National Hydro Network
Data Production Catalogue

Edition 1.2

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REVISION HISTORY

Date	Version	Description
June 2004	1.0	Original version
July 2004	1.0	Corrections to original version and addind of appendix
November 2004	1.1	Modifications highlighted in yellow. References to Linear Referencing System (LRS) deleted. External Event classes (Geometry, Line and Point) removed.
December 2004	1.2	Modifications highlighted in yellow. Certain attributes that related solely to External Event classes have been deleted. The Operation Type attribute has been deleted. Correction of bilingulal class names. Correction of certain hyperlinks. Addition of Island NID attribute to certain classes. Correction of the definition of the Island NID 1 and Island NID 2 attributes. Correction of the definition of the Junction Type attribute of NatProvTerr value.

FUTURE WORK

Key word	Description

TABLE OF CONTENT

OVERVIEW

The NHN Data Production Catalogue describes the feature and event classes and related attributes of the National Hydrographic Network Standards.

It is important to specify that the standard presented herein refers to a new database, the Geospatial Database (GDB). The concepts and management of NHN are based upon GBD – Standards and Specifications – April 2003.

Classes are grouped and presented according to different packages. A package groups a set of classes with a view to organizing the model into more abstract structures and achieving a higher-level view. In this catalogue, solely instanciable classes are presented.

Four packages are presented within the NHN Data Production Catalogue: *Hydro Network*, *Hydrographic*, *Hydro Events* and *Toponymy.*

The *Hydro Network* package contains the set of classes that form the linear network.

The *Hydrographic* package contains the set of classes that form the graphical representation of features related to the linear network.

The *Hydro Event* package contains attributive information that is referenced to *Hydro Network* geometry.

The *Toponymy* package associates geometries with official names.

The second part of the document describes the related attribute catalogue.

Appendix A presents spatial integrity constraints for NHN classes.

CLASSES CATALOGUE

REPRESENTATION

This section presents instructions related to feature representation.

The NHN catalogue lists the geometries authorized for each class of *Explicit Topographic Feature*. Classes of this catalogue can have a geometric or tabular representation.

1.GEOMETRIC REPRESENTATION

The Geospatial Database (GDB) defines three subclasses (geometric primitives or geometries):

- *Point*
- *Curve*
- and *Surface*

Point Graphic Class Ø

The class *Point* describes a geometric primitive with a dimension of 0 [ISO/TC 211211, DIS-19125-1]. A point is described by a single triplet of x, y, and z coordinates.

Line Graphic Class Đ

The abstract class *Curve* describes a geometric primitive with a dimension of 1 [ISO/TC 211211, DIS-19125-1]. A *Curve* is generally defined by a sequence of coordinates (2 or more). Specializations in this class define the type of interpolation between coordinates.

The class *Line* is a specialization of the class *Curve*. A line uses linear interpolation between each coordinate. A line is said to be *simple* when it does not go through the same point twice (it does not intersect itself). A line is said to be *closed* if its first and last points coincide. A *simple closed line* forms a *linear ring.*

Polygon Class Û

The abstract class *Surface* describes a geometric primitive with a dimension of 2 [ISO/TC211, DIS-19125-1].
The class *Polygon* is a specialization of the abstract class *Surface*. It represents a continuous image of a flat area. A polygon is composed of one and only one outer *linear ring*, and zero or more inner linear rings delimiting exclusions.

2.TABULAR REPRESENTATION

Aggregated Class ◇

A structured collection of components, where the components may have the same or different data structure, and where the data structure of the collection itself may also be a constituent part of a corresponding composite type.

Tabular Class

The tabular class contains attributive information that are referenced to geometry data.

CLASS DESCRIPTION

Feature and event classes are grouped:

1. by package
    2. presented by representation type
        3.in alphabetical order.

Each entry includes the class name, its definition, the list of related attributes, the association relations with other classes, the package with which the class is associated and the representation rules.

Specifically, these items are found:

CLASS NAME

This section corresponds to the topographic feature or event for which information is required.

DEFINITION

This section defines the feature or event as it pertains to the NHN.

ATTRIBUTES

This section presents the related attributes. Some of the atrributes attached to each class are in fact Object Metadata information that are processed like attributes. These are:

Object Metadata	Acquisition Technique, Completely Cover, Dataset Name, NID, Planimetric Accuracy, Provider, Validity Date

ASSOCIATION

This section presents the association with other features and events.

PACKAGE

This section presents the package with which the class is associated.

ATTRIBUTES CATALOGUE

Attributes are presented in alphabetical order. Each entry includes the name of the attribute, a definition, its format, a mandatory indication, a domain, and the features or events to which it relates.

Specifically, these items are found:

ATTRIBUTE NAME

This section corresponds to the attribute for which information is required.

DEFINITION

This section defines the attribute as it pertains to the NHN.

FORMAT

This section describes the format used to store the attribute.

MANDATORY

This section indicates if an attribute value is mandatory within the NHN.

DOMAIN

This section specifies restrictions on attribute domain values, as indicated below.

- Label
- Code
- Definition

If an attribute does not have a fixed domain, the value "None" is present.

CLASS(ES) or EVENT(S)

This section lists the name of the class(es) or event(s) related to the attribute.

CLASSES CATALOGUE

HYDRO NETWORK PACKAGE

RAPID ACCESS▶▶▶

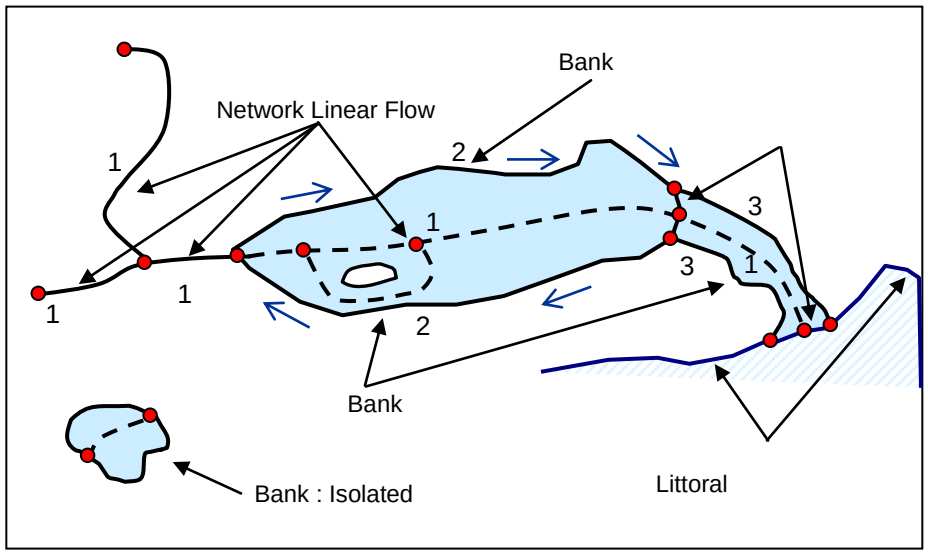
GEOMETRY CLASS

Bank Ð

Definition	Linear spatial representation delimiting all or part of an inland waterbody entity.
Attribute(s)	Acquisition Technique, Completely Cover, Dataset Name, Island NID, Isolated, NID, Operation Type, Permanency, Planimetric Accuracy, Provider, Shoreline Water Level, Validity Date, Water Definition, Waterbody NID
Association	constructs Hydrographic: Island, Hydrographic: Waterbody
Package	Hydro Network

Representation

Rule for direction: The ordering of vertices must allow that the water is always on the right side.



→ Ordering of vertices

● **Hydro Junction**	
1. Network Linear Flow 2. Bank : Lake 3. Bank : Watercourse	

Delimiter Ð

Definition A theoretical line inserted within a waterbody that is used to delimit:
1. Different region contiguous with one another (e.g. Lake from river, 2 intersecting double rivers).
2. Limit of presence of tides in a river.
3. Theoretical littoral limit.
4. Waterbody limit at a Provincial or Territorial limit.
5. Working unit region limit

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Delimiter Type, Island 1 NID, Island 2 NID, NID, Planimetric Accuracy, Operation Type, Provider, Validity Date, Waterbody 1 NID, Waterbody 2 NID

Association constructs Hydrographic: Waterbody, Hydrographic: Island

Package Hydro Network

Representation

Rule for direction: No specific rule for direction since there is water on both sides of a delimiter.

Not Illustrated

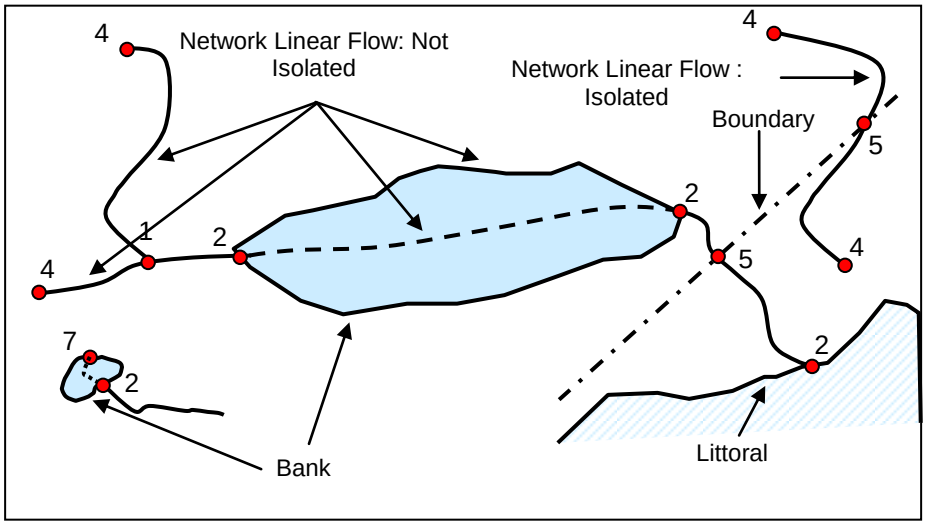
Hydro Junction Ø

Definition A Hydro Junction is a point entity that is always connected to one or more Network Linear Elements (NLEs).

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Junction Type, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydro Network

Representation



- **Hydro Junction Type**

1. Network Linear Flow
2. Network Linear Flow and Shoreline
3. Water Boundary Entity (not illustrated)
4. Start and End of Network Linear Element
5. NatProvTer
6. Network Linear Flow and Delimiter (not illustrated)
7. Start and End of Network connected to Bank

Littoral Ð

Definition Linear spatial representation representing the boundary between land and sea.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Island NID, NID, Operation Type, Planimetric Accuracy, Provider, Shoreline Water Level, Validity Date

Association constructs Hydrographic: Island

Package Hydro Network

Representation

Rule for direction: the ordering of littoral vertices must ensure that the waterbody is located to the right of the littoral.

Not Illustrated

Network Linear Flow Ð

Definition Linear spatial representation that traces the movement of water in a one-dimensional flow.

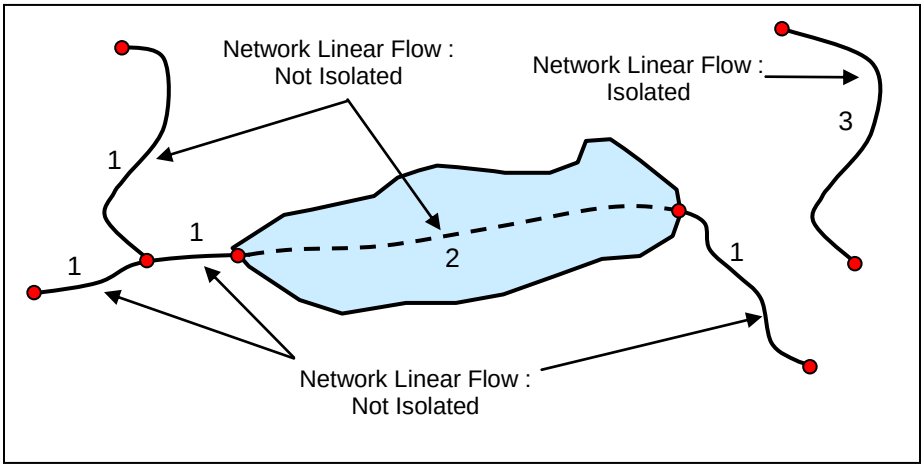
Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Flow Direction, Isolated, Level Priority, Network Flow Type, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydro Network

Representation

The line that represents a Network Linear Flow allows continuity of the waterway in the linear network. The location of the Network Linear Flow is the approximate centerline of the associated waterbody. The definition of a Network Linear Flow inside a waterbody is arbitrary. The network can flow on either or both sides of an island. When adjacent permanent and non-permanent polygons of water occur, the Network Linear Flow considers the entire area as a single water polygon through which continuity must be assured.

Rule for direction: the ordering of vertices must respect a downstream flow direction.



● **Hydro Junction**

1. Network Linear Flow : Observed, Not Isolated
2. Network Linear Flow : Inferred, Not Isolated
3. Network Linear Flow : Observed, Isolated

HYDROGRAPHIC PACKAGE

RAPID ACCESS▶▶▶

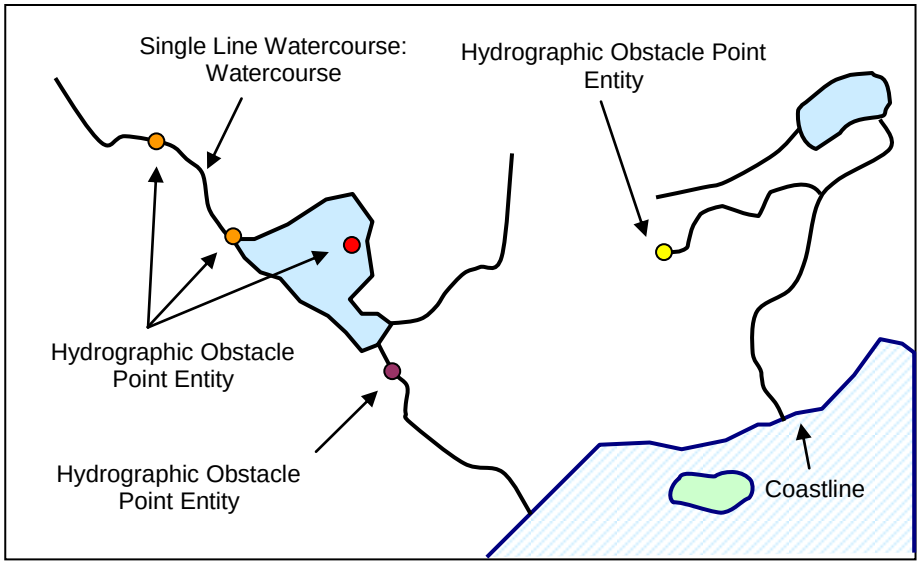
Hydrographic Obstacle Point Entity
Hydrographic Obstacle Line Entity
Hydrographic Obstacle Polygon Entity
Island
Manmade Hydrographic Point Entity
Manmade Hydrographic Line Entity
Manmade Hydrographic Polygon Entity
Single Line Watercourse
Waterbody

GEOMETRY CLASS

Hydrographic Obstacle Point Entity Ø

Definition	Point geometry spatial representation of an occurrence in which the natural flow of surface water is disturbed or impeded.
Attribute(s)	Acquisition Technique, Completely Cover, Dataset Name, NID, Obstacle Type, Operation Type, Planimetric Accuracy, Provider, Validity Date, NID,
Package	Hydrographic

Representation



- Hydrographic Obstacle Point Entity: Falls
- Hydrographic Obstacle Point Entity: Rapids
- Hydrographic Obstacle Point Entity: Rocks
- Hydrographic Obstacle Point Entity: Disappearing stream

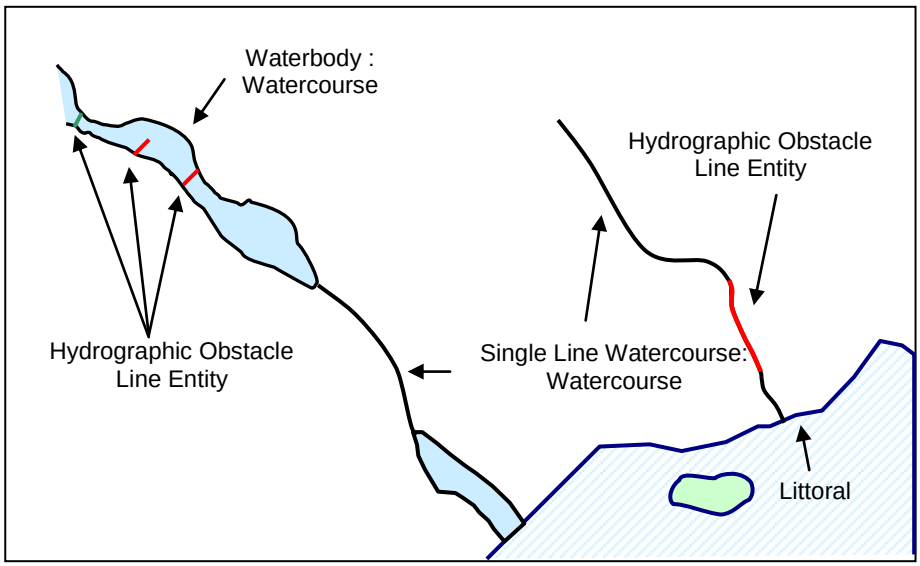
Hydrographic Obstacle Line Entity Ð

Definition Linear geometry spatial representation of an occurrence in which the natural flow of surface water is disturbed or impeded.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, NID, Obstacle Type, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydrographic

Representation



Hydrographic Obstacle Line Entity: Falls
Hydrographic Obstacle Line Entity: Rapids

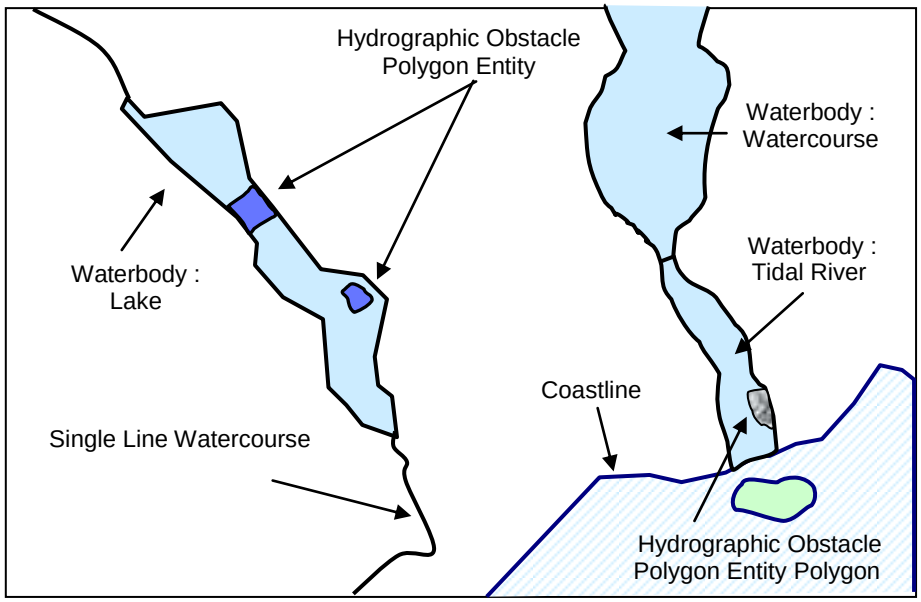
Hydrographic Obstacle Polygon Entity Û

Definition Polygonal spatial representation of an occurrence in which the natural flow of surface water is disturbed or impeded.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, NID, Obstacle Type, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydrographic

Representation



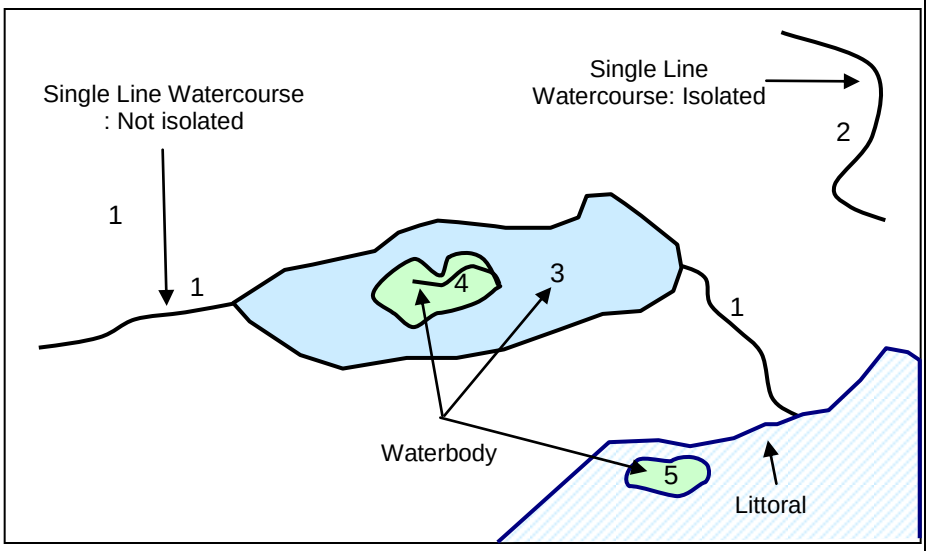
Hydrographic Obstacle Polygon Entity : Rapids

Hydrographic Obstacle Polygon Entity: Reefs

Island Û

Definition	Simple polygon with only an outer ring describing a land area surrounded by water, including Coastal Island and Sand Island.
Attribute(s)	Acquisition Technique, Coastal Island, Completely Cover, Dataset Name, NID, Operation Type, Planimetric Accuracy, Provider, Sand Island, Validity Date
Association	is constructed from — Hydro Network: Bank, Hydro Network: Delimiter, Hydro Network: Littoral
Package	Hydrographic

Representation



*The representation of the Island feature corresponds only to the outline of the piece of land.

1. Single Line Watercourse: Watercourse, Non Isolated
2. Single Line Watercourse : Watercourse, Isolated
3. Waterbody : Lake
4. Island : Non-Coastal Island
5. Island : Coastal Island

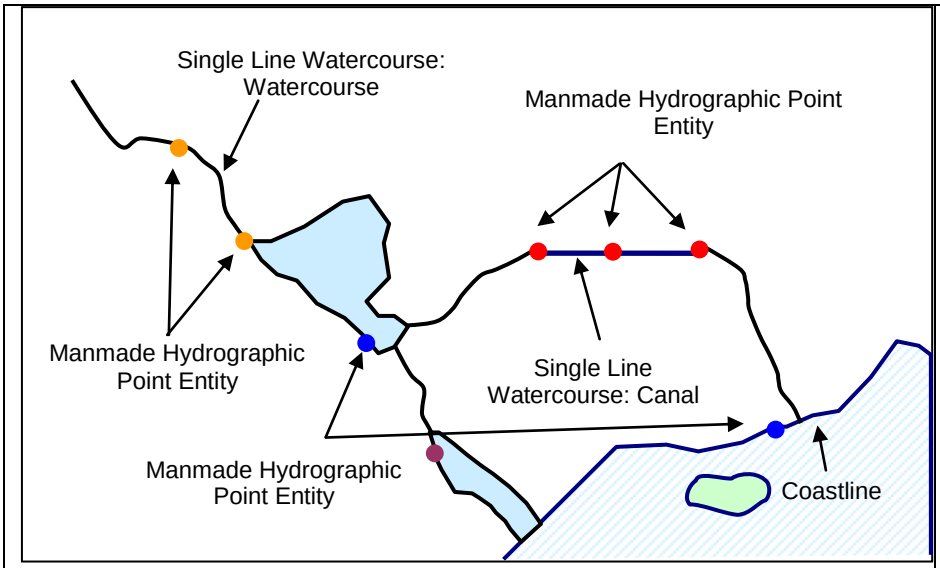
Manmade Hydrographic Point Entity Ø

Definition Point geometry spatial representation of a manmade structure constructed to facilitate access to a water resource or to control water level.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Manmade Status, Manmade Type, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydrographic

Representation



- Manmade Hydrographic Point Entity : Dam
- Manmade Hydrographic Point Entity: Fish Ladder
- Manmade Hydrographic Point Entity: Boat Ramp
- Manmade Hydrographic Point Entity: Lock Gate

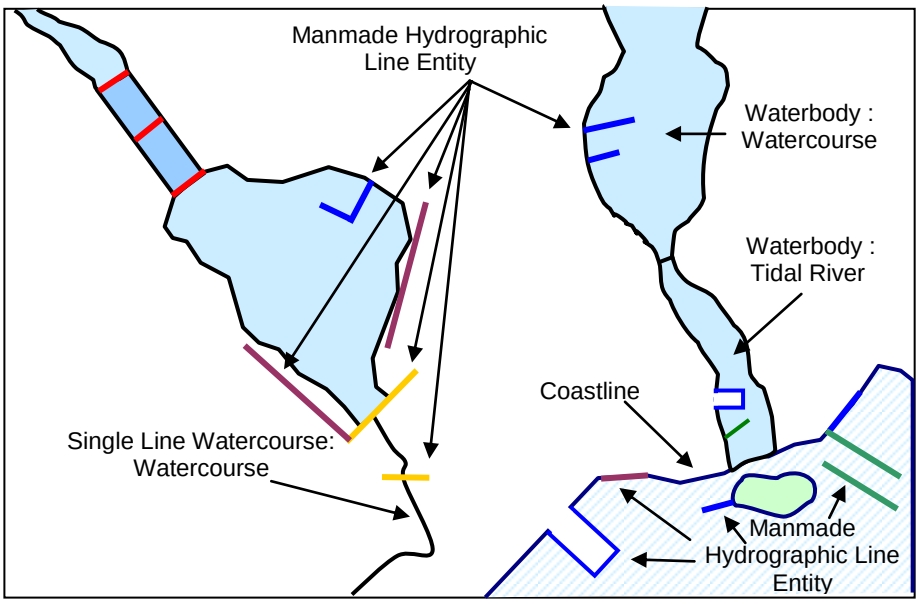
Manmade Hydrographic Line Entity Ð

Definition Linear spatial representation of a manmade structure constructed to facilitate access to water a resource or to control water level.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Manmade Status, Manmade Type, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydrographic

Representation



Manmade Hydrographic Line Entity: Dam
Manmade Hydrographic Line Entity: Wharf
Manmade Hydrographic Line Entity: Dike
Manmade Hydrographic Line Entity: Lock Gate
Manmade Hydrographic Line Entity: Breakwater

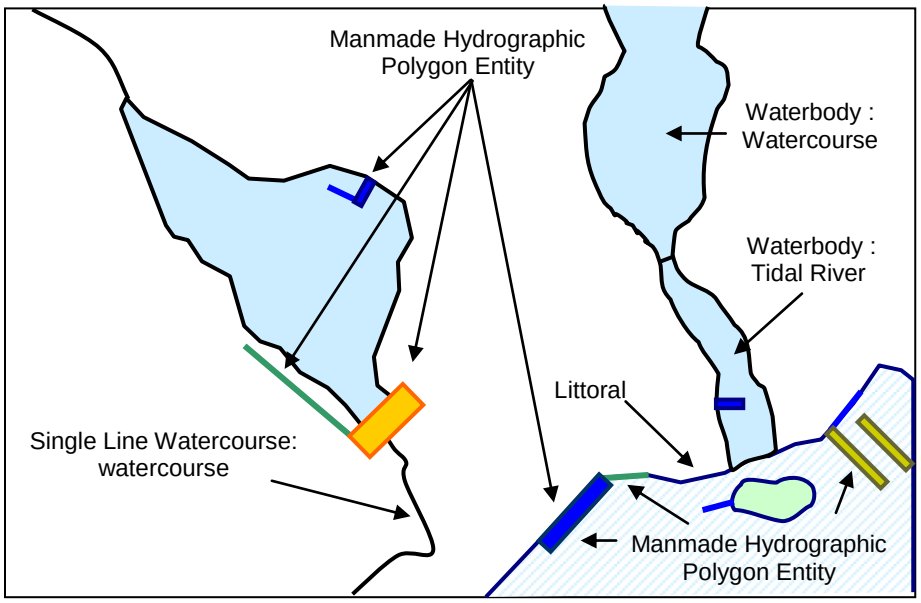
Manmade Hydrographic Polygon EntityÛ

Definition Polygonal spatial representation of a manmade structure constructed to facilitate access to a water resource or to control water level.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Manmade Status, Manmade Type, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydrographic

Representation



Manmade Hydrographic Polygon Entity : Dam
Manmade Hydrographic Polygon Entity: Wharf
Manmade Hydrographic Line Entity: Dike
Manmade Hydrographic Polygon Entity: Breakwater

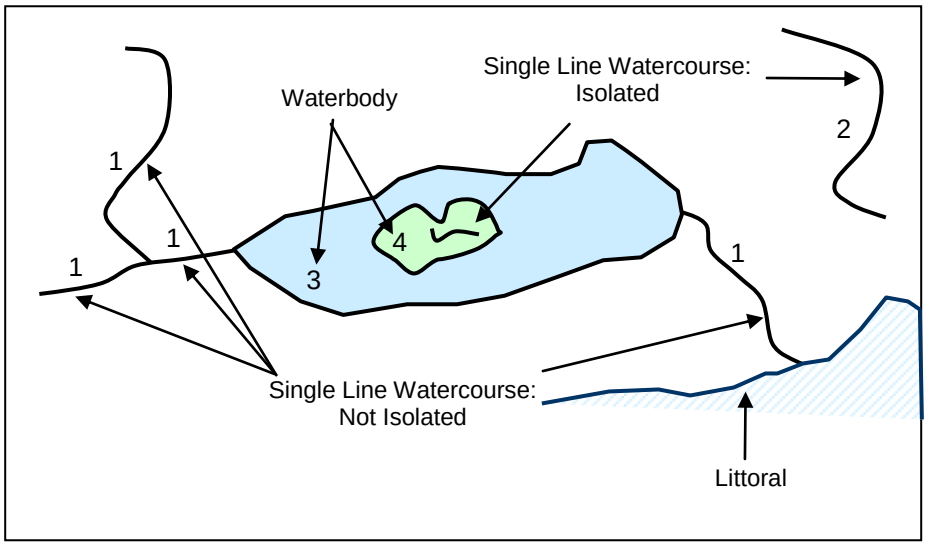
Single Line Watercourse Ð

Definition Linear descriptions of the course taken by a narrow natural or artificial flow of water over the earth's surface. The minimum and maximum widths for this type of water flow are defined according to capture scale resolution.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Isolated, NID, Operation Type, Permanency , Planimetric Accuracy, Provider, Validity Date, Water Definition

Package Hydrographic

Representation

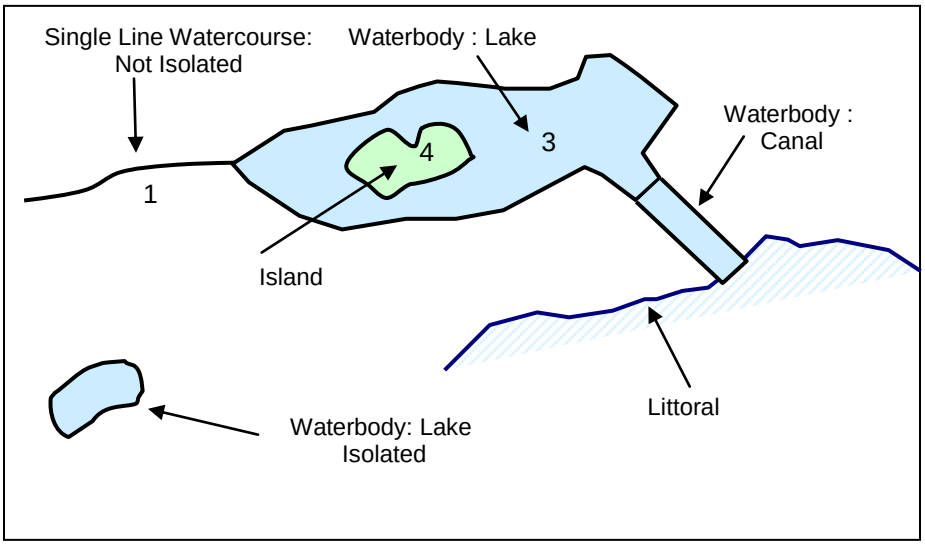


1. Single Line Watercourse : Watercourse, Not Isolated
2. Single Line Watercourse: Watercourse, Isolated
3. Waterbody: Lake
4. Island : Non-Coastal

Waterbody Û

Definition	A Waterbody feature with sufficient width such that it is represented by a polygon. This polygon is described by one or more bank and delimiter.
Attribute(s)	Acquisition Technique, Completely Cover, Dataset Name, Isolated, NID, Operation Type, Permanency , Planimetric Accuracy, Provider, Validity Date, Water Definition
Association	is constructed from Hydro Network: Bank, Hydro Network: Delimiter
Package	Hydrographic

Representation



1. Single Line Watercourse : Watercourse, Not Isolated
2. Waterbody Canal
3. Waterbody: Lake
4. Island; Non-Coastal

Rule for direction: the ordering of vertices must be clockwise, taking into account that the segments compose a ring describing the boundary of a water polygon in the hydrographic package.

HYDRO EVENTS PACKAGE

RAPID ACCESS▶▶▶

Flow Property Event
Manmade Line Event
Manmade Point Event
Obstacle Line Event
Obstacle Point Event

GEOMETRY CLASS

Flow Property Event

Definition A linear event describing the properties of a Network Linear Flow section according to its water velocity and usage.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Network Linear Element Code, Network Linear Element NID, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date, Water Definition

Package Hydro Events

Manmade Line Event

Definition A manmade structure constructed to facilitate access to a water resource or to control water level occurring on a linear portion of a Network Linear Element.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Hydrographic Entity Code, Manmade Hydrographic Entity NID, Manmade Type, Manmade Status, Network Linear Element Code, Network Linear Element NID, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydro Events

Manmade Point Event

Definition A manmade structure constructed to facilitate access to water resource or to control water level occurring on a point portion of a Network Linear Element.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Hydrographic Entity Code, Manmade Hydrographic Entity NID, Manmade Type, Manmade Status, Network Linear Element Code, Network Linear Element NID, NID, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydro Events

Obstacle Line Event

Definition An occurrence occurring on a linear portion of a Network Linear Element in which the natural flow of surface water is disturbed or impeded.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Hydrographic Entity Code, Network Linear Element Code, Network Linear Element NID, NID, Obstacle Hydrographic Entity NID, Obstacle Type, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydro Events

Obstacle Point Event

Definition An occurrence occurring on a point portion of a Network Linear Element in which the natural flow of surface water is disturbed or impeded.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Hydrographic Entity Code, Network Linear Element Code, Network Linear Element NID, NID, Obstacle Hydrographic Entity NID, Obstacle Type, Operation Type, Planimetric Accuracy, Provider, Validity Date

Package Hydro Events

TOPONYMY PACKAGE

RAPID ACCESS▶▶▶

Hydro Traversal
Toponymy Collection
Hydrographic Entity Association
Hydro Traversal Association
Named Feature Association
Named Line Feature
Named Point Feature
Named Polygon Feature

AGGREGATE CLASS

Hydro Traversal ◇

Definition	A collection of simple Line Strings issued from a Hydro Network Linear Flow forming a continuous, unique path. Each route is a continuous sequence of Network Linear Flow.
Attribute(s)	NID, Network Linear Flow NID
Association	defines Toponymy Collection
Package	National Toponymy Model

Toponymy Collection ◇

Definition	A collection of geometries forming a hydrographical feature that bears an official name.
Attribute(s)	Association Date, NID, Toponymic NID
Association	aggregation from Hydro Traversal, Hydrographic: Hydrographic Entity, Named Line Feature, Named Point Feature, Named Polygon Feature
Package	National Toponymy Model

TABULAR CLASS

Hydrographic Entity Association

Definition	Association class allowing the identification of all entities in the Hydrographic package related to a specific Toponymy Collection.
Attribute(s)	Hydrographic Entity NID, Hydrographic Entity Class Code, Toponymy Collection NID
Package	National Toponymy Model

Hydro Traversal Association

Definition	Association class allowing the identification of all the Hydro Traversal entities related to a specific Toponymy Collection.
Attribute(s)	Hydro Traversal NID, Toponymy Collection NID
Package	National Toponymy Model

Named Feature Association

Definition	Association class allowing the identification of all the Named Geometry features related to a specificToponymy Collection.
Attribute(s)	Named Feature Class Code, Named Feature NID , Toponymy Collection NID
Package	National Toponymy Model

GEOMETRY CLASS

Named Line Feature Ð

Definition The linear geometry representation of a toponym feature when different or not represented by existing topographic geometry.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Entity Type, NID, Operation Type, Planimetric Accuracy, Provider, Related NID, Validity Date

Package National Toponymy Model

Named Point Feature Ø

Definition The point geometry representation of a toponym feature when different or not represented by existing topographic geometry.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Entity Type, NID, Operation Type, Planimetric Accuracy, Provider, Related NID, Validity Date

Package National Toponymy model

Named Polygon Feature Û

Definition The polygon geometry representation of a toponym feature when different or not represented by existing topographic geometry.

Attribute(s) Acquisition Technique, Completely Cover, Dataset Name, Entity Type, NID, Operation Type, Planimetric Accuracy, Provider, Related NID, Validity Date

Package National Toponymy Model

ATTRIBUTES CATALOGUE

Attribute

Acquisition Technique

Definition The source of data used to populate the NHN.

Format Integer

Mandatory Yes

Domain [-1-7]

Label	Code	Definition
Unknown	-1	Impossible to determine the type.
None	0	No source value available.
Other	1	All possible values not explicitly mentioned in the domain.
GPS	2	
Orthoimage	3	
Orthophoto	4	
Digital Data	5	
Plan	6	
Field	7	

Class(es) Object Metadata

Attribute

Association Date

Definition Date relating to data association.. A known value in the format YYYY/MM.

Format Char (7)

Mandatory Yes

Domain None

Class(es) Toponymy Collection

Attribute

Coastal Island

Definition Tract of land surrounded by the sea.

Format Boolean

Mandatory Yes

Domain 0,1

Label	Code	Definition
No or False	0	Not a coastal island
Yes or True	1	Coastal Island

Class(es) Island

Attribute

Completely Cover

Definition This flag indicates if this set of metadata covers the full length of the Network Linear Element or only a portion of it.

Format Boolean

Mandatory Yes

Domain [-0-1]

Label	Code	Definition
No or False	0	Doesn't cover completely
Yes or True	1	Covers completely

Class(es) Object Metadata

Attribute

Dataset Name

Definition Province, territory, or country covered by the dataset.

Format Char (32)

Mandatory Yes

Domain List of valid dataset Name defined by a Province, Territory or other division of the territory (eg: watersheds) covered by the dataset.

Class(es) Object Metadata

Attribute

Delimiter Type

Definition A type assigned to the delimiter based on the characteristics of the waterbody regions this delimiter separates.

Format Integer

Mandatory Yes

Domain: [-2-5]

Label	Code	Definition
Unknown	-1	Impossible to determine the type.
None	0	No type value available.
Contiguous Waterbody	1	Used to separate two contiguous Waterbodies.
Tidal	2	Used to identify the portion of a Waterbody affected by the tide.
Coastline	3	Used to separate an ocean from its affluents.
Waterbody Limit at a Provincial or Territorial Limit	4	Used to identify a Waterbody at a Provincial or Territorial limit.
Working Unit Region Limit	5	Used to identify a Waterbody at a Working Unit Region. A working unit is defined as a sub-sub-basin defined by the atlas of Canada (http://atlas.gc.ca)

Class(es) Delimiter

Attribute

Entity Type

Definition Entity types of named topographic elements.

Format Integer

Mandatory Yes

Domain [1-8]

Marine Waterbody	1	A delineation representing the extents of a marine waterbody in part or in whole.
Fault Line	2	A delineation representing the extents of a fault line in the terrain.
Lanscape	3	A delineation representing the extents in part or in whole of a landscape area.

MassIce	4	A delineation representing the extents in part or in whole of a mass of permanent ice or snow.
Mountains	5	A delineation representing the extents in part or in whole of a range of mountains or elevated land.
Projection Of Land	6	A delineation representing the extents in part or in whole of a projection of land into a body of water.
Undersea Feature	7	A delineation representing the extents in part or in whole of a mass of an undersea feature.
Inland Water	8	Free waterbodies on continental surface; such as lakes, ponds, rivers.

Class(es) Named Line Feature, Named Point Feature, Named Polygone Feature

Attribute

Event Name

Definition A description of the non-NHN event available in the linked database.

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) External Line Event, External Point Event

Attribute

External Agency

Definition The name of the agency storing the external event.

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) External Geometry Event, External Line Event, External Point Event

Attribute

External ID

Definition The identifier of an event stored in another database. It may be an identifier assigned by a municipal, provincial, federal, or other agency. The purpose of these identifiers is to facilitate the transfer of data between different agencies (municipal, provincial, federal, or other agency) and to allow the data supplier to maintain a link between the NHN geometry and a Non-NHN geometry and/or event stored in another database.

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) External Geometry Event, External Line Event, External Point Event

Attribute

Flow Direction

Definition Indicates if the event follows the same direction as the digitizing of the Network Linear Element.

Format Integer

Mandatory Yes

Domain [1-3]

Label	Code	Definition
Same Direction	1	Event and Digitizing are in the same direction.
Opposite Direstion	2	Event and Digitizing are in the opposite direction.
N/A	3	While both sides are used.

Class(es) Network Linear Flow

Attribute

Hydrographic Entity Code

Definition The code of the table where the Hydrographic Entity comes from.

Format: Char (7)

Mandatory Yes

Domain List of valid Class Codes defined by NHN.

Class(es) External Geometry Event, External Line Event, External Point Event, Hydrographic Entity Association,Manmade Line Event, Manmade Point Event, Obstacle Line Event, Obstacle Point Event

Attribute

Hydrographic Entity NID

Definition A unique national identifier assigned to each Hydrographic Entity (foreign key).

Format UUID

Mandatory Yes

Domain: A UUID string representation (32 characters).

Class(es) Hydrographic Entity Association

Attribute

Hydro Traversal NID

Definition A unique national identifier assigned to each Hydro Traversal. (foreign key)

Format UUID

Mandatory Yes

Domain: A UUID string representation (32 characters).

Class(es) Hydro Traversal Association, Hydrographic Entity Association, Named Feature Association

Attribute

Island NID

Definition Reference to the NID of the Island that is associated to this feature (foreign key).

Format: UUID

Mandatory No

Domain: A UUID string representation (32 characters).

Class(es) Bank, Delimiter, Littoral

Attribute

Island 1 NID

Definition Reference to the NID of the Island that is associated to this feature when a delimiter crosses an Island (foreign key).

Format: UUID

Mandatory No

Domain: A UUID string representation (32 characters).

Class(es) Bank, Delimiter, Littoral

Attribute

Island 2 NID

Definition Reference to the NID of the Island that is associated to this feature when a delimiter crosses an Island (foreign key).

Format: UUID

Mandatory No

Domain: A UUID string representation (32 characters).

Class(es) Bank, Delimiter, Littoral

Attribute

Isolated

Definition Any Waterbody or Single Line Watercourse that has no connection with any other Waterbody or Single line Watercourse.

Any Bank that has no connection with delimiter (type 1,2,3) or Network Linear Flow (Observed).

A Bank describing an Island is isolated with respect to this rule, whether or not the Waterbody is isolated or not.

Any Network Linear Flow not connected to any other Network Linear Flow.

Format Booleen

Mandatory Yes

Domain [-0-1]

Label	Code	Definition
No or False	0	Not isolated
Yes or True	1	Isolated

Class(es) Bank, Network Linear Flow, Waterbody, Single Line Watercourse

Attribute

Junction Type

Definition A type assigned based on the network connectivity rules.

The different types of junctions are related to the linear elements associated with the intersection at the junction. These junction types serve to enforce connectivity rules.

Format Integer

Mandatory Yes

Domain : [-0-7]

Label	Code	Definition
None	0	No type value available.
Network Linear Flow	1	Connected to Network Linear Flow.
Network Linear Flow and Shoreline Element*	2	Connected to Network Linear Flow and Shoreline Element.
Water Boundary Entity	3	Connected to Water Boundary Element
Start and End of Network Linear Flow	4	Located at Start or End of Network Linear Flow
NatProvTer	5	Territorial limit for National, Provincial or Territorial boundary.
Network Linear Flow and Delimiter	6	Connected to Network Linear Flow and Delimiter
Start and End of Network connected to Bank	7	Source of Network

Class(es) Hydro Junction

*Correspond to entities Littoral or Bank entity
** Correspond to entities Littoral , Bank or Delimiter

Attribute

Level Priority

Definition Classification of Network Linear Flow based on the fact that a segment defines part of the main path or an alternate path across a waterbody.

Format Integer

Mandatory Yes

Domain [1-2]

Label	Code	Definition
Primary:	1	Main path
Secondary:	2	Alternate path

Class(es) Network Linear Flow

Attribute

Manmade Hydrographic Entity NID

Definition A unique identifier assigned to each NHN ManMadeHydrographic Entity (foreign key).

Format: UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) Manmade Line Event, Manmade Point Event

Attribute

Manmade Status

Definition The operational condition of a manmade structure at a specified time.

Format Integer

Mandatory Yes

Domain [-1-2]

Label	Code	Definition
Unknown	-1	Impossible to determine the status.
None	0	No status value available.

Operational	1	Ready for or in condition to undertake a destined function.
Abandoned	2	No longer suitable for a destined function.

Class(es) Manmade Hydrographic Point Entity, Manmade Hydrographic Line Entity, , Manmade Hydrographic Polygon Entity, Manmade Line Event, Manmade Point Event

Attribute

Manmade Type

Definition A manmade structure constructed to facilitate access to water resource or to control water level.

Format Integer

Mandatory Yes

Domain [-1-9]

Label	Code	Definition
Unknown	-1	Impossible to determine the type.
None	0	No type value available.
Dam	1	A manmade structure built across a water body or a watercourse to control the water flow.
Dock	2	The waterway extending between two piers or projecting wharves or cut into the land to receive ships.
Wharf	3	A structure built along or at an angle to the shore of navigable waters so that ships may lie alongside to receive and discharge cargo and passengers.
Breakwater	4	A structure for breaking the force of waves to protect a beach, harbour, or other waterfront facilities.
Dike/Levee	5	An embankment built to restrict the flow of water or other liquids
Lock Gate	6	A gate on a navigable canal used to raise or lower the water level so that boats may pass from one level to another.
Boat Ramp	7	A sloped area partially above and partially below the water surface used for launching or landing watercraft.
Fish Ladder	8	A constructed series of pools arranged like steps to enable fish to pass an obstacle. Fish ladders are also referred to as fish ways, fish passes, and fish passage facilities.
Slip	9	A substructure serving as a place for building or repairing ships.

Class(es) Manmade Hydrographic Point Entity, Manmade Hydrographic Line Entity , Manmade Hydrographic Polygon Entity, Manmade Point Event, Manmade Line Event

Attribute

Named Feature Code

Definition The code of the table where the Named Feature comes from.

Format: Char (7)

Mandatory Yes

Domain List of valid Class Codes defined by a NHN.

Class(es) Named Feature Association

Attribute

Named Feature NID

Definition A unique national identifier assigned to a Named Feature Geometry.

Format UUID

Domain A UUID string representation (32 characters).

Class(es) Named Feature Association

Attribute

Network Flow Type

Definition Mode of creation of the Network Linear Flow.

Format Integer

Mandatory Yes

Domain [-1-3]

Label	Code	Definition
Unknown	-1	Impossible to determine the type.
None	0	No type value available.
Observed	1	Network flow line corresponding to single watercourse.
Inferred	2	Network flow line passing through a water area.
Constructed	3	Allowing the connection of isolated networks.

Class(es) Network Linear Flow

Attribute

Network Linear Element Code

Definition The code of the table where the Network Linear Element comes from.

Format: Char (7)

Mandatory Yes

Domain List of valid Class Codes defined by NHN.

Class(es) External Geometry Event, External Line Event, External Point Event, Flow Property Event, Manmade Line Event, Manmade Point Event, Obstacle Line Event, Obstacle Point Event

Attribute

Network Linear Element NID

Definition A unique identifier assigned to a Network Linear Element. (foreign key)

Format: UUID

Mandatory Yes

Domain: A UUID string representation (32 characters).

Class(es) External Geometry Event, External Line Event, External Point Event, Manmade Line Event, Manmade Point Event, Obstacle Line Event, Obstacle Point Event

Attribute

Network Linear Flow NID

Definition A unique identifier assigned to a Network Linear Flow. (foreign key)

Format: UUID

Mandatory Yes

Domain: A UUID string representation (32 characters).

Class(es) Hydro Traversal

Attribute

NID

Definition A unique identifier assigned to each occurrence and feature.

Format: UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) Bank, Delimiter, External Geometry Event, External Line Event, External Point Event, Flow Property Event, Hydro Junction, Hydrographic Entity Association, Hydrographic Obstacle Line Entity, Hydrographic Obstacle Point Entity, Hydrographic Obstacle Polygon Entity, Hydro Traversal, Hydro Traversal Association, , Island, Littoral, Manmade Hydrographic Point Entity, Manmade Hydrographic Line Entity, Manmade Hydrographic Polygon Entity, Manmade Line Event, Manmade Point Event, Named Feature Association, Named Line Feature, Named Point Feature, Named Polygone Feature, Network Linear Flow, Obstacle Line Event, Obstacle Point Event, Single Line Watercourse, Toponymy Collection, Waterbody

Attribute

Obstacle Hydrographic Entity NID

Definition A unique identifier assigned to each NHN Obstacle Hydrographic Entity (foreign key).

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) Obstacle Line Event,Obstacle Point Event

Attribute

Obstacle Type

Definition The nature of the obstacle on the Hydro Network where the natural flow of surface water is disturbed or impeded.

Format Integer

Mandatory Yes

Domain [-1-8]

Label	Code	Definition
Unknown	-1	Impossible to determine the type.
Falls	1	A site at which the natural flow of surface water is disturbed or impeded due to a perpendicular or steep drop over which water from a watercourse or waterbody flows.
Rapids	2	A site at which the natural flow of surface water is disturbed or impeded due to a fast-flowing, often turbulent, section of a watercourse or waterbody. Rapids generally contain exposed rocks or boulders.
*Reef	3	A rock formation that is alternatively covered and uncovered by the tide.

Rocks	4	A rock or earthen formation always visible.
Disappearing stream	5	Extremity of a watercourse or a natural depression where water disappears into the ground.
**Exposed shipwreck	6	The remains of a grounded ship that is partially above the water surface.
Ford	7	A shallow part of a watercourse suitable for crossing by people or vehicles.
Other	8	A type not in the actual list.

Class(es) Hydrographic Obstacle Point Entity, Hydrographic Obstacle Line Entity, Hydrographic Obstacle Polygon Entity, Obstacle Line Event, Obstacle Point Event

*Limited Obstacle type value for Waterbody: Tidal River
**Limited Obstacle type value for Littoral

Attribute

Operation Type

Definition The nature of the modification done on provided source data.

Format Integer

Mandatory Yes

Domain [0-3]

Label	Code	Definition
Unchanged	0	
Added	1	
Modified	2	
Deleted	3	

Class(es) Bank, Delimiter, External Geometry Event, External Line Event, External Point Event, Flow Property Event, Hydro Junction, Hydrographic Entity Association, Hydrographic Obstacle Line Entity, Hydrographic Obstacle Point Entity, Hydrographic Obstacle Polygon Entity, Hydro Traversal, Hydro Traversal Association, , Island, Littoral, Manmade Hydrographic Point Entity, Manmade Hydrographic Line Entity, Manmade Hydrographic Polygon Entity, Manmade Line Event, Manmade Point Event, Named Feature Association, Named Line Feature, Named Point Feature, Named Polygone Feature, Network Linear Flow, Obstacle Line Event, Obstacle Point Event, Single Line Watercourse, Toponymy Collection, Waterbody

Attribute

Permanency

Definition Nature of the occurence through time.

Format Integer

Mandatory Yes

Domain [-1-2]

Label	Code	Definition
Unknown	-1	Impossible to determine.
None	0	No value available.
Permanent	1	Intended to exist or function for a long, indefinite period.
Intermittent	2	Coming and going at intervals.

Class(es) Bank, Single Line Watercourse, Waterbody

Attribute

Planimetric Accuracy

Definition Planimetric data accuracy expressed as the Circular Map Accuracy Standard (CMAS).

Format Real

Mandatory Yes

Domain $[0,50] \in \mathbb{R}$; a value equal or greater than the accuracy of the Landsat 7 Orthorectified product for the concerned area.

Class(es) Object Metadata

Attribute

Provider

Definition The affiliation of the organization that generated (created or revised) the object.

Format Integer

Mandatory Yes

Domain [1-4]

Label	Code	Definition
Other	1	All possible values not explicitly mentioned into the domain.
Federal	2	
Provincial/Territorial	3	
Municipal	4	

Class(es) Object Metadata

Attribute

Related NID

Definition Reference to existing geometry part of the Network or Hydrographic packages.

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) Named Line Feature, Named Point Feature, Named Polygone Feature

Attribute

Sand Island

Definition Island composed almost entirely of sand. Constant winds, salt spray, and blowing sand limit the growth of trees and shrubs.

Format Integer

Mandatory Yes

Domain: [-1-2]

Label	Code	Definition
Unknown	-1	Impossible to determine.
None	0	No value available.
No or False	1	Not a sand Island.
Yes or True	2	A sand Island.

Class(es) Island

Attribute

Shoreline Water Level

Definition Elevation of the free-water surface of a body of water relative to a datum level.

Format Integer

Mandatory Yes

Domain: [-1-4]

Label	Code	Definition
Unknown	-1	Impossible to determine the water level
None	0	No water level value available.
HHWLT	1	Higher high water, large tide. Average of the highest high waters, one from each of the 19 years of prediction.
HHWMT	2	Higher high water, mean tide. Average of all the higher high waters from 19 years of prediction.
LLWMT	3	Lower low water, mean tide. Average of all the lowest low water, one from each of the 19 years of prediction.
LLWLT	4	Lower low water, large tide. Average of the lowest low water, one from each of the 19 years of prediction.

Class(es) Bank, Littoral

Attribute

Toponymic NID

Definition Unique Canadian Geographical Names DB feature identifier.

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) Named Feature Association, Toponymy Collection

Attribute

Toponymy Collection NID

Definition A unique national identifier assigned to each Toponymy Collection (foreign key).

Format UUID

Mandatory Yes

Domain: A UUID string representation (32 characters).

Class(es) Hydro Traversal Association, Hydrographic Entity Association, Named Feature Association

Attribute

Validity Date

Definition The date of data creation or revision. A known value in the format YYYY/MM.

Format Char (7)

Mandatory Yes

Domain None

Class(es) Object Metadata

Attribute

Water Definition

Definition Properties of a Waterbody, Single Line Watercourse or Flow Property Event according to its water velocity and usage.

Format Integer

Mandatory Yes

Domain: [0-9]

Label	Code	Definition
None	0	No Waterbody Type value available.
Canal	1	An artificial watercourse serving as a navigable waterway or to channel water.
Conduit	2	An artificial system, such as an Aqueduct, Penstock, Flume, or Sluice, designed to carry water for purposes other than drainage.

Ditch	3	Small, open manmade channel constructed through earth or rock for the purpose of conveying water.
*Lake	4	An inland body of water of considerable area.
*Reservoir	5	A wholly or partially manmade feature for storing and/or regulating and controlling water.
Watercourse	6	A channel on or below the earth's surface through which water may flow.
Tidal River	7	A river in which flow and water surface elevation are affected by the tides.
*Liquid Waste	8	Liquid waste from an industrial complex.

Class(es) Bank,Waterbody, Flow Property Event, Single Line Watercourse
* Value non authorized for Single Line Watercourse

Attribute

Waterbody NID

Definition A unique identifier assigned to each Waterbody whenever the bank defines a Waterbody Type (foreign key).

Format UUID

Mandatory No

Domain A UUID string representation (32 characters).

Class(es) Bank

Attribute

Waterbody 1 NID

Definition A unique identifier assigned to a Waterbody. (foreign key)

Format UUID

Mandatory Yes

Domain A UUID string representation (32 characters).

Class(es) Delimiter

Attribute

Waterbody 2 NID

Definition A unique identifier assigned to each Waterbody. (foreign key)

Format UUID

Mandatory No

Domain A UUID string representation (32 characters).

Class(es) Delimiter

Bilingual list of classes

English Class Name	French Class Name
Bank	Rive
Delimiter	Délimiteur
External Geometry Event	Événement externe géométrique
External Line Event	Événement externe ligne
External Point Event	Événement externe point
Flow Property Event	Événement écoulement hydrographique
Hydro Junction	Jonction hydro
Hydro Traversal	Route hydrographique
Hydro Traversal Association	Association route hydrographique
Hydrographic Entity Association	Association entité hydrographique
Hydrographic Obstacle Line Entity	Entité obstacle hydrographique ligne
Hydrographic Obstacle Point Entity	Entité obstacle hydrographique point
Hydrographic Obstacle Polygone Entity	Entité obstacle hydrographique polygone
Island	Île
Littoral	Littoral
Manmade Hydrographic Line Entity	Entité hydrographique anthropique ligne
Manmade Hydrographic Point Entity	Entité hydrographique anthropique point
Manmade Hydrographic Polygone Entity	Entité hydrographique anthropique polygone
Manmade Line Event	Événement anthropique ligne
Manmade Point Event	Événement anthropique point
Named Feature Association	Association entité nommée
Named Line Feature	Entité nommée ligne
Named Point Feature	Entité nommée point
Named Polygone Feature	Entité nommée polygone
Network Linear Flow	Filamentaire d'écoulement
Obstacle Line Event	Événement obstacle ligne
Obstacle Point Event	Événement obstacle point
Simple Line Watercourse	Cours d'eau simple
Toponymy Collection	Collection toponymique
Waterbody	Région hydrique

APPENDIX A

SPATIAL INTEGRITY CONSTRAINTS

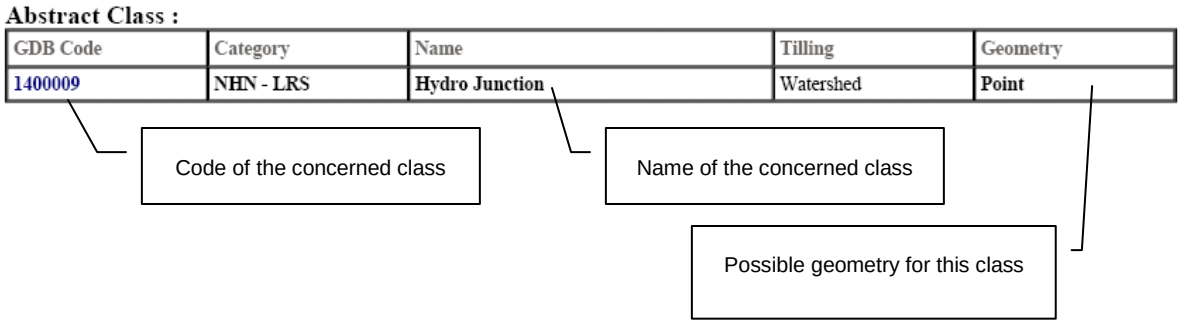
SPATIAL INTEGRITY CONSTRAINTS

This section presents the spatial integrity constraints of a class or a specific sub-type class with other classes or specific sub-type class. There are 2 files (XML et XSLT) that, saved into a common directory can be easily visit with any viewer application.

Concepts and predicates are used in the GDB to guarantee the topological integrity of data. Chapter 7 of Geospatial Database – Standards and Specifications – April 2003 explains in details those tools.

The different tables are sorted by code The header of each table indicate the code, name of the concerned class and the possible geometry for this class.

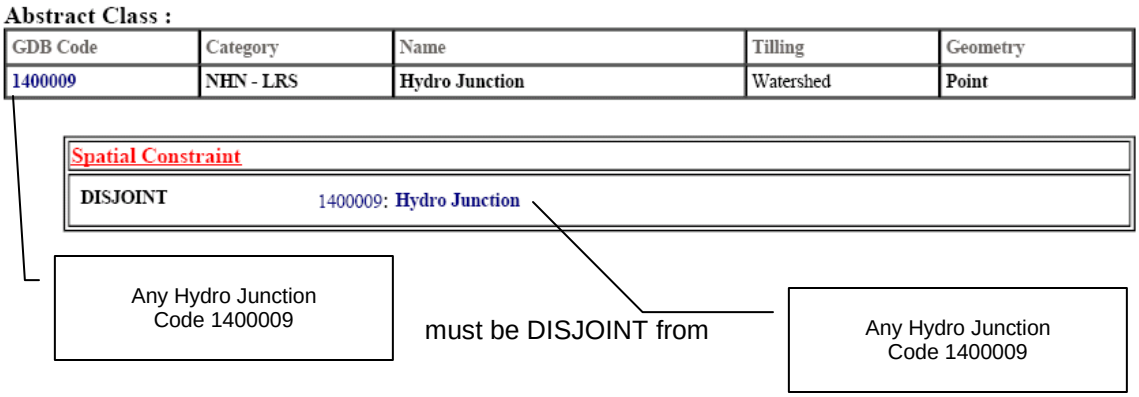
Example 1:



The tables first show spatial integrity constraints that apply to abstract classes if they exist and next the geometry classes.

Each table indicates a spatial integrity constraint that the concerned object must respect as well as the cardinality. Cardinality represents the minimum and maximum number of intersections authorized between two geometries. It complements the relationship. The cardinality field is empty when either no value applies or when the default values apply (1,N). The third column shows towards which object (code, description) the constraint applies.

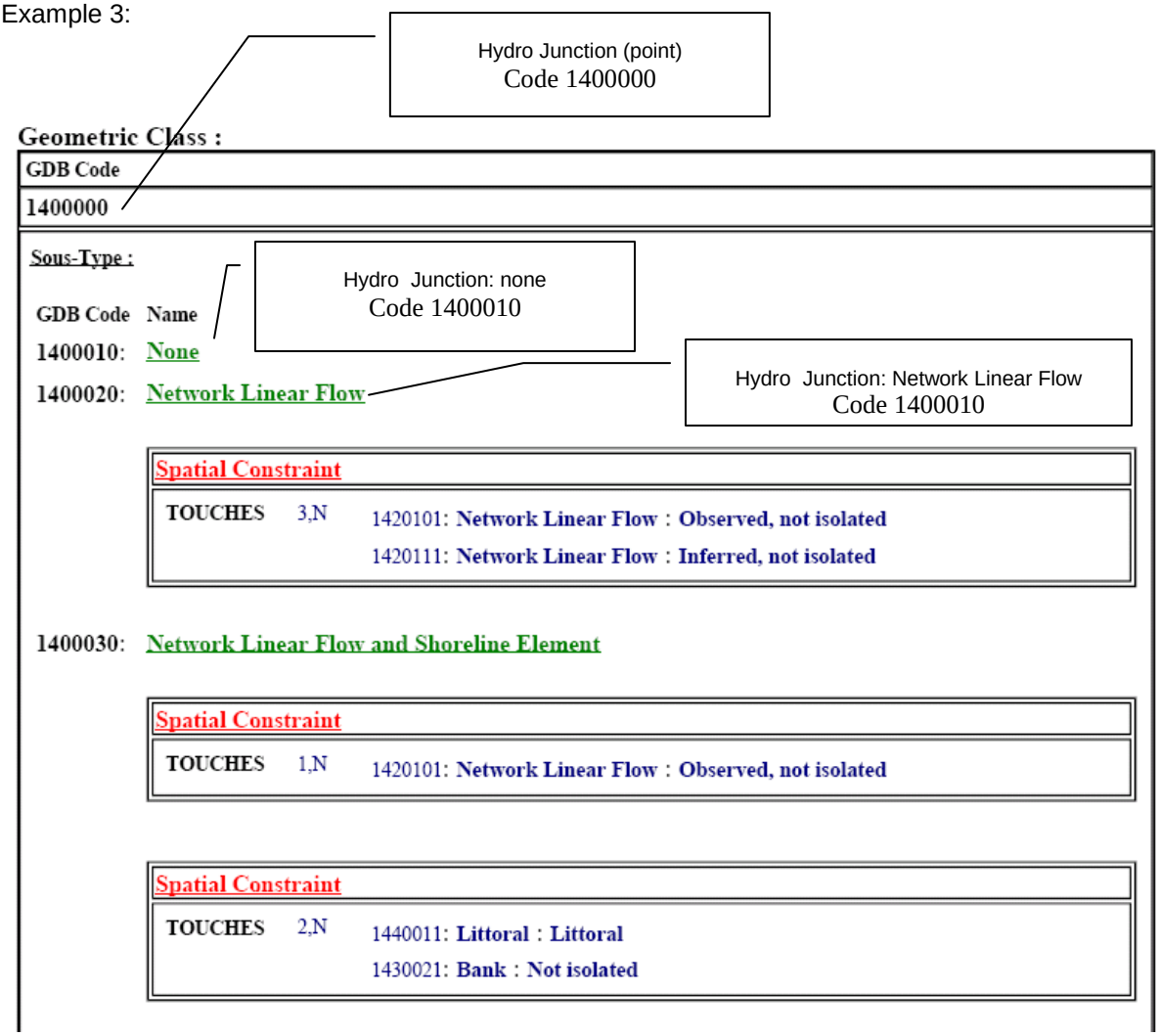
Example 2:



If we take again the example of the Hydro Junction class, the above table indicates that any Hydro Junction must be DISJOINT from any other object Hydro Junction as no explicite code is identifed.

Next, the spatial integrity constraints specific to class sub-type are explained if they exist.

Example 3:



The preceding example describes the spatial integrity constraints of all sub-type of the object Hydro Juction 1400000.

- The object Hydro Junction type «None» does not have particular spatial integrity constraints.
- However, the object Hydro Junction type « Network Linear Flow» must TOUCH a « Network Linear Flow» type Observed, not isolated or Inferred, not isolated. At least one constraint must be true for the feature to be valid. If any false constraints are encountered, the feature will be reported as being erroneous.

Also, the object Hydro Junction type « Network Linear Flow» must TOUCH a minimum of 3 objects for the relation to be true.

The files containing the spatial integrity constraints for all NHN classes and sub-types are available at the following adress:

ftp://ftp.cits.rncan.gc.ca/pub/optimum/information/document/

- NHN_English.xml
- English\NHN-EN.xslt
- Schema_BDG.xsd