Ordnance Survey

OS MASTERMAP WATER NETWORK

Technical Specification

OS MasterMap® Water Network

Technical specification

Contents

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Introduction

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Chapter 1 Introduction

OS MasterMap Water Network provides a three dimensional structured link and node network of watercourses for Great Britain. A link represents the approximate central alignment of a watercourse and includes inland rivers, tidal water, lakes and canals attributed with additional information including flow direction and primary flow paths. Where watercourses are obscured or underground, connectivity is provided where discernible as part of the Ordnance Survey capture process, or when supplied by an accepted source

The OS MasterMap Water Network product is in geometric sympathy with the underlying topographic features that comprise OS MasterMap Topography Layer (figure 1). Polygons and lines representing the water area and its banks are not supplied in this product, but will continue to be maintained and supplied as part of the OS MasterMap Topography Layer product.

Figure 1: OS MasterMap Water Network

Identifiers

Ordnance Survey provides persistent managed identifiers as TOID®s. TOIDs are strings of up to twenty characters, starting with 'osgb'; the remaining characters are digits (0 to 9). In an INSPIRE encoded dataset such as this, each feature carries its identifier in three ways as described below:

1. **gml:id**

   Required by GML. This matches the pattern in other OS MasterMap products.

2. **gml:identifier**

   Recommended by INSPIRE and the UK INSPIRE project. This formats the TOID into a persistent URI, using http://data.os.uk/id/ as a namespace, instead of 'osgb'. This does not mean that the water network features are available as linked data.

3. **net:inspireId**

   The localId is set to the TOID (without 'osgb'), and the namespace set as above. The INSPIRE identifier model does not fit with SF0; it does fit with level 1.

```
- <base:member>
  - <water:HydroNode gml:id="osgb5000005131859581">
    - <gml:identifier codeSpace="http://inspire.jrc.ec.europa.eu/ids">
        http://data.ordnancesurvey.co.uk/id/5000005131859581
      </gml:identifier>
      <net:beginLifespanVersion>2014-02-25T00:00:00.000</net:beginLifespanVersion>
    - <net:inspireId>
      - <base:Identifier>
          <base:localId>5000005131859581</base:localId>
          <base:namespace>http://data.ordnancesurvey.co.uk</base:namespace>
          <base:versionId>1</base:versionId>
        </base:Identifier>
      </net:inspireId>
```

An example of a feature in an INSPIRE encoded dataset carrying its identifier in three ways

The feature version is encoded as the versionId within the INSPIRE Identifier.

Available Formats

OS MasterMap Water Network will only be supplied in GML 3.2.1.

Adherence to Standards

OS MasterMap Water Network is based on the INSPIRE Hydrography Data Specification, which itself is based on the ISO TC211 family of open standards.

Extending INSPIRE Specification

OS MasterMap Water Network extends the INSPIRE specification.

UML Diagram and Table Conventions

The data structure is described below by means of UML class diagrams and accompanying tables containing text. The UML diagrams conform to the approach specified in ISO 19103 Conceptual schema language and ISO 19109 Rules for application schema, as adopted by INSPIRE.

Colour conventions have been used in the diagrams and tables to distinguish the INSPIRE specification from the additional properties that have been added in this specification.

In the UML diagram classes from the INSPIRE Data Specifications are coloured grey, whereas classes in the Ordnance Survey product specification are orange. All code lists are coloured blue, enumerations are green and data types are purple, which can be seen in figure 2. The tables which follow in this Technical Specification use orange for a feature type, blue for a code list, green for enumerations and purple for data types.

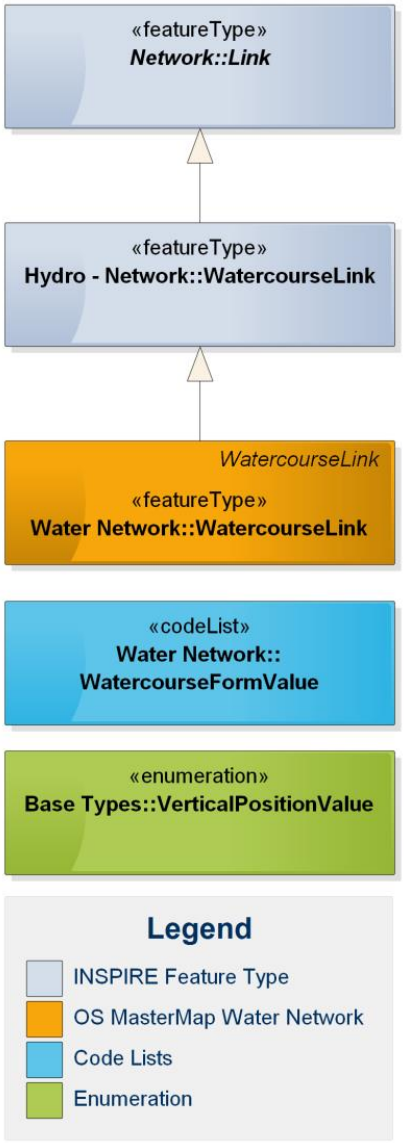


Figure 2: A UML diagram using the colour conventions specified in this Technical Specification

Chapter 2 OS MasterMap Water Network

The OS MasterMap Water Network is a topological network representing the watercourses within Great Britain.

The product is made up of five feature types:

1. WatercourseLink – features that represent the approximate central alignment of a watercourse, including rivers, lakes and canals. They can represent part or a whole watercourse.

2. HydroNode - features that represent a river's source, end, a junction where three or more links meet, and places where the real world related attribution changes; for example a watercourse becoming tidal.

3. WatercourseSeparatedCrossing – features to indicate the relationships between watercourses that intersect at different levels.

4. WatercourseLinkSet – features to represent sets of links for example named rivers or watercourses within a catchment area.

5. WatercourseInteraction – features that represent events along the water network, for example, weirs and mooring points.

In the first release only two feature types will be supplied, WatercourseLink, and HydroNode (figure 3). This technical specification will cover all five of the feature types which make up the product as they are referenced in the product schema which is the controlling specification for the product.

All the feature instances, of whichever feature type are provided as a single FeatureCollection.

OS MasterMap Water Network has been built with the INSPIRE Hydro – Network Specification as a basis which results in the product inheriting attribution from INSPIRE. The overview of the product structure can be found in figure 4 which highlights the inherited INSPIRE feature types and attribution. Properties of the INSPIRE specification, which are voidable and are not being populated in the product, have not been included in the class diagrams or the following tables. For information on the INSPIRE properties which are not included in this product, please see the INSPIRE Data Specification on Hydrography – Network application schema, which is available at http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_HY_v3.1.pdf.

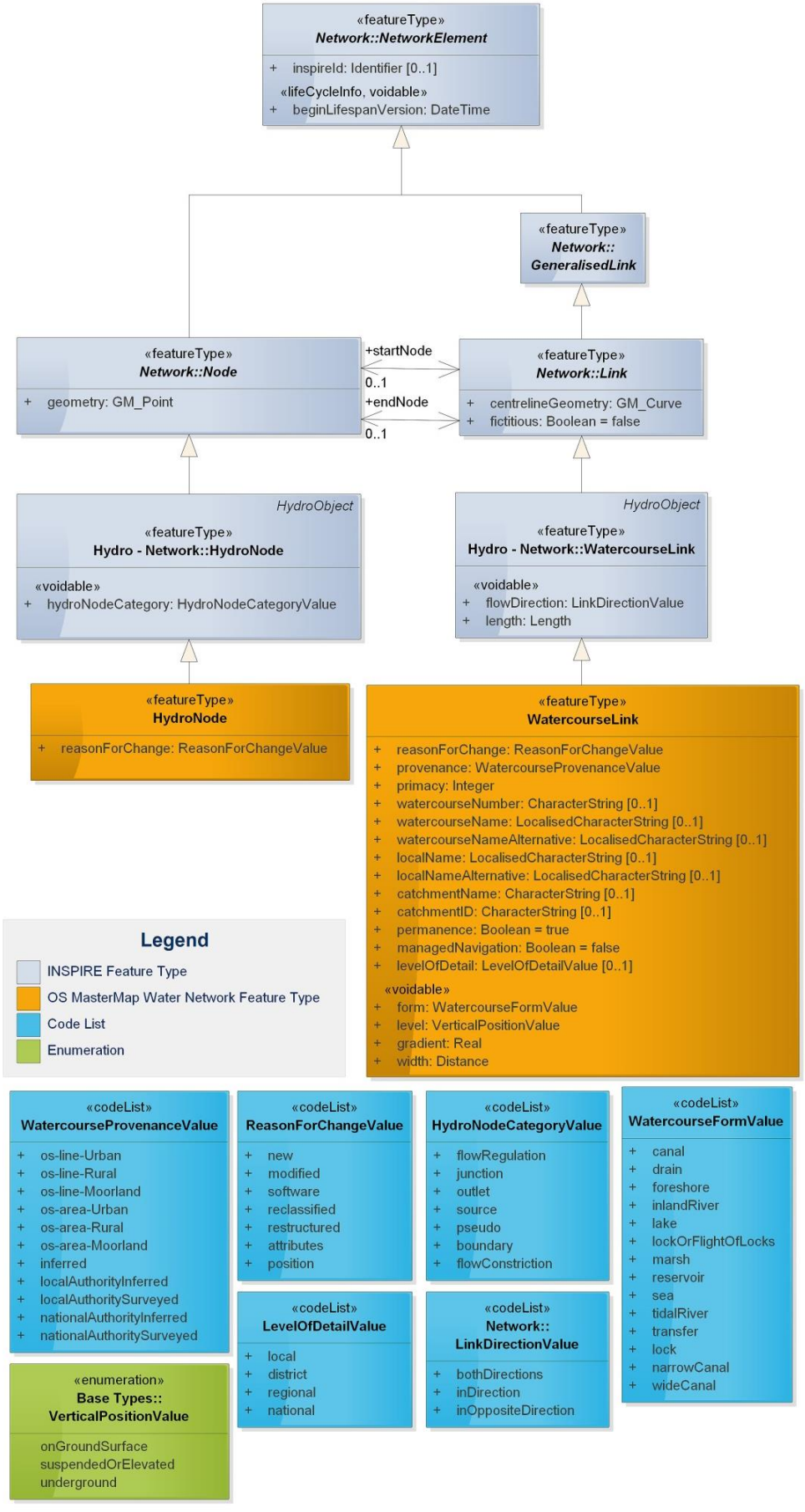


Figure 3: UML Diagram showing the data structure of OS MasterMap Water Network in its first release.

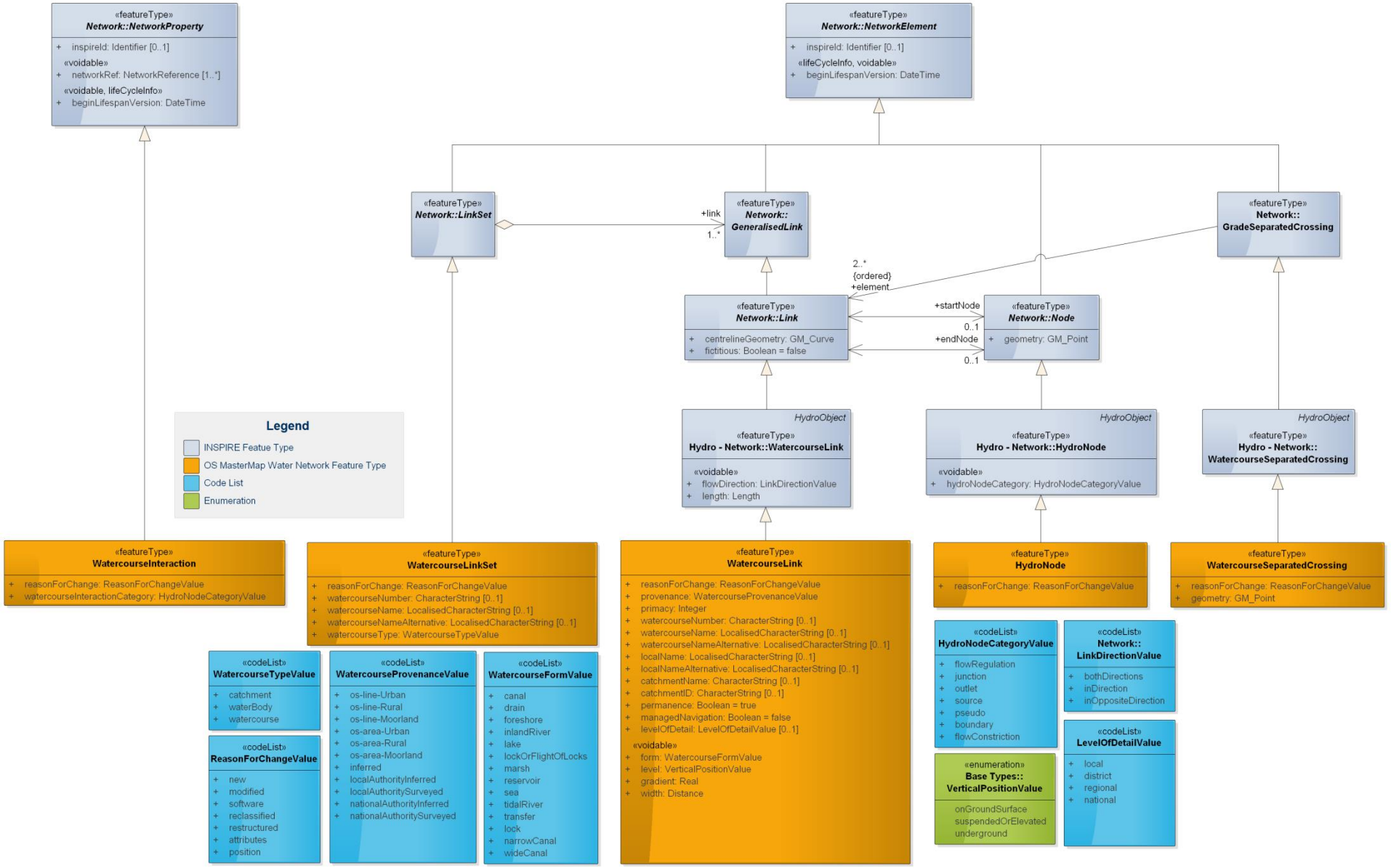


Figure 4: UML diagram of OS MasterMap Water Network product structure referenced by the schema.

WatercourseLink

WatercourseLink features represent the alignments of watercourses and have, in the most part, been derived from Ordnance Survey detailed topographic data.

Where the classification or name changes along a watercourse the network will be split and a HydroNode classified as pseudo created.

Attributes

«featureType» WatercourseLink	
Definition: A segment that represents part of a watercourse.	
Subtype of: WatercourseLink	
Attribute: centrelineGeometry	
Definition: The three-dimensional geometry that represents the general alignment of the watercourse.	
Type: GM_Curve	**Multiplicity:** [1]
Attribute: ficticious	
Definition: Indicator that the centreline geometry of the link is a straight line with no intermediate control points – unless the straight line represents the geography in the resolution of the data set appropriately.	
Type: Boolean	**Multiplicity:** [1]
Association Role: startNode	
Definition: The HydroNode coincident with the first vertex for this WatercourseLink.	
Multiplicity: [1]	
Association Role: endNode	
Definition: The HydroNode coincident with the last vertex for this WatercourseLink. On very rare occasions the end HydroNode may be the same instance as the start HydroNode.	
Multiplicity: [1]	
Attribute: inspireId	
Definition: External object identifier of the spatial object.	
NOTE: the localId contains the Ordnance Survey TOID.	
NOTE: an external object identifier is a unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object. The identifier is an identifier of the spatial object, not an identifier of the real-world phenomenon.	
Type: Identifier	**Multiplicity:** [0..1]
Attribute: versionId «lifeCycleInfo» «voidable»	
Definition: The identifier of the particular version of the spatial object, with a maximum length of 25 characters. If the specification of a spatial object type with an external object identifier includes life-cycle information, the version identifier is used to distinguish between the different versions of a spatial object. Within the set of all versions of a spatial object, the version identifier is unique.	
Type: CharacterString	**Multiplicity:** [0..1]
Attribute: beginLifespanVersion «lifeCycleInfo»	
Definition: Date and time at which this version of the spatial object was inserted or changed in the spatial data set. *NOTE: this is equivalent to 'versionDate' in other MasterMap products; at present, the time part is always set to zero.*	

Type: DateTime	**Multiplicity:** [1]
Attribute: reasonForChange	
Definition: The cause of the creation of the current version of the feature.	
Type: ReasonForChangeValue	**Multiplicity:** [1]
Attribute: form «voidable»	
Definition: The nature of the watercourse being represented by the feature.	
Type: WatercourseFormValue	**Multiplicity:** [1]
Attribute: level «voidable»	
Definition: A description of the relationship of the watercourse to ground level.	
Type: VerticalPositionValue	**Multiplicity:** [1]
Attribute: provenance	
Definition: The origin of the centrelineGeometry property.	
Type: WatercourseProvenanceValue	**Multiplicity:** [1]
Attribute: flowDirection «voidable»	
Definition: Direction of water flow in the segment relative to digitisation of segment geometry.	
Type: LinkDirectionValue	**Multiplicity:** [1]
Attribute: primacy	
Definition: Value indicating the relative importance of the WatercourseLink within any larger watercourse it is part of.	
NOTE: primary flow is indicated as 1, secondary (and all other levels of) flow is indicated as 2. Further levels are not currently indicated. The primary flow was originally calculated using a combination of attributes.	
Type: Integer	**Multiplicity:** [1]
Attribute: watercourseNumber	
Definition: The code assigned by a responsible body that is used to identify the watercourse.	
The responsible bodies are Environment Agency® for England. Scottish Environmental Protection Agency for Scotland and Natural Resources Wales for Wales. *Not currently populated.*	
Type: CharacterString	**Multiplicity:** [0..1]
Attribute: watercourseName	
Definition: The name of the watercourse that the WatercourseLink is part of.	
NOTE 1: where a feature has more than one name, the language of each name is provided as a 3-digit ISO 639-2 code ('eng', 'cym', 'gla'). See also OS MasterMap Water Network – June 2015 Product Notes	
NOTE 2: where a watercourse has a name in more than one language then this attribute will be the Welsh or Gaelic version.	
Type: LocalisedCharacterString	**Multiplicity:** [0..1]
Attribute: watercourseNameAlternative	
Definition: An alternative name of the watercourse that the WatercourseLink is part of.	
NOTE 1: where a feature has more than one name, the language of each name is provided as a 3-digit ISO 639-2 code ('eng', 'cym', 'gla'). See also OS MasterMap Water Network – June 2015 Product Notes	
NOTE 2: where a watercourse has a name in more than one language then this attribute will be the English version.	

Type: LocalisedCharacterString	**Multiplicity:** [0..1]
Attribute: localName	
Definition: A name that applies to part of a watercourse that is a sub section of a larger named watercourse that the WatercourseLink is part of.	
NOTE 1: where a feature has more than one name, the language of each name is provided as a 3-digit ISO 639-2 code ('eng', 'cym', 'gla'). See also OS MasterMap Water Network – June 2015 Product Notes	
NOTE 2: where a watercourse has a local name in more than one language then this name will be the Welsh or Gaelic version.	
Type: LocalisedCharacterString	**Multiplicity:** [0..1]
Attribute: localNameAlternative	
Definition: An alternative name that applies to part of a watercourse that is a sub section of a larger named watercourse that the WatercourseLink is part of.	
NOTE 1: where a feature has more than one name, the language of each name is provided as a 3-digit ISO 639-2 code ('eng', 'cym', 'gla'). See also OS MasterMap Water Network – June 2015 Product Notes	
NOTE 2: where a watercourse has a name in more than one language then this attribute will be the English version.	
Type: LocalisedCharacterString	**Multiplicity:** [0..1]
Attribute: catchmentName	
Definition: The name of the catchment area where the WatercourseLink falls, assigned by a responsible body.	
The responsible bodies are Environment Agency for England, Scottish Environmental Protection Agency for Scotland, and Natural Resources Wales for Wales.	
Type: CharacterString	**Multiplicity:** [0..1]
Attribute: catchmentID	
Definition: The code of the catchment area where the WatercourseLink falls, assigned by a responsible body.	
The responsible bodies are Environment Agency for England. Scottish Environmental Protection Agency for Scotland and Natural Resources Wales for Wales.	
Type: CharacterString	**Multiplicity:** [0..1]
Attribute: permanence	
Definition: A logical indicator that describes if the watercourse contains water year round (in normal conditions) or only contains water intermittently. For example, a flood relief channel would have this set to 'False'.	
Type: Boolean	**Multiplicity:** [1]
Attribute: managedNavigation	
Definition: A logical indicator that describes whether the watercourse is managed for inland navigation by a member of The Association of Inland Navigation Authorities (AINA).	
Note: All values are currently set to false, future releases of the product may include values set to true.	
Type: Boolean	**Multiplicity:** [1]
Attribute: length	
Definition: Calculated two dimensional length of network segment in metres.	
Value supplied to one decimal place.	
Type: Length	**Multiplicity:** [1]
Attribute: gradient «voidable»	

Definition: A calculated percentage value that indicates the rate of descent of the surface of the water. See Gradient for derivation.	
Where the gradient does not correlate with the flow, this value is not supplied and a "nilReason" of 'unknown' is given.	
Type: Real	**Multiplicity:** [1]
Attribute: width «voidable»	
Definition: The average width of the watercourse along the WatercourseLink expressed in metres.	
This value is void for WatercourseLink features derived from Ordnance Survey large-scales single line features. These values will be given a "nilReason" of 'unknown'.	
Type: Distance	**Multiplicity:** [1]
Attribute: levelOfDetail	
Definition: A calculated value indicating the relative cartographic importance of a WatercourseLink to aid selection and depiction when styling the data.	
See LevelOfDetail for derivation.	
Type: LevelOfDetailValue	**Multiplicity:** [0..1]

CodeLists and Enumerations

LinkDirectionValue

Code List: LinkDirectionValue List of values for flow relative to a WatercourseLink coordinate order http://inspire.ec.europa.eu/codelist/LinkDirectionValue/	
Value	**Description**
bothDirections	Water flows in both directions along the watercourse.
inDirection	Water flows in the same direction as the order of the coordinate vertices.
inOppositeDirection	Water flows in the opposite direction to the order of the coordinate vertices.

Where the flow direction has not been determined this attribute is set to null and a 'nilReason' is given.

- Where the value of nilReason is set to 'unknown' then the flow direction is not known to Ordnance Survey. A correct value may exist but the methods employed by Ordnance Survey to date have not facilitated capture.
- Where the value of nilReason is set to 'missing', then the flow can be considered indiscernible. Ordnance Survey has attempted to identify the flow on the ground but no flow has been determined.

WatercourseFormValue

codeList: WatercourseFormValue Classification value defining the type of WatercourseLink.	
Value	**Description**
Canal	A manmade watercourse originally created for inland navigation.
Drain	Not in first release of product. A manmade watercourse whose primary purpose is the removal of excess water from a localised area. This value is not used in release 1.0 and will be populated in a future release of

	the product. Watercourses that are drains are included and attributed as inlandRiver.
Foreshore	A watercourse that flows without a well-defined channel over the foreshore (the area between the high and low water marks).
inlandRiver	A river or stream that is not influenced by normal tidal action.
Lake	A large area of non-tidal water without an obvious flow that is enclosed by land.
lockOrFlightOfLocks	An enclosure in a canal or navigable river with a movable gate and sluices at either end. Designed to allow vessels to move between sections of canal or navigable river at different levels by filling or draining the enclosure. This attribute is not fully populated in the first release of the data, however, it will be added to in future data updates. Where watercourses flow through Locks they are included but may be attributed with a more general term.
Marsh	An area of ground that is predominantly waterlogged by freshwater throughout the year with no identifiable specific alignment for the flow. For the water network they are captured only where water flows into and out of the marsh and connects to other watercourses.
Reservoir	An area of non-tidal water used for storing water that may be used for irrigation, water supply, power generation or flood control that has been created artificially either fully or in part. This attribute does not manifest in the first release of the data however it will be utilised in future normal data updates. Where watercourses flow through Reservoirs they are included but may be attributed with a more general term.
Sea	Tidal water where the influence of inland watercourses is negligible, for example a wide estuary or the open sea They are usually included to provide connections for watercourses running into estuaries.
tidalRiver	Watercourses that are subject to the effect of normal tidal action. These exist between the Normal Tidal Limit and Point B (an intangible line where the level of a river meets the level of the sea).
Transfer	A manmade watercourse whose primary purpose is to move water from one location to another (using gravity and/or pumping) typically for water supply or power generation.

Where the WatercourseForm has not been determined this attribute is set to null, the value of nilReason is set to 'unknown'.
NOTE: a correct value will exist but the methods employed by Ordnance Survey to date have not facilitated capture.

WatercourseProvenanceValue

codeList: WatercourseProvenanceValue The source and/or technique used to create the WatercourseLink feature	
Value	**Description**
OS-line-Urban	The WatercourseLink is based upon Topographic line features representing watercourses within Ordnance Survey basic scale data, where the line feature was originally captured to an accuracy of 0.5m RMSE. See Topographic Line and Area features for more information.
OS-line-Rural	The WatercourseLink is based upon Topographic line features representing watercourses within Ordnance Survey basic scale data, where the line feature was originally captured to an accuracy of 1.1m RMSE. See Topographic Line and Area features for more information.

OS-line-Moorland	The WatercourseLink is based upon Topographic line features representing watercourses within Ordnance Survey basic scale data, where the line feature was originally captured to an accuracy of 4.1m RMSE. See Topographic Line and Area features for more information.
OS-area-Urban	The WatercourseLink is based upon Topographic area features representing watercourses within Ordnance Survey basic scale data, where the area feature was originally captured to an accuracy of 0.5m RMSE. See Topographic Line and Area features for more information.
OS-area-Rural	The WatercourseLink is based upon Topographic area features representing watercourses within Ordnance Survey basic scale data, where the area feature was originally captured to an accuracy of 1.1m RMSE. See Topographic Line and Area features for more information.
OS-area-Moorland	The WatercourseLink is based upon Topographic area features representing watercourses within Ordnance Survey basic scale data, where the area feature was originally captured to an accuracy of 4.1m RMSE. See Topographic Line and Area features for more information.
Inferred	A WatercourseLink where the alignment has been added by deduction from existing Ordnance Survey Topographic features or terrain data to provide an indicative connection between other WatercourseLink features.
localAuthorityInferred	A WatercourseLink provided by a local authority that has not been measured or otherwise confirmed on the ground added to provide an indicative connection between other WatercourseLink features.
localAuthoritySurveyed	A WatercourseLink provided by a local authority that has been measured or otherwise confirmed on the ground.
nationalAuthorityInferred	A WatercourseLink provided by an accepted national authority that has not been measured or otherwise confirmed on the ground and added to provide an indicative connection between other WatercourseLink features.
nationalAuthoritySurveyed	A WatercourseLink provided by an accepted national authority that has been measured or otherwise confirmed on the ground.

A feature may have more been obtained from more than one source, where this is the case the following priority order is used to assign the provenance value.

1 OS-line or OS-area

2 localAuthoritySurveyed or nationalAuthoritySurveyed

3 localAuthorityInferred or nationalAuthorityInferred

4 inferred

LevelOfDetailValue

This attribute is currently set to a single value of 'Local' pending future developments in creating an attribute set in sympathy with OS Open Rivers data.

codeList : LevelOfDetailValue A calculated value indicating the relative cartographic importance of a WatercourseLink to aid selection and depiction when styling the data.	
Value	**Description**
Local	A watercourse important mainly at a local level, recommended for representation

	only at scales of 1:20 000 and larger.
District	Not in first release of product. A watercourse important at a local and district level, recommended for representation only at scales of 1:50 000 and larger.
Regional	Not in first release of product. A watercourse important at a local, district and regional level, recommended for representation at scales of 1:250 000 and larger.
National	Not in first release of product. A watercourse important at a national level recommended for representation at all scales.

ReasonForChangeValue

codeList: ReasonForChangeValue	
Value	**Description**
New	This is a new feature in the database.
Modified	The feature has been edited by an operator i.e. the geometry of a feature is changed following real-world change.
Software	Feature has been adjusted by an automatic software process. Includes geometric adjustment, cleaning and reversing direction of digitising.
Reclassified	The classifying attributes of a feature have changed
Restructured	New feature(s) have been created from parts of existing feature(s). Applied to features where a feature is split into two or more features, or two or more features are joined together.
Attributes	Applied to features that have attributes other than the classifying ones changed.
Position	Correction of position of feature, not related to real-world change.

VerticalPositionValue

enumeration: VerticalPositionValue The relative vertical position of a feature.	
Value	**Description**
onGroundSurface	The feature is on ground level.
suspendedOrElevated	The feature is suspended or elevated.
Underground	The feature is underground.

Where the VerticalPosition has not been determined this attribute is empty, with a nilReason explicitly stated as ‘unknown’. A correct value does exist but the methods employed by Ordnance Survey to date have not facilitated capture.

HydroNode

HydroNode features explicitly represent the starts, ends, junctions of watercourses, and places where certain attribution changes. They only exist at the end points of the WatercourseLink features. HydroNode positions are provided in 3D. The vertical coordinate has been sourced from Ordnance Survey terrain data.

Attributes

«featureType» HydroNode	
Definition: A feature at the end of one or more Watercourselink features that indicates the confluence of two or more watercourses and/or a change in attribution of the connected WatercourseLink features .	
Subtype of: HydroNode	
Attribute: reasonForChange	
Definition: The cause of the creation of the current version of the feature.	
Type: ReasonForChangeValue	**Multiplicity:** [1]
Attribute: geometry	
Definition: The location of the HydroNode.	
Type: GM_Point	**Multiplicity:** [1]
Attribute: inspireId	
Definition: External object identifier of the spatial object.	
NOTE: the localId contains the Ordnance Survey TOID.	
NOTE: an external object identifier is a unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object. The identifier is an identifier of the spatial object, not an identifier of the real-world phenomenon.	
Attribute: versionId «lifeCycleInfo»	
Definition: The identifier of the particular version of the spatial object, with a maximum length of 25 characters. If the specification of a spatial object type with an external object identifier includes life-cycle information, the version identifier is used to distinguish between the different versions of a spatial object. Within the set of all versions of a spatial object, the version identifier is unique.	
Type: CharacterString	**Multiplicity:** [0..1]
Attribute: beginLifespanVersion «lifeCycleInfo»	
Definition: Date and time at which this version of the spatial object was inserted or changed in the spatial data set. *NOTE: this is equivalent to 'versionDate' in other MasterMap products.*	
Type: DateTime	**Multiplicity:** [1]
Attribute: hydroNodeCategory «voidable»	
Definition: Nature of the HydroNode.	
Type: HydroNodeCategoryValue	**Multiplicity:** [1]

CodeLists and Enumerations

HydroNodeCategoryValue

codeList: HydroNodeCategoryValue Classification value defining the type of hydrographic node.	
Value	**Description**
flowConstriction	A split in the network captured to indicate a hydrographic point of interest or facility, or a man-made object that affects the network flow. *This attribute is not manifest in the first release of the data, however, it will be utilised in future data updates*.

flowRegulation	A split in the network captured to indicate a man-made object that is used to regulate the network flow. *This value is not currently supplied.*
junction	A split in the network to indicate where three or more WatercourseLink features meet at the same level. For example, confluences or bifurcations.
Outlet	The end terminal of a set of one or more interconnected links that does not have any downstream flow. For example, where a watercourse sinks into the ground or the point where a river enters the sea.
Source	The start terminal of a set of one or more interconnected links that has downstream flow. For example, springs or collects.
Pseudo	A location where the real world attribution of a watercourse changes that requires a WatercourseLink to be split.
boundary	HydroNode used to connect different networks. *NOTE: can be used to connect cross border networks or adjacent networks together. Differs from source / outlet in that in the real world there is an adjacent link that is not present in the dataset supplied.*

Where the hydroNodeCategory has not been determined this attribute is set to null, the value of nilReason is set to 'unknown'.

Chapter 3 Feature Types for Future Release

The following three feature types are not currently populated in the current version of OS MasterMap Water Network. However, they are referenced in the product's schema which is the controlling specification for the product. The intention is to add these in future versions of the product.

WatercourseSeparatedCrossing

Not currently populated in OS MasterMap Water Network

A feature used to indicate the relationship between watercourses that pass over one another without interaction. The WatercourseLink features are not broken at these locations, figure 5, and WaterCourseSeparatedCrossing feature is used to describe the vertical sequence of WatercourseLink features.

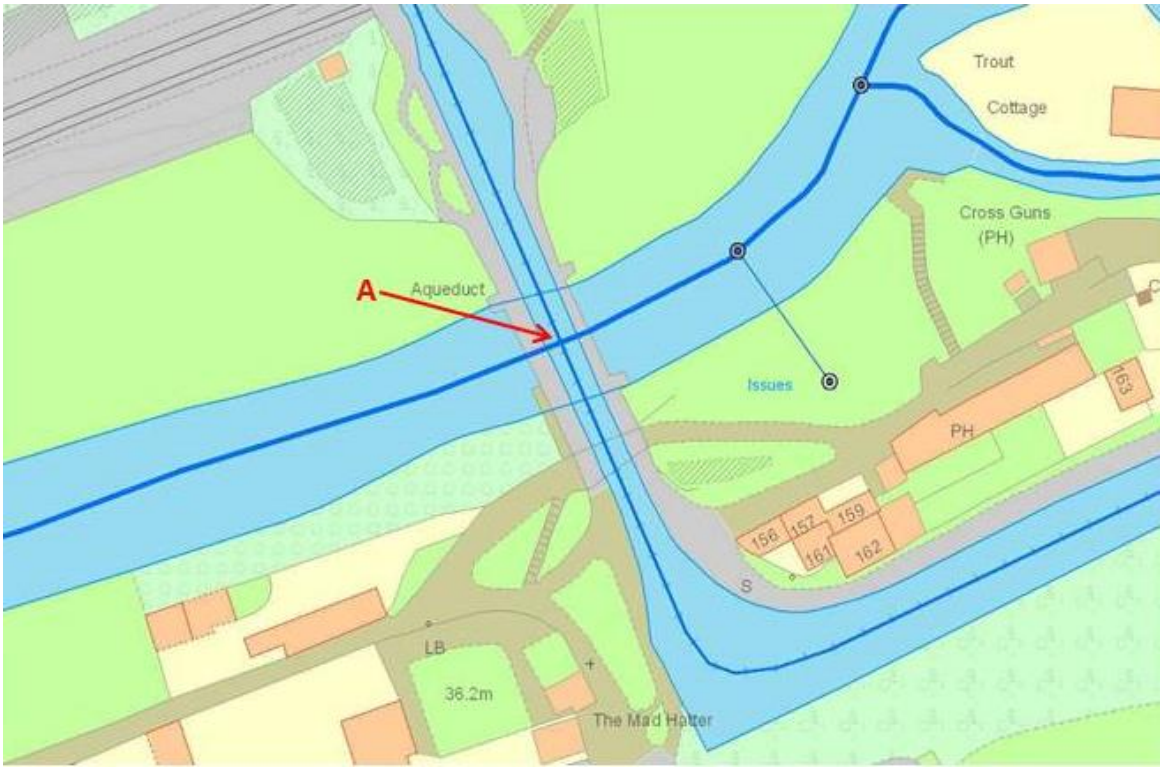


Figure 5: An example of where a watercourseSeparatedCrossing feature would exist.

«featureType» WatercourseSeparatedCrossing	
Definition: A feature that indicates two or more watercourses pass over one another at different physical levels.	
Subtype of: WatercourseSeparatedCrossing	
Association Role: element	
Definition: Sequence of crossing links. The order reflects their elevation; the first WatercourseLink is the lower WatercourseLink.	
Multiplicity: 2..*	
Attribute: reasonForChange	
Definition: Reason for the current version to be created	
Type: ReasonForChangeValue	**Multiplicity:** [1]
Attribute: geometry	

Definition: Point where two or more WatercourseLink features intersect.	
Type: GM_Point	**Multiplicity:** [1]

WatercourseLinkSet

Not currently populated in OS MasterMap Water Network

This spatial object type is included for future use to record sets of links that when combined create a recognisable identifiable watercourse for example a named river or a canal.

«featureType» WatercourseLinkSet	
Definition: A feature recording a set of watercourse links representing an identifiable watercourse.	
Subtype of: LinkSet	
Attribute: reasonForChange	
Definition: The cause of the creation of the current version of the feature	
Type: ReasonForChangeValue	**Multiplicity:** [1]
Attribute: watercourseNumber	
Definition: Official code assigned to identify the watercourse.	
This is an official identification code assigned by a responsible authority such as the Environment Agency (EA) or Scottish Environmental Protection Agency (SEPA).	
Type: CharacterString	**Multiplicity:** [0..1]
Attribute: watercourseName	
Definition: The name of the watercourse that the WatercourseLinkSet is representing.	
NOTE 1: where a feature has more than one name, the language of each name is provided as a 3-digit ISO 639-2 code ('eng', 'cym', 'gla')"	
NOTE 2: where a watercourse has a name in more than one language then this attribute will be the Welsh or Gaelic version.	
Type: LocalisedCharacterString	**Multiplicity:** [0..1]
Attribute: watercourseNameAlternative	
Definition: An alternative name of the watercourse that the WatercourseLinkSet is representing.	
NOTE 1: where a feature has more than one name, the language of each name is provided as a 3-digit ISO 639-2 code ('eng', 'cym', 'gla')"	
NOTE 2: where a watercourse has a name in more than one language then this attribute will be the English version.	
Type: LocalisedCharacterString	**Multiplicity:** [0..1]
Attribute: watercourseType	
Definition: The type of watercourse that the WatercourseLinkSet represents.	
Type: WatercourseTypeValue	**Multiplicity:** [1]

WatercourseTypeValue

codeList: WatercourseTypeValue Classification value defining the type of Watercourse.	
Value	**Description**
catchment	The area drained by a watercourse and its tributaries that enters the sea, a lake or a sink where no further flow is identified. Supplied by the Environment Agency for England. Scottish Environmental Protection Agency for Scotland and Natural Resources Wales for Wales.
waterBody	A water body defined under the Water Framework Directive (WFD).
watercourse	A watercourse with an accepted proper name in common use.

WatercourseInteraction

Not currently populated in OS MasterMap Water Network

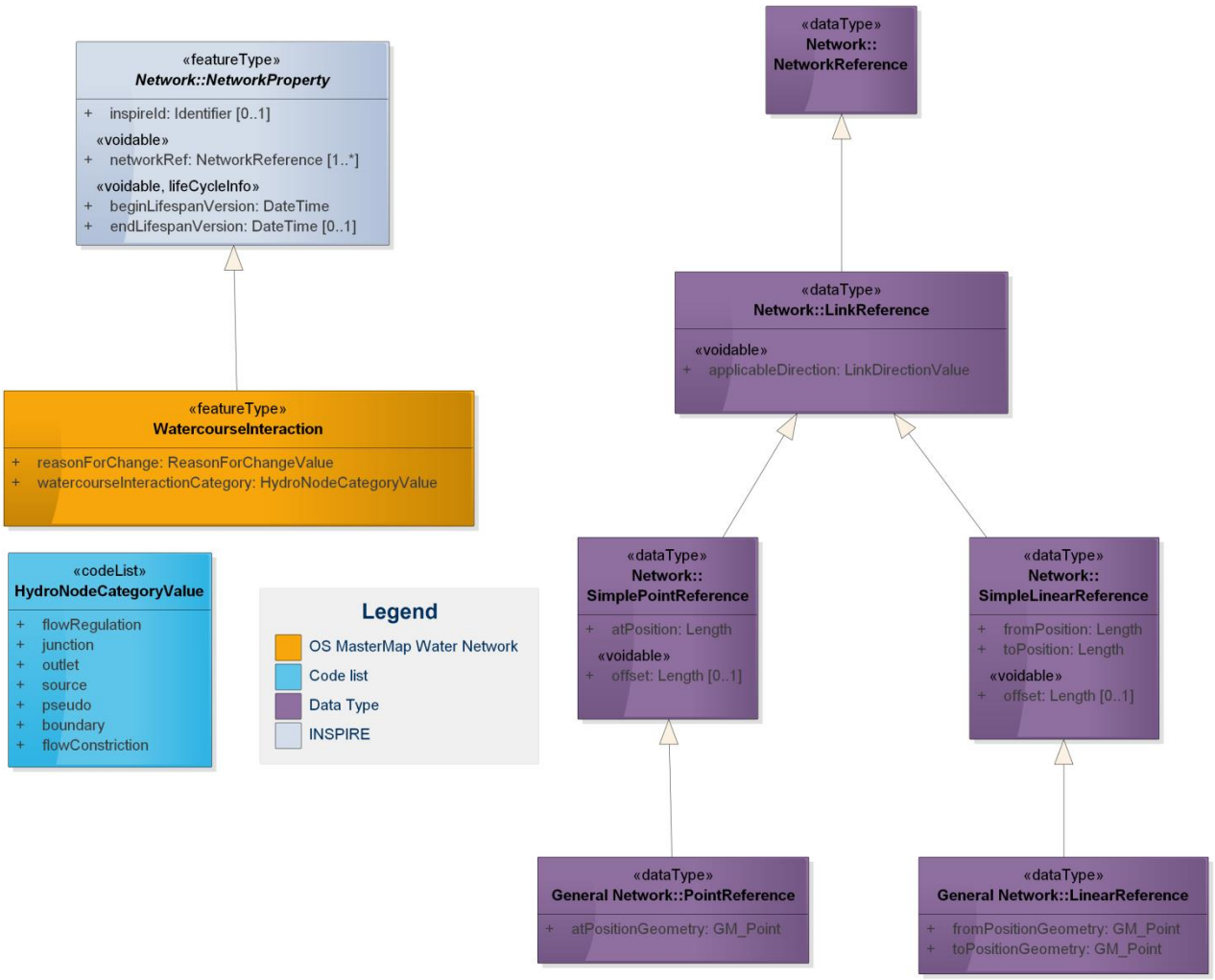
A feature that allows the supply of additional information related to the network in addition to the attribution and geometry of WatercourseLink features. For example, where a watercourse passes under a bridge or over a weir.

«featureType» WatercourseInteraction	
Definition: A feature that describes an event along a watercourse related to the water network that cannot be indicated by the attribution or geometry of WatercourseLink or HydroNode feature(s)	
Subtype of: NetworkProperty	
Attribute: reasonForChange	
Definition: Reason for the current version to be created	
Type: ReasonForChangeValue	**Multiplicity:** [1]
Attribute: watercourseInteractionCategory	
Definition:	
Type: HydroNodeCategoryValue	**Multiplicity:** [1]

Interactions can be either pointReference (for interactions less than 2m in length) or linearReference (for interactions more than 2m in length) which is illustrated in figure 6. These record the position along a specified WatercourseLink for a point interaction, or the start and end position along one or more links for a linear interaction.

Interactions can be recorded with an offset indicating which side of the WatercourseLink the interaction is and a distance.

LinearReference



The linearReference data type will be used where required to record interaction over a length of a WatercourseLink. For example, in figure 7, linear interactions could be used to record where the water network passes under the bridge for a distance at A, over a weir at B or has an associated fish pass at an offset at C.

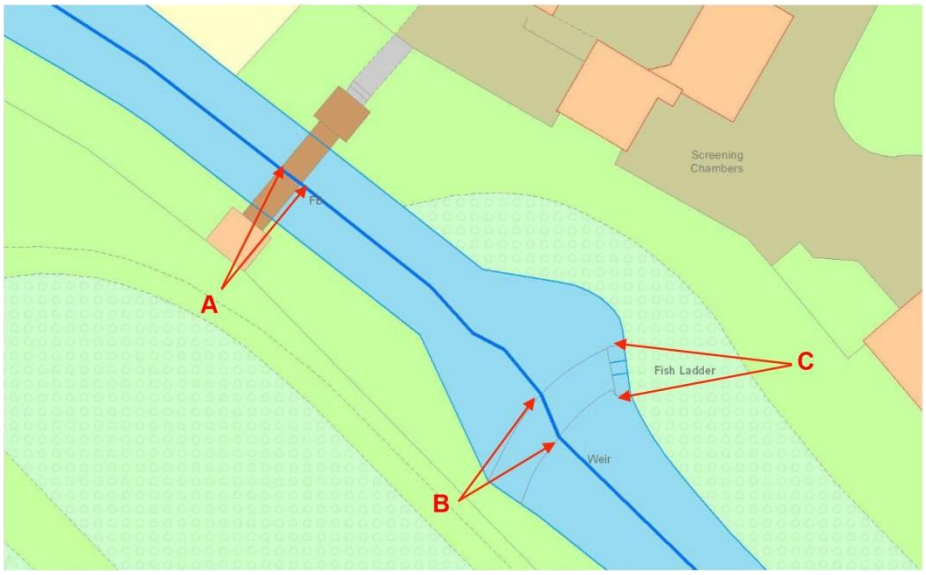


Figure 7: Examples of watercourseInteractions which could be modelled through linear referencing.

Where a linear interaction applies to two or more links, then each part of the interaction are recorded by means of more than one networkReference property.

«dataType» LinearReference	
Definition: Reference to a part of a WatercourseLink along which a specific property applies.	
Subtype of: SimpleLinearReference	
Attribute: fromPositionGeometry	
Definition: Point geometry to explicitly locate the start location from which property applies.	
Type: GM_Point	**Multiplicity:** [1]
Attribute: toPositionGeometry	
Definition: Point geometry to explicitly locate the end location to which property applies.	
Type: GM_Point	**Multiplicity:** [1]

PointReference

The pointReference data types will be used to record interactions at points on the WatercourseLink (interactions with a length of less than 2 m). For example figure 8, point interactions could be used to record the presence and position of features such as sluices (A in image below).

Figure 8: Examples of watercourseInteractions which could be modelled through point referencing.

«dataType» PointReference	
Definition: Reference to specific point on a WatercourseLink at which a specific property applies.	
Subtype of: SimplePointReference	
Attribute: atPositionGeometry	
Definition: Point geometry to explicitly locate where on the WatercourseLink the property applies.	
Type: GM_Point	**Multiplicity:** [1]

Chapter 4 GML Overview

Simple Features – Level 1

The GML data conforms to GML Simple Features Profile level 1. At release 1, the only thing that does not conform to level 0 is the inspireId.

The geometries that we use are OGC 'simple': points, and line strings with linear interpolation.

Schemas

XML schemas are used to define and validate the format and content of the GML. The GML 3.2 specification provides a set of schemas that define the GML feature constructs and geometric types. These are designed to be used as a basis for building application-specific schemas, which define the data content.

The Ordnance Survey application schema **waterNetwork.xsd**, which is referenced by the data, is available on our website. It imports the INSPIRE Hydrography networks application schema, which in turn imports the GML 3.2 schemas. These in turn import schemas produced by the W3C. The data contains elements and attributes from a range of namespaces:

Namespace identifier	Short form prefix	Application schema
http://namespaces.os.uk/mastermap/waterNetwork/1.0	water	OS MasterMap Water Network
urn:x-inspire:specification:gmlas:HydroNetwork:3.0	hy-n	INSPIRE Hydrography networks
urn:x-inspire:specification:gmlas:Network:3.2	net	INSPIRE generic network
urn:x-inspire:specification:gmlas:BaseTypes:3.2	base	INSPIRE base types
http://www.opengis.net/gml/3.2	gml	OGC GML 3.2.1
http://www.w3.org/1999/xlink	xlink	W3C® XML Linking
http://www.w3.org/2001/XMLSchema-instance	xsi	W3C XML Schema instance

Chapter 5 Data provenance

Data creation

Data was created from Ordnance Survey large-scale data with additional input from recognised bodies.

In OS MasterMap Topography Layer, watercourses less than specified widths are captured as single line features for cartographic clarity purposes. These dimensions are 1 m in urban areas, 2m in rural areas and 5m in mountain and moorland areas.

For watercourses captured as area features, algorithms were used to create a network including generating topological connections if appropriate. Additional connecting geometry has been added to ensure topological connectivity where this can be deduced by inspection.

Watercourses represented by line features were used to generate network lines and these were extended both automatically and manually to indicate connectivity.

Manual improvement was undertaken where validation identified issues with flow and connectivity and as a result of customer feedback.

Derived attributes

This section describes how attributes that are derived from other information contained within Ordnance Survey large scale data.

Width attribute

The width attribute is calculated to provide an average width of the Topographic Area feature(s) used to create the network links. There may be significant variation along the portion of the watercourse represented by a WatercourseLink with a single width attribute.

Topographic Line and Area features

The majority of links in the data were sourced from Ordnance Survey detailed topographic data. Different depictions within Ordnance Survey detailed topographic data are adopted for cartographic clarity purposes and watercourses may be represented as lines or areas. Watercourses less than specified widths are captured as single line features, those greater than the specified widths as area features.

Locality	Width	Topographic Representation	Width attribute
Urban	< 1.0m	line	null
Urban	+> 1.0m	area	calculated
Rural	< 2.0m	line	null
Rural	+> 2.0m	area	calculated
Mountain and moorland	< 5.0m	line	null
Mountain and moorland	+> 5.0m	area	calculated

Advances in data capture techniques mean that the cartographic constraints on capture as area features are now less pronounced. As a result some features below the minimum widths in the table above may have been captured as areas.

LevelOfDetail

Definition: A calculated value indicating the relative cartographic importance of a WatercourseLink to aid selection and depiction when styling the data.

Currently this has been populated with a single value pending development of algorithms to create more usable attribution.

Primacy

The Primacy attribute is derived by assessing a combination of the flow, width, gradient and length of the network WatercourseLink feature to identify the most likely course of the main flow of a watercourse at bifurcations.

Gradient

Gradient is a calculated attribute that indicates the rate of descent of the surface of the water over the entire length of the WatercourseLink.

Gradient is expressed as a % or drop in metres per 100 metres of WatercourseLink length.

$$\text{Gradient} = \frac{\text{Height on first vertex} - \text{Height on last vertex}}{\text{Planar length of link}} * 100$$

For more detailed analysis of the WatercourseLink, height is provided on each vertex that can allow a user to calculate gradients within sections of the WatercourseLink.

Heighting the network

The water network was heighted by interpolation from a bare earth terrain comprising mass points and breaklines. The highest resolution height information available was used in this process. This terrain was captured by Ordnance Survey recently and is the basis for new products that include a height component.

The data used to height the network is of a resolution and quality that in some cases results in height attribution that contradicts the flow attribution. This is typically in areas with little change in elevation. In these cases the calculated gradient attribute will not be supplied.

Future developments will reduce occurrences by improving the terrain data to reflect the influence of watercourses on the terrain surface.

Chapter 6 Further Information

Further Information about OS MasterMap Water Network can be found on the Ordnance Survey website:

http://os.uk/business-and-government/products/os-mastermap-water-network.html

Product Guide:

http://os.uk/docs/product-guides/os-mastermap-water-network-product-guide.pdf

Getting Started Guide:

http://www.os.uk/docs/user-guides/os-mastermap-water-network-getting-started-guide.pdf

Ordnance Survey

http://os.uk

Annexe A OS MasterMap Water Network – June 2015 Product Notes

The following Annex outline observations made from product testing or are otherwise of note to users of the product. Ordnance Survey are working towards fixing these errors for the next release.

Language Qualifiers

The xml:lang attributes are not populated in the product. They are planned for population in a future product release where a feature has more than one name.

Name Continuity

The names of watercourses in the product are not all continuous throughout their extent.

HydroNode Categories

There are a number of errors with HydroNode features with the hydroNodeCategory value “Source” and “Outlet” where the flowDirection of the connected WatercourseLink is in the wrong direction or is unknown.

Geometry Issues

There are a number of WatercourseLink features which self-intersect. The vast majority are at the mm level and were created by rounding processes. These will be fixed in future release.

There are a small number of WatercourseLink features which are shorter in length than 1m.

There are a small number of WatercourseLink features which form a closed loop.

There are a number of double digitised WatercourseLink features across the product.

Annexe B Product and service performance report form

Ordnance Survey welcomes feedback from its customers about OS MasterMap Water Network

If you would like to share your thoughts with us, please print a copy of this form and when completed post or fax it to the address below.

Your name: .....

Organisation: .....

Address: .....

.....

.....

Postcode: .....

Phone: .....

Fax: .....

Email: .....

Quotation or order reference: .....

Please record your comments or feedback in the space below. We will acknowledge receipt of your form within three (3) working days and provide you with a full reply or a status report within 21 working days.

If you are posting this form, please send it to:

OS MasterMap Networks Product Manager, Ordnance Survey, Adanac Drive, SOUTHAMPTON, SO16 0AS.

If you wish to return it by fax, please dial 02380 056159.

Any personal information that you supply with this report form will be used by Ordnance Survey only in the improvement of its products and services. It will not be made available to third parties.

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