

ORDNANCE SURVEY GB

OS MASTERMAP WATER NETWORK LAYER – OVERVIEW

Version history

Version	Date	Description
1.1	06/2015	Minor updates.
1.2	01/2022	Introduction of vector tiles and GeoPackage formats to the product. Minor formatting updates to the document.

Purpose of this document

This document provides information about and insight into the OS MasterMap Water Network Layer product and its potential applications. For information on the contents and structure of OS MasterMap Water Network Layer, please refer to the Getting Started Guide and Technical Specification.

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Contact details

[OS website 'Contact us' page \(https://www.ordnancesurvey.co.uk/contact-us\)](https://www.ordnancesurvey.co.uk/contact-us).

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I. Introduction to the product

OS MasterMap Water Network Layer is a three-dimensional digital representation of Great Britain's watercourses. The product includes rivers, streams, lakes, lochs and canals as a series of watercourse network lines. The network lines (links) are attributed to provide a range of information about the section of watercourse they depict. OS MasterMap Water Network Layer will significantly enhance systems used to manage waterways and rivers and the flood risk they pose.



Figure 1: Example extract from OS MasterMap Water Network Layer showing WatercourseLink and HydroNode features.

Watercourses that are underground or below structures are included where Ordnance Survey capture processes or accepted sources can infer the connection.

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.

OS MasterMap Water Network Layer is provided with three-dimensional coordinates.

I.1 Key features of the product

The OS MasterMap Water Network Layer product includes the following key features:

- Flow and connectivity.
- Three-dimensional geometry.
- Catchment information including name.
- The names of watercourses, including language alternatives.
- Vertical relationships where water courses pass over or under one other.
- Average widths.
- Additional information provided by national authorities.

1.2 Product applications

OS MasterMap Water Network Layer supports a wide range of customer applications that use geographic information. The product can be used alone or in combination with other Ordnance Survey products, such as OS MasterMap Topography Layer, OS MasterMap Imagery Layer and OS Terrain 5.

The OS MasterMap Water Network Layer product could be used for applications such as:

- Tracking water flows and contamination.
- Flood prediction, protection and response measures.
- Analytics and visual interpretation, particularly when used in combination with other Ordnance Survey products, for example, OS Terrain 5.
- The management of statutory directives relating to watercourses.
- Ecology studies, for example, species migration.

2. Product details

2.1 Feature types in the product

OS MasterMap Water Network Layer features are classified into feature types. Each feature type has associated attribution, and further detail can be found in the product's [Technical Specification \(https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support\)](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support), which is available on the OS website. The product has two core feature types: WatercourseLink and HydroNode.

2.1.1 WatercourseLink feature

A WatercourseLink feature (Figure 2) represents the alignment of a watercourse; the majority have been derived from Ordnance Survey's detailed topographic data, made available to customers as the OS MasterMap Topography Layer product.

WatercourseLink features are split in the following circumstances:

- Where two or more watercourses meet
- Where the real-world-based attribution of a watercourse changes
- Where the name of a watercourse changes or ceases to apply

WatercourseLink features are not split where they pass under or over one another at different levels. They may be split where they pass into a culvert or tunnel or onto an aqueduct.

Height has been added to each vertex coordinate using the raw data used to create the OS Terrain height products.

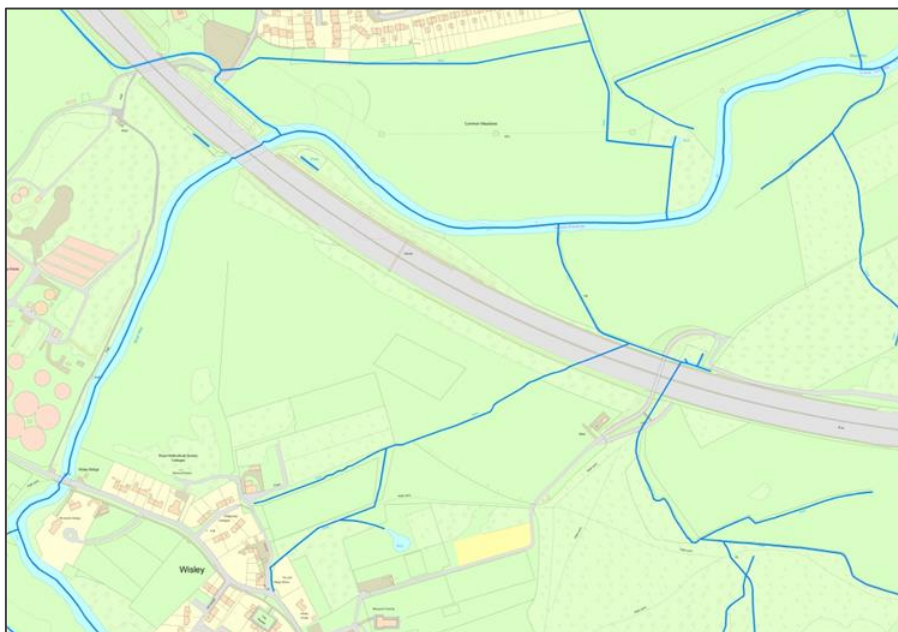


Figure 2: The WatercourseLink feature represents the alignment of watercourses.

2.1.2 HydroNode feature

A HydroNode feature (Figure 3) explicitly represents the source, sink or junction of a watercourse. In addition, they record the location where any real-world-related attribution changes.

A HydroNode feature may only exist at the end point of a WatercourseLink feature. Height has been added to the coordinate for the HydroNode using the raw data used to create the OS Terrain height products.

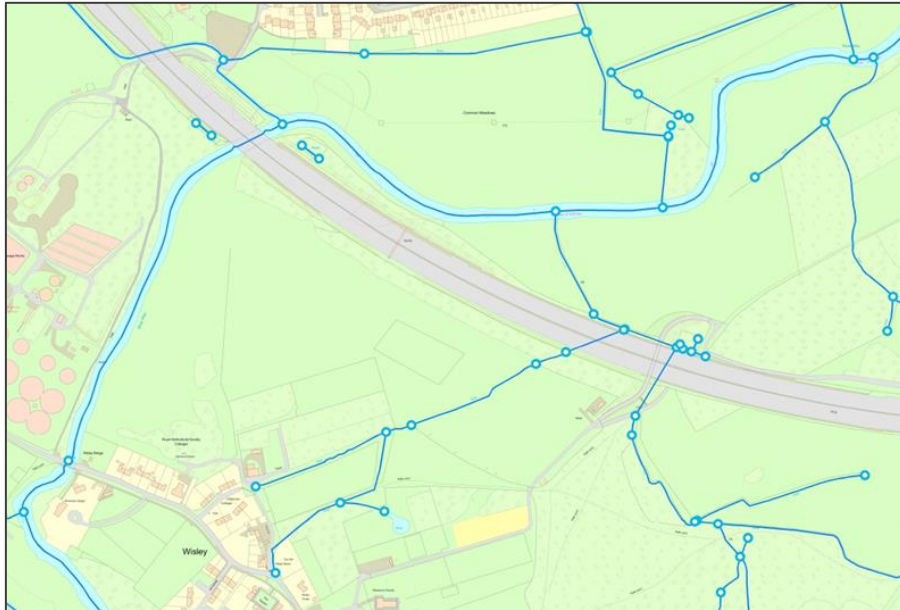


Figure 3: The HydroNode feature explicitly represents a watercourse's source and sink, and locations where junctions of watercourses exist.

2.2 Standards

OS MasterMap Water Network Layer is based on the [INSPIRE Data Specification on Hydrography](https://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_HY_v3.1.pdf) (https://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_HY_v3.1.pdf), which itself is based on the ISO TC211 family of open standards.

2.3 Coordinate reference system

OS MasterMap Water Network Layer uses the British National Grid (BNG) spatial reference system. BNG uses the OSGB36 geodetic datum and a single Transverse Mercator projection for the whole of Great Britain. Positions on this projection are described using easting and northing coordinates in units of metres. The BNG is a horizontal spatial reference system only; it does not specify a vertical (height) reference system.

This water network product, unlike other OS MasterMap layers, contains height values for the geometry vertices. Several orthometric height datums are used in OS MasterMap data to define vertical spatial reference systems; the most common of these is Ordnance Datum Newlyn (ODN), which is used throughout mainland Britain. Height values on the features do not specify which vertical reference system is used, although information on the extents of additional datums can be provided.

OS MasterMap Water Network Layer is projected in the EPSG 7405 OSGB36/British National Grid + ODN. This projection is used as it specifies the Z value as ODN.

In the Geography Markup Language (GML) data, this is represented by reference to its entry in the [EPSG registry](http://www.opengis.net/def/crs/EPSG/0/7405) (<http://www.opengis.net/def/crs/EPSG/0/7405>).

The GeoPackage product format is in the BNG projection (BNG: 27700).

The vector tiles product format is in the Web Mercator projection (EPSG:3857). This projection is a global coordinate reference system.

[A Guide to Coordinate Systems in Great Britain](https://www.ordnancesurvey.co.uk/documents/resources/guide-coordinate-systems-great-britain.pdf) (<https://www.ordnancesurvey.co.uk/documents/resources/guide-coordinate-systems-great-britain.pdf>) is available on the OS website.

2.4 Product update schedule

OS MasterMap Water Network Layer is supplied to customers quarterly in January, April, July and October, incorporating any updates made by the revision programme.

3. Product supply

3.1 Available formats for the product

- Geography Markup Language (GML) 3.2.1, zipped using gzip
- GeoPackage file, zipped using gzip
- Vector tiles (MBTiles) file, zipped using gzip

3.2 Product supply mechanism

OS MasterMap Water Network Layer incorporates a web-based ordering system that allows customers to order their initial data supply and any updates, obtain price estimates and view details of their holdings on demand. The product is supplied as an online download. You can download data in various formats from the [OS Data Hub \(https://osdatahub.os.uk/\)](https://osdatahub.os.uk/).

3.3 Coverage and file size

For GML, OS MasterMap Water Network Layer is a national dataset and is maintained and supplied as 5km by 5km tiles of data. File size estimates can vary from about 1Kb compressed to about 780Kb (compressed). A full national supply will be approximately 1.25Gb compressed. Compression rates vary and are dependent on the size and content of a tile.

For GeoPackage and vector tiles, the coverage will be Great Britain (GB) only. The file size is 1.8Gb zipped for GeoPackage and 1.5Gb zipped for vector tiles.

3.4 Geographic chunking

To make the management of large areas easier, data is split into chunks, each of which covers a nominal square area or part of such a square or a nominated size. Chunk boundaries are imposed purely for the purpose of dividing large supply areas into pieces of a manageable size in a geographically meaningful way. Both full supply and updates are chunked.

The following steps describe how data is chunked into geographic areas.

1. The customer submits an area of interest (AOI).
2. The online system creates a grid covering the entire area based on specified size; any 5km by 5km chunk that intersects the AOI will be included in the order (Figure 4).
3. Each square grid forms a chunk file.
4. Each feature that intersects that square goes into the chunk file.
5. OS MasterMap Water Network Layer is supplied in 5km by 5km chunks.

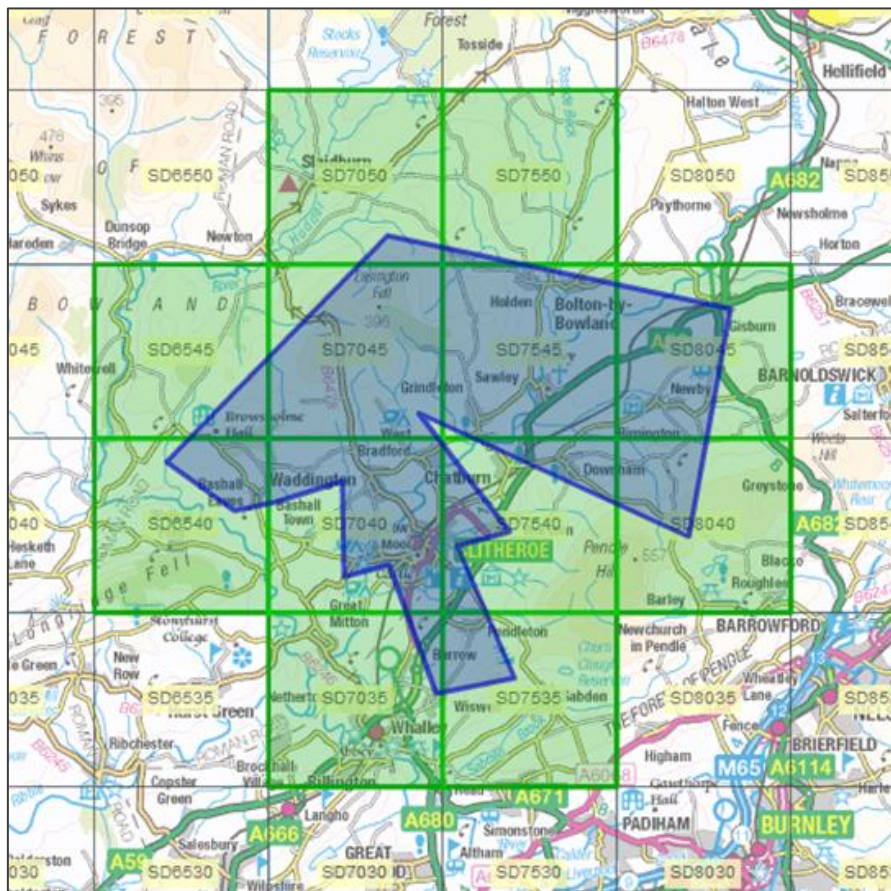


Figure 4: Twelve chunks are created, one for every tile that is intersected by the area of interest (AOI).

Where WatercourseLink features go over tile edges they are supplied in every chunk they intersect. Therefore, these features will be duplicated. Systems reading OS MasterMap data must identify and provide the option to remove these duplicate features.

Empty chunks are not supplied; that is, if a chunk contains no information relating to a customer’s selected themes, then it would be an empty file and it would not be supplied.

3.5 Change-only update

OS MasterMap Water Network Layer change is supplied on a chunk basis. When a feature is changed, all chunks that contain that feature are flagged as containing an update. Within an updated chunk, all features are supplied whether changed or not. Inspection of the individual metadata attributes can highlight whether any individual feature has been updated.

Annex A: Additional resources

- Further information about the product can be found on the [OS MasterMap Water Network Layer product page on the OS website \(http://os.uk/waternetwork\)](http://os.uk/waternetwork).
- [OS MasterMap Water Network Layer Technical Specification \(https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support\)](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support)
- [OS MasterMap Water Network Layer Getting Started Guide \(https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support\)](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support).

Loading the data (GeoPackage format)

The product's Getting Started Guide focuses solely on using the product in Geography Markup Language (GML) format. For guidance on using the product in GeoPackage format, please see the [Getting Started with GeoPackage guide \(https://www.ordnancesurvey.co.uk/documents/getting-started-with-geopackage.pdf\)](https://www.ordnancesurvey.co.uk/documents/getting-started-with-geopackage.pdf), which is available on the OS website.

Loading the data (vector tiles format)

The product's Getting Started Guide focuses solely on using the product in GML format. For guidance on using the product in vector tiles format, please see the [Getting Started with Vector Tiles guide \(https://www.ordnancesurvey.co.uk/documents/user-guides/getting-started-with-vector-tiles-v1.0.pdf\)](https://www.ordnancesurvey.co.uk/documents/user-guides/getting-started-with-vector-tiles-v1.0.pdf), which is available on the OS website.