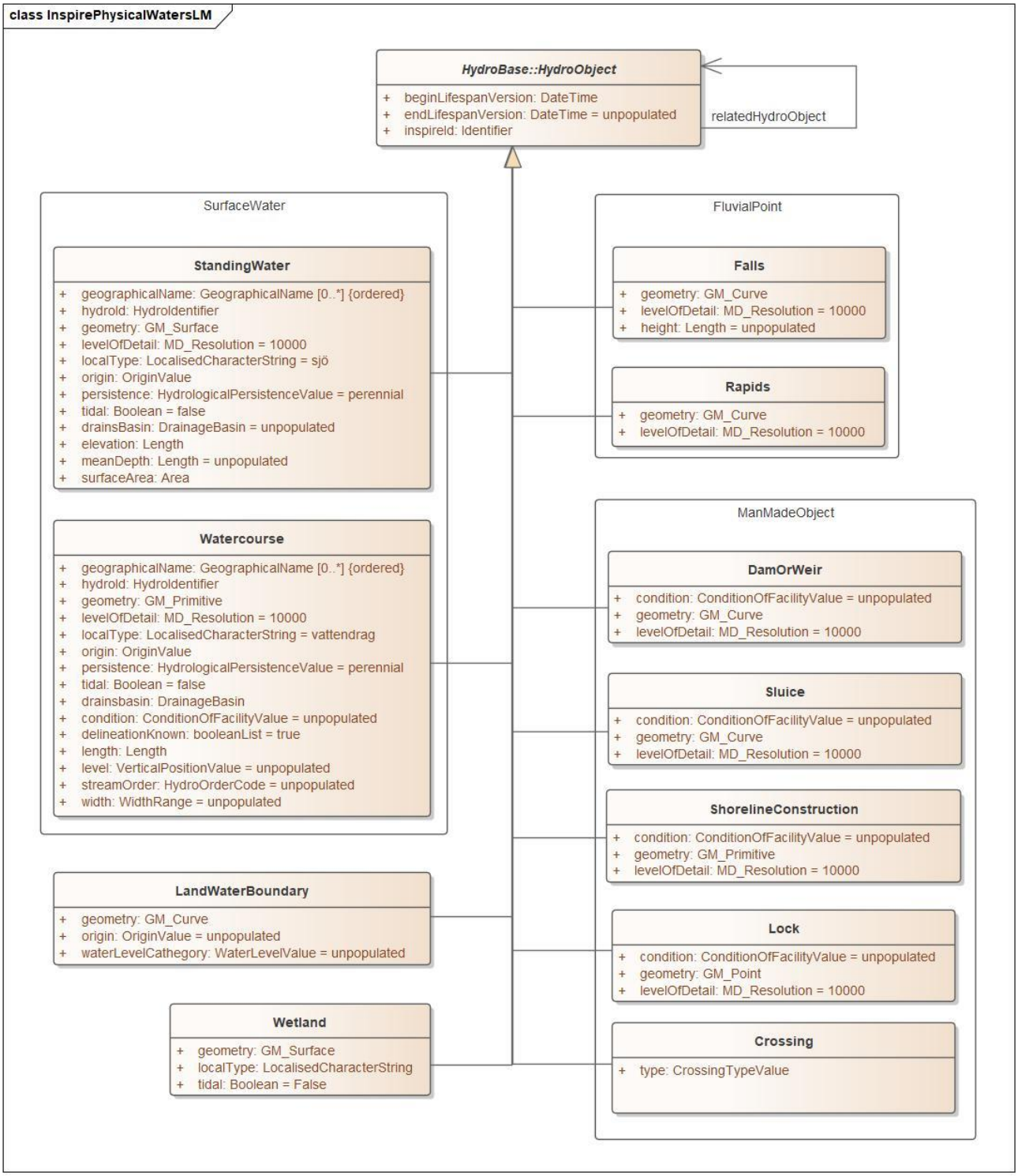


Table 7. Object types and attributes in INSPIRE Physical waters.

Objekttyp/Beskrivning	**Attribut/Beskrivning**
HydroObject (Abstract) An identity basis for hydrographic real-world objects (including artificial).	+ BeginLifespanVersion: Time when the geometry or any of the attributes of the object was changed. + inspireId: Identifier + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). As identifier, vattenytaid is used for StandingWater and Watercourse polygon, aceid is used for other objects.
StandingWater* A body of water which is 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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geographicalName: Name (spelling) of the lake, if name exists, might be specified in more than one language. Pronunciation is not presented. The name comes from Ortnamnsregistret. + hydroId: Same as inspireId. Used for connection between WatercourseLink och StandingWater. + geometry: Geometry for the surface. + levelOfDetail: ”10000”, i.e scale 1:10 000. + localType: “sjö” (lake). + origin: “natural” or “manMade”. + persistence: “perennial”. + tidal: “false”. + elevation: Elevation of the water surface in metres above sea level. If dammed up water, the highest water level is presented. + surfaceArea: Area of the lake surface in m². + meanDepth: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.

Objekttyp/Beskrivning	Attribut/Beskrivning
Watercourse* A natural or artificial flowing watercourse (the geometry could be a line or a surface). 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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geographicalName: Name (spelling) of the watercourse, if name exists, might be specified in more than one language. Pronunciation is not presented. The name comes from Ortnamnsregistret. + hydroId: Same as inspireId. Used for connection between WatercourseLink och Watercourse (polygon). + geometry: Geometry for line or surface. + levelOfDetail: ”10000”, i.e. scale 1:10 000. + localType: “vattendrag” (watercourse) or ”vattendragsyta” (watercourse surface). + origin: unpopulated. + persistence: “perennial”. + tidal: “false”. + drainsbasin: unpopulated. + delineationKnown: Only available for line objects and set to “true”, since watercourse below ground is not presented here. + length: Length on the watercourse in metres. Only presented for line objects, not for surface objects. + level: unpopulated. + width: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
LandWaterBoundary The line where a land mass is in contact with a body of water. Here are landwaterboundaries neighbouring to sea, standing water, water-course surfaces, glaciers and manmade waters presented, as well as closing lines and closing lines neighbouring to sea.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geometry: Geometry for the landwater boundary (curve). + origin: unpopulated. + waterLevelCathegory: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.

Objekttyp/Beskrivning	Attribut/Beskrivning
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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geometry: Geometry for the surface. + localType: Name of the object type; ”sankmark, fast” (wetland, solid) or ”sankmark, våt” (wetland, wet). + tidal: “false”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
ShorelineConstruction An artificial structure with a fixed position on land that is adjacent to a body of water. *Jetty:* 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. *Pile fendering:* Only shown within NSL areas. Pile fenderings longer than 8 m are shown. *Guide jetty:* Only shown within NSL areas. Guide jetties longer than 8 m are shown. Shown coherently under bridges. *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. *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	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + condition: unpopulated + geometry: Geometry for the objects (boundary, centre line, point). + levelOfDetail: “10000”, i.e. scale 1:10 000.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.

Objekttyp/Beskrivning	Attribut/Beskrivning
measured from the shoreline and narrower than 6 m are shown. Only quays shown in the Swedish Maritime Administration database are mapped. *Dolphin:* Dolphin whose surface is less than 12 m² are shown as Small dolphin, others as Normal dolphin.	
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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geometry: Geometry (curve). + levelOfDetail: ”10000”, i.e. scale 1:10 000. + height: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
Rapids Part of a watercourse with a faster flow, where the bottom slopes down steeply, but there is not a sufficient 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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geometry: Geometry (curve). + levelOfDetail: ”10000”, i.e. scale 1:10 000.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + condition: unpopulated. + geometry: Geometry (point). + levelOfDetail: ”10000”, i.e. scale 1:10 000.

Objekttyp/Beskrivning	Attribut/Beskrivning
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + condition: unpopulated. + geometry: Geometry (curve). + levelOfDetail: ”10000”, i.e. scale 1:10 000.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + condition: unpopulated. + geometry: Geometry (curve). + levelOfDetail: ”10000”, i.e. scale 1:10 000.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.
Crossing A construction with the purpose to lead watercourses 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.	In addition to the inherited attributes from HydroObject, the following attributes are also presented: + geometry: Geometry (line). + condition: unpopulated. + levelOfDetail: ”10000”, i.e. scale 1:10 000. + type: ”Aqueduct”.

Objekttyp/Beskrivning	Attribut/Beskrivning
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.

* 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.

4.6.3 SWEDISH WATER STANDARD NETWORK

Figure 6.Swedish water standard Network.

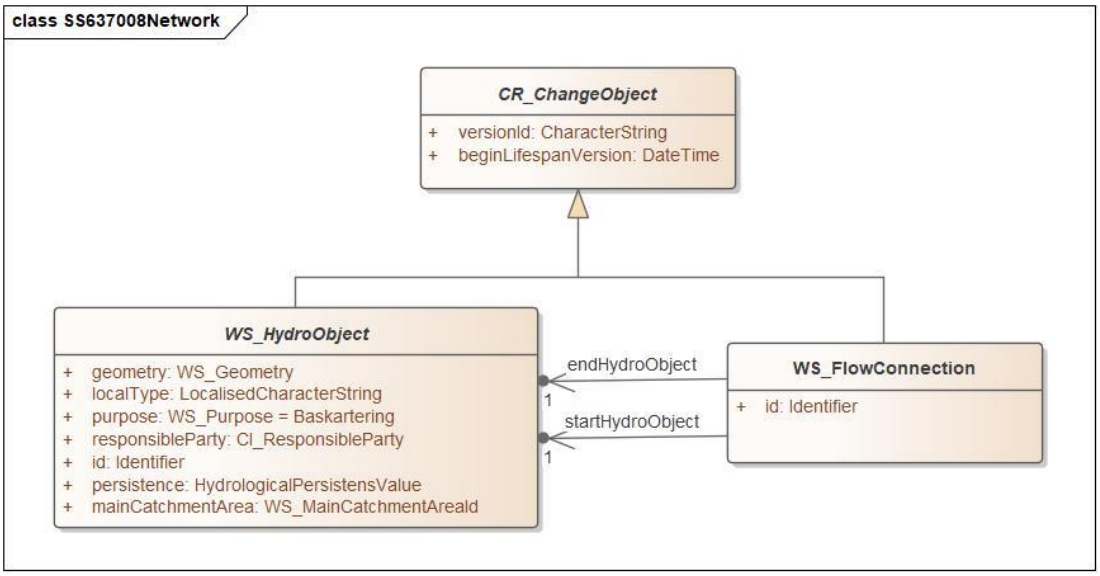


Table 8. Object types and attributes in Swedish water standard network.

Objekttyp/Beskrivning	Attribut/Beskrivning
CR_ChangeObject (abstract) Stores information on an object's metadata.	+ versionId: ”1”. + beginLifespanVersion: Time when the geometry or any of the attributes of the object was changed.

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_HydroObject (abstract) CR_ChangeObject is the basic class for WS_HydroObject and thus enables version management of all objects.	In addition to the inherited attributes from CR_ChangeObject, the following attributes are also presented: + geometry: Geometry for the object. + localType: Name for the different object types. + purpose: ”Baskartering”. + responsibleParty: ”Lantmäteriet”. + id: Identifier for the object + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). + persistence: ”perennial”. + mainCatchmentArea: Code for the main drainage basin in which the object lies.
WS_FlowConnection Object that describes the flow between HydroObjects in the network.	In addition to the inherited attributes from CR_ChangeObject, the following attributes are also presented: + id: Identifier for the object + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). + startHydroObject: The hydro object that constitutes the starting point for the flow. + endHydroObject: the hydro object that constitutes the end point for the flow.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier.

Comment: If QGIS is used, a problem arises which causes that not all the attributes in the logical network in accordance with the Swedish water standard are visible. Read more about XML schema files on the homepage of the Swedish water standard.

On that page you can also download a file with a description of how to handle this problem (zipfil med beskrivning QGIS projekt och gmlfiler). Among other things, this file states:

“When the GML file is read, all xlink attributes are normally removed, which makes it impossible to follow links that are in WS_FlowConnection, for example. It is possible to instead read the GML file via a QGIS plug-in (GML Loader) which allows the links to be read as individual fields, or that the attributes of the linked object are included. The disadvantage is that the number of fields becomes extremely large, since all the fields in the linked tables are shown."

In this case all the fields are seen, but the entire search paths are then displayed in the attributes.

4.6.4 SWEDISH WATER STANDARD WATERBODY

Figure 7. Swedish water standard Waterbody.

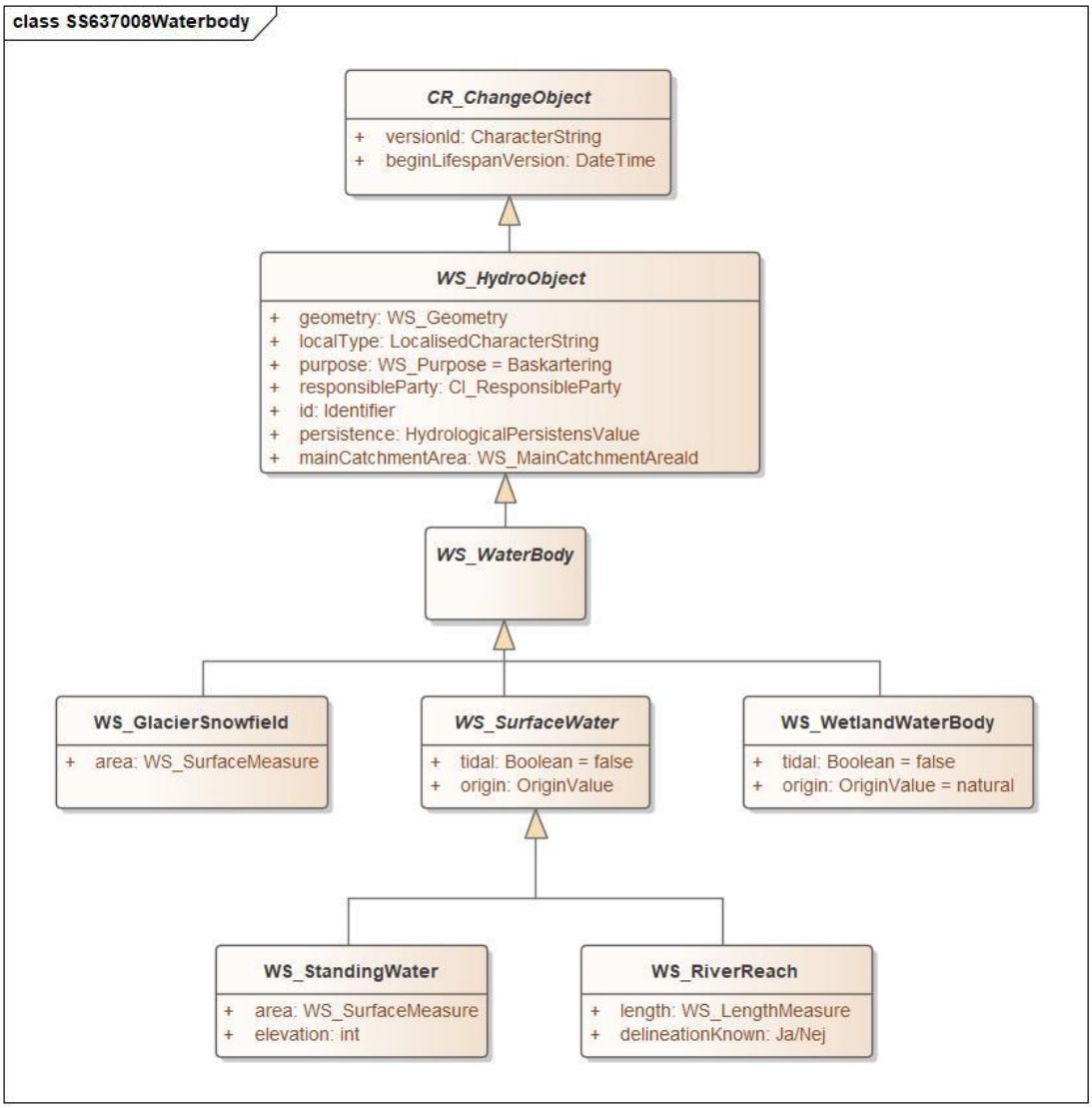


Table 9.Object types and attributes in the Swedish standard Waterbody.

Objekttyp/Beskrivning	Attribut/Beskrivning
CR_ChangeObject (abstract) Stores information on an object's metadata.	+ versionId: ”1”. + beginLifespanVersion: Time when the geometry or any of the attributes of the object was changed.

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_HydroObject (abstract) CR_ChangeObject is the basic class for WS_HydroObject and thus enables version management of all objects.	In addition to the inherited attributes from CR_ChangeObject, the following attributes are also presented: + geometry: Geometry for the object. + localType: Name for the different object types. + purpose: ”Baskartering”. + responsibleParty: ”Lantmäteriet”. + id: Identifier for the object + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). As identifier, vattenytaid is used for StandingWater and aceid is used for other objects. + persistence: ”perennial”. + mainCatchmentArea: Code for the main drainage basin in which the object lies.
WS_Waterbody Water body - delimited accumulation of water.	Contains inherited attributes from Hydroobject.
WS_GlacierSnowfield Glacier - body of surface water consisting of solid water that is in motion and varies in extent but remains for several years.	In addition to the inherited attributes from Waterbody, the following attributes are also presented: + localType: ”glaciär” (glacier). + area: Area of the glacier surface in m². + origin: ”natural”. + geographicalName: Name (spelling) of the glacier, if name exists, might be specified in more than one language. Pronunciation is not presented. The name comes from Ortnamnsregistret.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: ”Produkt”. + geometrySource: ”Lantmäteriet”.
WS_SurfaceWater Surface water - standing or flowing water located above the surface of the land.	In addition to the inherited attributes from Waterbody, the following attributes are also presented: + tidal: ”false”. + origin: ”natural” or ”manMade”.

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_WetlandWaterBody Wetland water body - body of shallow water with a water surface or an area of land that is wet throughout the year. 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 at least 500 m².	In addition to the inherited attributes from Waterbody, the following attributes are also presented: + localType: ”sankmark, fast” (wetland, solid) or ”sankmark, våt” (wetland, wet). + tidal: ”false”. + origin: ”natural”. + area: Area of the surface in m².
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: ”Produkt”. + geometrySource: ”Lantmäteriet”.
WS_StandingWater* Body of surface water - permanent, extensive body of surface water on land without a significant rate of flow. 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.	In addition to the inherited attributes from Surface Water, the following attributes are also presented: + localType: ”sjö” (lake). + area: Area of the surface in m². + elevation: Elevation of the water surface in metres above sea level. If dammed up water, the highest water level is presented. If the attribute lacks value, -999 is presented. + origin: ”natural” or ”manMade”. + geographicalName: Name (spelling) of the lake, if name exists, might be specified in more than one language. Pronunciation is not presented. The name comes from Ortnamnsregistret.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_RiverReach* River reach - surface water body with significant flow rate delimited by two water exchange locations. The shortest distance shown for watercourses not connecting hydrographic map objects (e.g. lakes and wetlands) is 250 m. Within the coverage area for the Mountain Map 1:50 000 and the Mountain Map 1:100 000 (mountain region), simplified display is applied. Here are, in addition to watercourses, also centre lines and indistinct centre lines presented. Watercourses under ground are presented as indistinct centre lines.	In addition to the inherited attributes from Surface Water, the following attributes are also presented: + localType: ”vattendrag” (watercourse), ”stomlinje” (centre line) or ”stomlinje, otydlig” (centre line, indistinct). + origin: ”natural” or ”manMade” (canals, mainly larger ones are presented). + length: Length of the watercourse in metres. + geographicalName: Name (spelling) of the watercourse, if name exists, might be specified in more than one language. Pronunciation is not presented. The name comes from Ortnamnsregistret. + delineationKnown: ”true” for watercourse, ”false” for centre line in lake surface, centre line in watercourse surface, indistinct centre line. + HydroId: contains vattenytaid of the lake in which a centre line lies. + Complex: points to the MainRiver (via vattendragsid) a centre line or a watercourse belongs to. + Complex: points to the WaterSubSystem (via vattenytaid) in which a centre line lies.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: ”Produkt”. + geometrySource: ”Lantmäteriet”.

* 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.

4.6.5 SWEDISH WATER STANDARD WATER LOCATIONS

Figure 8. Swedish water standard Water Locations.

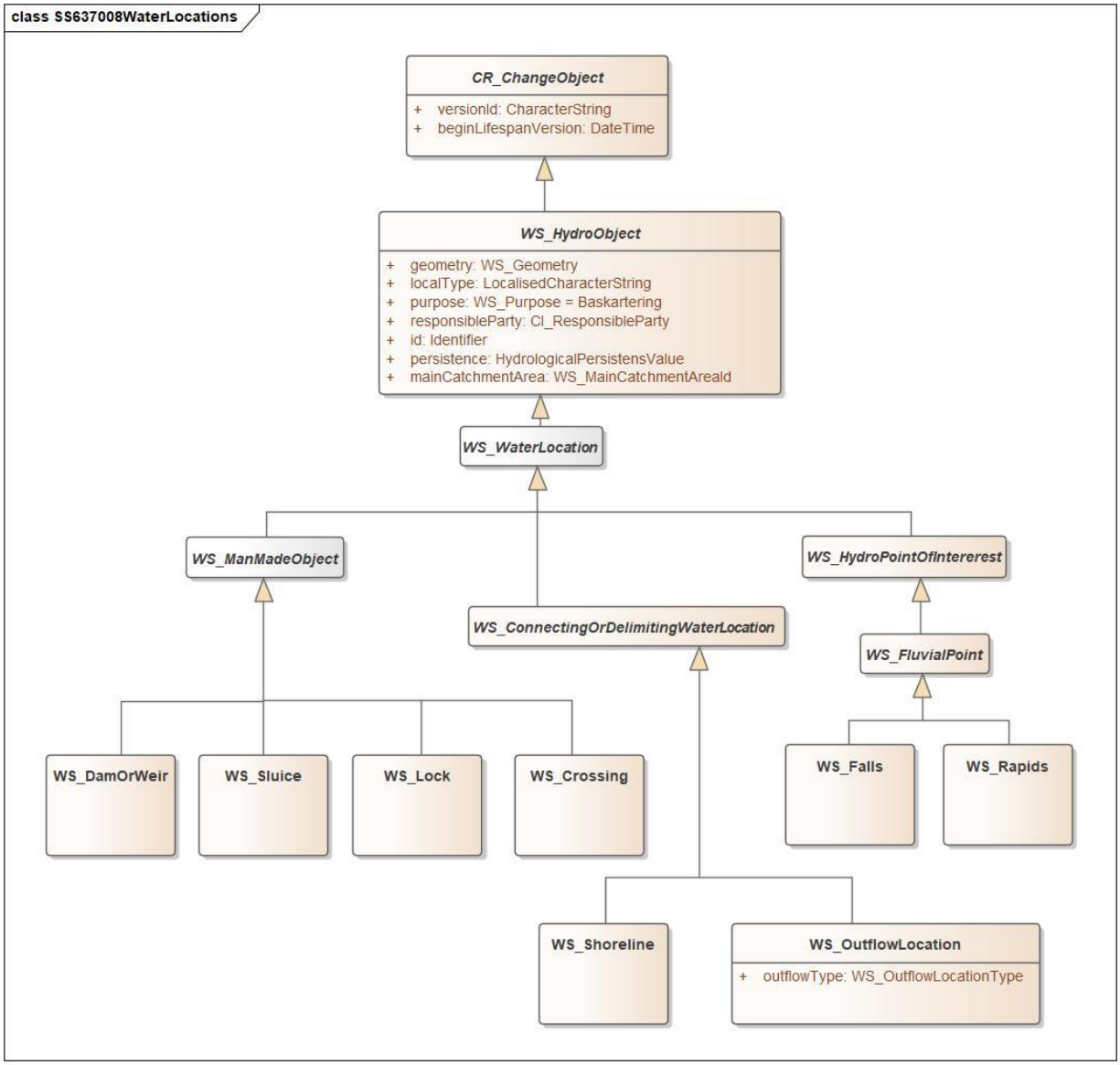


Table 10. Object types and attributes in the Swedish water standard Water Locations.

Objekttyp/Beskrivning	Attribut/Beskrivning
CR_ChangeObject	+ versionId: ”1”. + beginLifespanVersion: Time when the geometry or any of the attributes of the object was changed.

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_HydroObject (abstract) CR_ChangeObject is the basic class for WS_HydroObject and thus enables version management of all objects.	In addition to the inherited attributes from CR_ChangeObject, the following attributes are also presented: + geometry: Geometry for the object. + localType: Name for the different object types. + purpose: ”Baskartering”. + responsibleParty: ”Lantmäteriet”. + id: Identifier for the object + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). As identifier, aceid is used. + persistence: ”perennial”. + mainCatchmentArea: Code for the main drainage basin in which the object lies.
WS_WaterLocation Water location - point of interest in connection with body of water and/or water system.	
WS_ManMadeObject Man-made object - water location consisting of a man-made object within a water body that has one of the following function types: retains water; regulates quantity of water; changes the course of water; enables watercourses to cross each other.	
WS_ConnectingOrDelimitingWaterLocation Connecting or delimiting water location - water location where the exchange of water between bodies of water can occur.	
WS_HydroPointOfInterest Hydrographic point of interest - water location in or in connection with water that affects or changes the nature of the flow or hydrography.	
WS_FluvialPoint Fluvial point – hydrographically interesting place with special hydrological characteristics in a body of water.	

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_DamOrWeir Dam or weir – man-made object that constitutes a permanent barrier in a body of surface water and dams up water or controls 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.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”dammbyggnad” (dam). + origin: ”manMade”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.
WS_Sluice Man-made object that consists of an open, sloping water course (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.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”ränna” (sluice). + origin: ”manMade”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.
WS_Lock Lock – man-made object with two or a series of gates used to raise or lower vessels between different levels of water. Shown in full.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”slussport” (lock). + origin: ”manMade”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.
WS_Crossing A construction with the purpose to lead watercourses across an obstacle. The obstacle might be a valley, a road, a railroad or another watercourse. The aqueducts in Håverud,	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: “akvedukt” (aqueduct). + origin: “manMade”. + type: “Aqueduct”.

Objekttyp/Beskrivning	Attribut/Beskrivning
Kungs Norrby and Ljungsbro are presented.	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.
WS_Shoreline Shoreline – the boundary line that separates a body of surface water from land at the surface of the water.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”strandlinje” (shoreline). + shorelineType: Can be of type ”Hav” (Sea), ”Sjö” (Lake), ”Vattendragsyta” (Watercourse surface), ”Anlagt vatten” (Manmade water), ”Glaciärgräns” (Glacier boundary). The types ”Hav”, ”Sjö” and ”Vattendragsyta” can also be combined with ”Diffus” (Diffuse). + origin: ”natural”. + shoreComposition: unpopulated. + waterLevelCategory: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.
WS_Outflowlocation Outflow location – Closing lines between lakes and watercourse polygons and Closing lines between coast and watercourse polygons. In the list WS_OutflowLocationType Mynning (end of a main branch) is used for closing lines in the sea and Utlopp for all other closing lines.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”stängning” (closing line). + OutflowlocationType: Closing lines in the sea are stated as ”Mynning” (Mouth) and other closing lines as ”Utlopp” (Outlet). + origin: ”natural”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.

Objekttyp/Beskrivning	Attribut/Beskrivning
WS_Falls Waterfall – fluvial point where the water is in free fall from a height. Complete display in watercourses thatares at least about 20 m wide. In narrow watercourses down to about 6 m, only significant waterfalls are displayed.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”vattenfall” (falls). + origin: ”natural”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.
WS_Rapids Rapids – fluvial point where the river bed slopes down steeply and gives rise to strong currents or turbulent water. 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.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”fors” (rapids). + origin: ”natural”.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: “Produkt”. + geometrySource: “Lantmäteriet”.

Figure 9. Swedish water standard Water Complex.

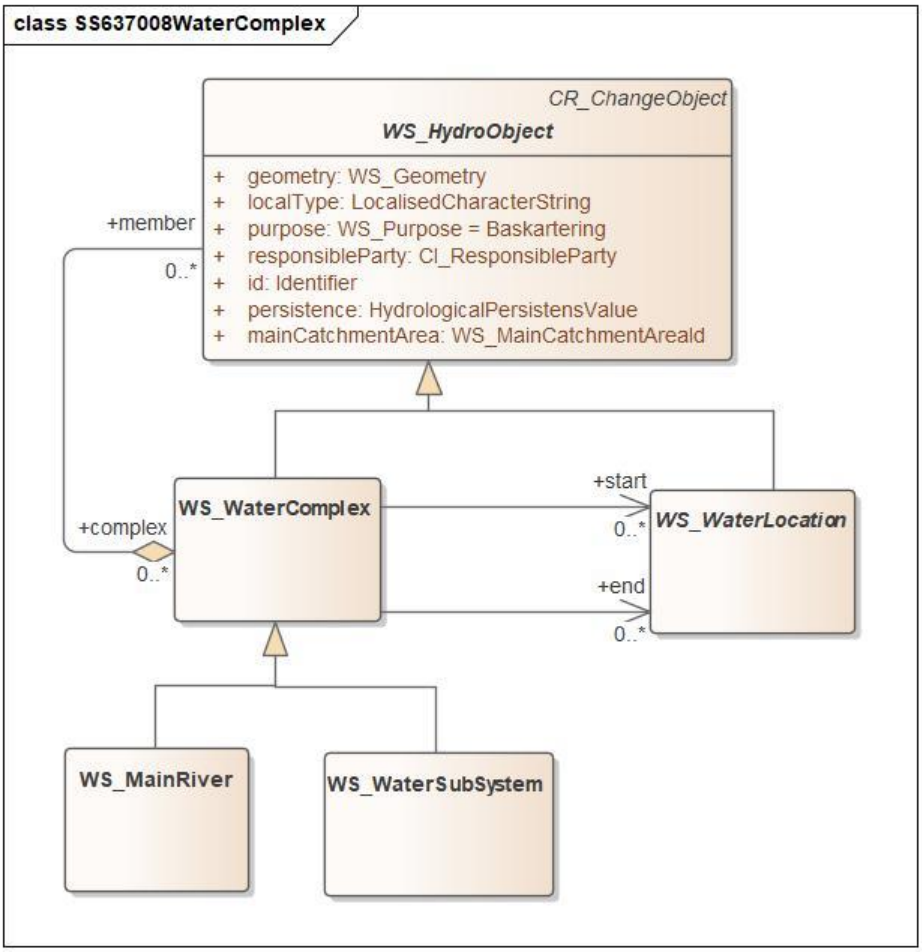


Table 11. Object types and attributes in the Swedish water standard Water Complex.

Objekttyp/Beskrivning	**Attribut/Beskrivning**
WS_HydroObject (abstract) CR_ChangeObject is the basic class for WS_HydroObject and thus enables version management of all objects.	Attributes from CR_ChangeObject: + versionId: ”1”. + beginLifespanVersion: Time when the geometry or any of the attributes of the object was changed. Also presented are: + geometry: Geometry for the object. + localType: Name of the different object types. + purpose: ”Baskartering”. + responsibleParty: ”Lantmäteriet”. + id: Identifier for the object + NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data). As identifier, vattendragsid

Objekttyp/Beskrivning	Attribut/Beskrivning
	is used for WS_MainRiver and vattenytaid is used for WS_WaterSubSystem. + persistence: ”perennial”. + mainCatchmentArea: Code for the main drainage basin, in which the object lies.
WS_WaterComplex Water complex – a gathering of several water objects.	
WS_WaterLocation Water location - point of interest in connection with body of water and/or water system.	
WS_MainRiver Main branch – a coherent waterway of surface waters in a surface water system, through which the largest amount of water runs from one of the springs to the mouth. Observe that main branches that are not included in any network are not presented in MainRiver either.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”huvudgren” (main branch). + origin: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: ”Produkt”. + geometrySource: ”Lantmäteriet”.
WS_WaterSubSystem Part of a water system consisting of watercourse surfaces, delimited by arbitrary chosen water locations.	In addition to the inherited attributes from Hydroobject, the following attributes are also presented: + localType: ”vattendragsyta” (watercourse surface). + geographicalName: Name (spelling) of the watercourse, if name exists, might be specified in more than one language. Pronunciation is not presented. The name comes from Ortnamnsregistret. + origin: unpopulated.
	In the gml-file some additional attributes according to the gml-specification are also presented, e.g.: + gml_id: NameSpace (SE.LM.HY for Swedish data, SE.LM.HY.NVE for Norwegian data, SE.LM.HY.SYKE for Finnish data) + Identifier. + geometryPurpose: ”Produkt”. + geometrySource: ”Lantmäteriet”.