

ORDNANCE SURVEY GB

OS MASTERMAP TOPOGRAPHY LAYER™ – OVERVIEW

Version history

| Version | Date | Description |
|---------|---------|---|
| 2.0 | 08/2017 | First issue. |
| 2.1 | 05/2018 | Reintroduced information table on page 29 (N.B. As of version 3.0, the theme rules table has moved to the Technical Specification). |
| 2.2 | 07/2018 | Clarification on capture rules for private property. |
| 3.0 | 02/2023 | Introduction of vector tiles and GeoPackage formats to the product. Document name changed from Product Guide to Overview. Formatting updates to the document. Some content moved from this document to the Technical Specification. |

Purpose of this document

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

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I. Introduction to the product

OS MasterMap Topography Layer contains features that represent objects in the physical environment, such as buildings, fields, fences, and letter boxes. It also includes intangible objects, such as county boundaries and the lines of mean high or low waters. There are over 500 million features in the product. Coverage includes the whole of Great Britain (i.e. England, Scotland, and Wales).

I.1 Product highlights

The key characteristics and benefits of OS MasterMap Topography Layer are:

- Individual real-world topographic features are represented by points, lines, and polygons, each with their own unique reference, called a topographic identifier (TOID).
- Each uniquely referenced feature has attribution that provides information about the real-world object it represents and metadata that tracks changes to the feature's lifecycle.
- It employs a scale of data capture appropriate to the density of features – the higher the number of features within an area, the larger the scale used to survey them – ensuring the detail of individual features can be shown and with coordinates delivered in British National Grid (with the exception of vector tiles format, which is supplied in Web Mercator projection – EPSG:3857).
- The data is developed, managed and maintained by Ordnance Survey within one of the world's largest spatial databases.
- The data is delivered as a seamless, geographically contiguous area for the whole of Great Britain.

These characteristics mean that a user may use the product in a wide variety of ways, including:

- Improving the accuracy of their own derived data.
- Improving their data capture processes.
- Creating consistency and achieving maintainable standards within geographic data holdings.
- Establishing a common reference between their own datasets and data they may wish to share with other organisations.
- Improving the visual clarity of data and aiding the visual interpretation of data.
- Using OS products in an integrated manner to derive additional information. For example, appending OS AddressBase data to OS MasterMap Topography Layer buildings data to derive building names and addresses.
- Identifying and managing change in their area of interest (AOI).
- Creating historical views of their AOI.
- Enhancing the queries that can be run on their data, thereby providing better information for decision making.



Figure 1: OS MasterMap Topography Layer in 'Outdoor Style'.

1.2 Product purpose

OS MasterMap Topography Layer was initially developed in response to the need for a national topographic dataset that offers users a more sophisticated type of data that represents the world in a more realistic way and is more aligned to the increasing use and functionality of geographic information systems (GIS) and spatial database technology within organisations.

The product's primary purpose is to provide the most detailed topographic data available of the physical environment of Great Britain. OS MasterMap Topography Layer is regularly updated by ground and aerial survey to a regular schedule, and the data is captured and published to a consistently high standard.

Many users apply geographic products as a starting point to derive their own data, which can be time consuming and inefficient. This is particularly true where features in the data are amalgamations of more than one real-world feature, or even individual parts of a real-world feature. Where the feature represents a real-world feature that has an 'area', such as a building or a parcel of land, the feature is represented in the data as a polygon. This should provide opportunities for users to derive their data with greater efficiency and ease as features can be selected either singularly or in groups. The way, and, largely, the extent of a user's ability to take advantage of the polygonised structure will depend on the systems in use in their organisation. However, most GIS have the necessary 'data capture' tools to analyse and interrogate the topography features.

OS MasterMap Topography Layer provides detailed attribution, through its descriptive terms, relating to the real-world object and the group of features it represents. This means certain types of analysis can be performed, without the user having to manually add their own attribution to the data. The themed attribution (see [Section 3](#) for more information) also means the user can apply their own criteria to refine the data into groups of features that meet their own specific requirements. An example of this would be finding buildings of a certain size by using the calculated area provided as one of the attributes.

It is important for many applications of geographic information (GI) to be able to identify where changes have taken place and the history of a feature's changes. This is important because users may need to learn how the landscape has altered and reflect those changes in their own data. Ordnance Survey updates OS MasterMap Topography Layer on a regular basis, and these changes are passed on to users through a dataset called change-only update (COU). COU supplies just the features that have changed since the last update or customer user order. This should normally result in much less data needing to be processed and uploaded to the user's holdings upon the arrival of each update. This is, however, dependent on how frequently the COU data is applied. Furthermore, OS MasterMap Topography Layer is the first product from Ordnance Survey to introduce the concept of feature lifecycles and unique referencing. This makes it possible to relate change in the real world to features in the digital environment, and to identify and manage that change to OS MasterMap Topography Layer so that users can, if they wish, keep their own data holdings up to date. This will also enable the user to assess the consequences of feature changes. It may even be possible, depending on the systems used, for users to roll back their holdings of OS MasterMap Topography Layer to a specific point in time. However, Ordnance Survey does not supply previous versions of any feature or dataset.

Thematic maps

One of the most common uses for GI is to produce maps that are coloured to highlight a particular value or property that a real-world feature may have; these are often called thematic maps. An example is given in Figure 2. The figure was created by grouping the calculated area value attribute of each unit on an industrial park into one of five categories. Each category is 'themed' with its own colour. The ranges and colours are shown in the legend. Most computer systems offer the ability for features to be assigned a colour or style based on the value of an attribute; OS MasterMap Topography Layer has both the structure and attribution to make it relatively quick to produce such thematic maps. The result is data that is easier to customise, easier to interpret and more eye-catching.



Figure 2: Thematic mapping with OS MasterMap Topography Layer.

Linking datasets

One common barrier to users is linking datasets together and sharing this data with other Ordnance Survey users, making greater use of their own data. To be able to link or 'associate' datasets together normally requires each dataset to have a common reference – one piece of information that is in all datasets. OS MasterMap Topography Layer can help to create links between users' own datasets and OS MasterMap features by using the TOID as a common reference. In this way, OS MasterMap Topography Layer provides a foundation dataset for a Digital National Framework that aims to help users of spatial data to derive more value by associating datasets together. Using a common reference can also provide such benefits to an organisation as removing ambiguity over a feature's identity and allowing the faster retrieval of data when querying or analysing the data.

1.3 Product applications

OS MasterMap Topography Layer is used extensively by businesses and organisations that need to relate their activities and / or their assets to the physical environment.

One of the most common uses for the product is by organisations who have their own GI and wish to examine it in relation to the real world around them. An example would be utility companies that have assets both at surface level and below surface level. They frequently need to visit these assets, either for repair, maintenance, or to add new assets. By viewing their infrastructure against the features in OS MasterMap Topography Layer, it will help their crews locate the assets and become familiar with the area before they leave their depot, and it will allow them to provide a better user service by identifying those nearby premises that need to be notified about the works.

Taking this a stage further, many organisations need to derive their own GI from OS MasterMap Topography Layer. They use the individual features that Ordnance Survey provide to form the building blocks for their own sets of GI. Many local- and central-government organisations use the data in this way. A local authority, for example, may use it to maintain a register of land and buildings in their ownership. Once they have the physical feature or group of features they are interested in, they can attach their own attribution to that already provided with the product. When this kind of data association takes place, it can lead to efficiencies in storing and using data. It can also enable data to be shared more easily both between and within organisations.

As more GI is created, it is possible to analyse the spread and distribution of features or activities and learn from their relationship to other physical features. For example, a police force might plot the locations of certain types of street crimes, and by analysing the pattern and the timing of the incidents against the local topography, they may be able to target their resources more efficiently.

OS MasterMap Topography Layer can also be used as part of a data modelling or a predictive modelling tool. In addition, OS MasterMap Topography Layer is also used by organisations looking for areas where specific physical conditions exist. A retailer, for example, may use OS MasterMap Topography Layer to help them find a site for a new store by using the attribution to find land parcels of a certain size and distance from a settlement or main road and cross referencing the information contained within OS AddressBase to identify an ideal catchment area. Emergency planners may use OS MasterMap Topography Layer to assist in planning and preparing for emergencies by identifying the areas most likely to be affected. The product can also be used to model the sequence of events in any given type of emergency, so that their own resources and command centres are unlikely to be cut off or taken out of action by the emergency itself.

It is possible to customise OS MasterMap Topography Layer styling as a way of clearly communicating GI in reports and presentations. GI can be conveyed more meaningfully in a map than by text or tables, making it easier to get points across to many different types of audience, whether they are key decision-makers, people inside the organisation, or members of the public. OS maintains an '[OS MasterMap Topography Layer Stylesheets page](https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets)' on GitHub (<https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets>) with predesigned, schema-specific styling guides for the product.

It should be noted that the ability of an organisation to develop any or all the applications mentioned above will depend, in part, on the systems they use. Most GIS are capable of performing, to a greater or lesser degree, the applications already mentioned. Examples of other product applications for OS MasterMap Topography Layer include the following:

- Land management and property development
- Site planning
- Citizen services
- Location-based services on mobile devices
- Environmental monitoring
- Tourism and promotional material
- Risk assessment
- User service centres

1.4 System requirements

OS MasterMap Topography Layer data is designed for use as a digital map within GIS and database systems.

For details of Ordnance Survey's Licensed Partners who can incorporate OS MasterMap Topography Layer in their systems, please see the '[Our Partners page](https://www.ordnancesurvey.co.uk/business-government/our-partners)' on the OS website (<https://www.ordnancesurvey.co.uk/business-government/our-partners>).

Ordnance Survey does not recommend either suppliers or software products. The most appropriate system will depend on many factors, such as the amount of data being taken, resources available within the organisation, the existing and planned information technology infrastructure or, last but by no means least, the applications in which OS MasterMap Topography Layer is to be used.

However, as a minimum, the following elements will be required in any system:

- A means of reading the data in its native format, or translating the data into a file format, or storing the data in a database.
- A means of storing and distributing the data, perhaps in a database or through a web-based service.
- A way of visualising and querying the data, typically a GIS.

There is more information on handling OS MasterMap Topography Layer in [Section 4](#).

2. Product details

2.1 The data model

OS MasterMap Topography Layer is grouped into feature themes. Within each theme there will be features deemed to belong to that theme. A feature can belong to more than one theme.

Each feature will have one or more versions of itself which can be tracked as a means of demonstrating change over time. New versions of features will replace existing features through COU, and features that no longer exist can be deleted as a result.

The rest of this section introduces the concepts of themes, features, and attributes.

2.2 Themes

A theme is a set of features that have been grouped together for the convenience of users and to provide a high-level means of dividing the data on the layer in a logical and user-friendly fashion. A feature can be a member of any number of themes but must belong to at least one theme as a minimum requirement.

A theme is created by applying rules based on the attributes of features. A theme rule can depend on the common values contained in the feature attributes. A feature is considered a member of each theme to which it passes a theme rule.

Themes are not part of the classification system of features for OS MasterMap. Because of this, a new theme can be created, for the convenience of our users, without in any way affecting either the existing themes or the classification of OS MasterMap features. An overview of each theme for OS MasterMap Topography Layer is given in [Section 3](#).

2.3 Features

In this Overview, the term 'real-world object' is used to describe a geographic entity that can be captured and represented in the data. A real-world object is represented by a feature in OS MasterMap data. A complete list of the real-world objects and their feature representations is given in the OS MasterMap Real World Object Catalogue, which is available from the Related Links section at the bottom of the ['OS MasterMap Topography Layer Product Support page' on the OS website](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support>).

Each feature has one of three geometrical structures – a point, a line, or a polygon. A line feature will have a start and end node that reflects the start and end of the real-world object it represents. Where the start and end node are coincident, the feature created is structured as a polygon. Lines and polygons represent both the location and the geometry of the real-world object. Points do not necessarily represent the exact geometry of the real-world object, just the centroid of its location. Text features are used to provide additional information and context about real-world objects represented by point, line, or polygon features. They are represented as a point, which indicates the location where the text should be displayed.

Polygon features fit with each other topologically within structuring layers. This means that polygons sit adjacent to each other like pieces of a jigsaw puzzle, rather than on top of each other. In Figure 3, it can be seen that buildings (orange polygons), if 'removed', leaves their footprints in a land feature (green polygon); the land feature does not exist below the buildings.

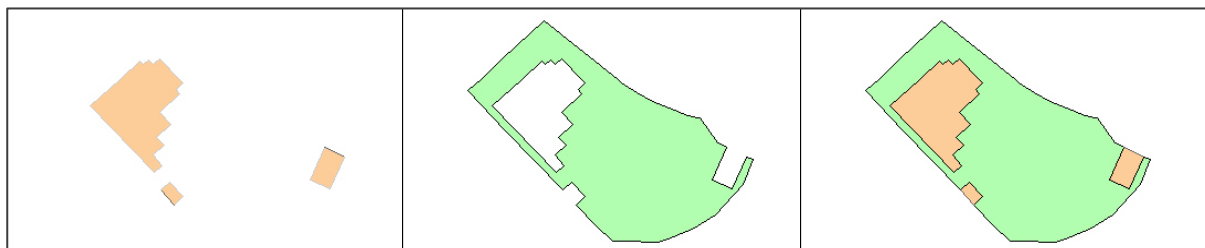


Figure 3: OS MasterMap Topography Layer polygons.

2.4 Attributes

Each feature comes with an extensive set of attributes that provide information about the feature, for example, its identity, its relationship to other features, its geometry, and the kind of real-world object it purports to represent. Each type of feature has a different set of attributes.

There are two types of attribute information:

- Attributes that provide data about the real-world object the feature represents, such as its area or its nature.
- Attributes that provide additional information about the feature, such as its lifecycle and quality.

Three of the most important pieces of additional information for the vector layers – the TOID, version, and version date – are discussed in more detail in [Section 5](#).

OS MasterMap Topography Layer provides attribution that can be searched for and queried within a GIS. Attribution makes it possible to select parcels of land with common features, for example, a polygon attributed as having coniferous tree cover.

2.5 Coordinate reference systems

The Geography Markup Language (GML) and GeoPackage formats use the British National Grid (BNG) spatial reference system. BNG uses the OSGB36 (EPSG 27700) 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.

Vector tiles format is supplied in Web Mercator projection (EPSG:3857). Web Mercator projection uses WGS84 geodetic datum to render the vector tiles.

There are three resources available on the OS website that will help you gain further insight into coordinate systems in Great Britain:

- [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>)
- [A beginner's guide to finding grid references](https://getoutside.ordnancesurvey.co.uk/guides/beginners-guide-to-grid-references/) (<https://getoutside.ordnancesurvey.co.uk/guides/beginners-guide-to-grid-references/>)
- [OS Fact Sheet: Using the National Grid](https://www.ordnancesurvey.co.uk/documents/resources/guide-to-nationalgrid.pdf) (<https://www.ordnancesurvey.co.uk/documents/resources/guide-to-nationalgrid.pdf>)

2.6 Styling

Stylesheets are available for OS MasterMap Topography Layer to optimise the cartographic representation of the product, assisting users in visualising and identifying topographic features at a glance. Users can choose the style that suites their use case best from the four different styles available: backdrop, light, outdoor, and standard.

The predefined stylesheets are available in four formats (QML, LYR, SLD and JSON) for interoperability with GIS and web map services. The files can be downloaded via the ['OS MasterMap Topography Layer Stylesheets page' on GitHub](https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets) (<https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets>).

Note: Click the 'Code' drop-down button and then click 'Download ZIP' to access the styling files.



Figure 4: An extract of OS MasterMap Topography Layer in Outdoor Style.

3. Overview of the product's themes

This section gives an overview of the nine themes of OS MasterMap Topography Layer:

- Administrative Boundaries
- Buildings
- Heritage and Antiquities
- Land
- Rail
- Roads, Tracks, and Paths
- Structures
- Terrain and Height
- Water

The main features of each theme are described in the following sub-sections. More detailed information about the nine themes, including the rules that govern which theme or themes are assigned to a feature, can be found in the product's Technical Specification, which is available from the ['OS MasterMap Topography Layer Product Support page' on the OS website](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support>).

Wherever possible, real-world objects are represented in their true surveyed position. However, for the sake of clarity of display or plotting, real-world objects may be generalised (for example, small juts in house fronts may not be shown). The normal methods of generalisation that can be applied to features are:

- Emphasis
- Selection for inclusion
- Simplification
- Omission

Real-world objects may also be simplified in the OS MasterMap Topography Layer, for example, a small group of trees may be recorded as a single point or polygon feature. The following sub-sections give a breakdown, by feature type, of the nine themes in greater detail, including regional and cultural special designations.

3.1 Administrative Boundaries

Administrative boundaries are defined as showing the limits of responsibility and representation for electoral and administrative purposes. Boundary alignments are shown within the Administrative Boundaries theme. As well as the boundary's relationship to real-world objects, its mereing and boundary descriptions, where needed for clarification, are also supplied.

3.2 Buildings

Buildings are defined as permanent roofed constructions, usually with walls. This includes permanent roofed constructions that exceed 8.0m² in area (12.0m² in private gardens). Exceptions are made to this area rule for smaller buildings that, due to their detached position, form relatively important topographic features; these are shown at minimum size, as stated above. With a few exceptions (for example, by describing government offices or hypermarkets), no distinction is currently made between residential, private, public, commercial, or industrial buildings.

3.3 Heritage and Antiquities

For Ordnance Survey purposes, antiquities are defined as existing artificial features of a date not later than AD 1714 (the date of the accession of George I). These antiquities are captured along with very important battlefield sites and natural features connected with important historic events. Features and sites of a date later than AD 1714 may be treated as antiquities as an exception if they are of national importance.

The investigation, recording and surveying of archaeology is the responsibility of English Heritage, Historical Environment Scotland (HES) and Cadw (Wales). Antiquity find sites are not shown in OS MasterMap Topography Layer. Ordnance Survey has no responsibility for defining the authenticity of distinctive or descriptive names of antiquities.

3.4 Land

A land feature is defined as either a man-made or a natural polygon feature that describes the surface cover and area to which it is applied. This includes both natural and man-made slopes and cliffs. All general features are also placed in the Land theme. There are some exceptions to this, such as routes of communication and buildings.

3.5 Rail

Rail features are defined as features related to travel by railway or tramway. The exception to this is railway tunnels, which are currently in the Structures theme. OS MasterMap Topography Layer contains information relating to permanent railways that form the network between two points, for example, from railway station to railway station, or from an industrial building to a private quarry.

3.6 Roads, Tracks, and Paths

Roads

For Ordnance Survey purposes, a road is defined as a metalled way for vehicles. Roads that form part of the public network and driveways to private properties that are over 100m in length are normally included within OS MasterMap Topography Layer.

Tracks

A track, for Ordnance Survey purposes, is defined as an unmetalled way that is clearly marked, permanent and used by vehicles. Tracks are only normally recorded in private gardens if they are 100m or more in length. They need not be 'all weather'. All tracks are described as 'Track', or 'Tk' if required to be abbreviated. Distinctively named tracks have their name recorded, for example, HICKS LANE (Track).

Paths

For Ordnance Survey purposes, a path is defined as any established way other than a road or track. They can be considered as either 'made' or 'unmade'.

3.7 Structures

Structures are defined as features that are man-made constructions but do not qualify as buildings (for example, Band Stands and Clock Towers). These features may or may not obstruct passage at ground level. OS MasterMap Topography Layer contains information relating to all permanent structures that are considered large enough to be included.

3.8 Terrain and Height

These are features that denote the ground level at any given point. OS MasterMap Topography Layer does not contain height contours; instead it contains height information point features of known height.

3.9 Water

Water features are defined as features that contain, delimit, or relate to real-world objects containing water.

4. Product supply

4.1 Available formats for the product

- GeoPackage
- Vector tiles (MBTiles)
- Geography Markup Language (GML) 2.1.2

4.2 Coverage

Coverage is Great Britain (GB).

4.3 File size

File sizes vary greatly depending on tile size and the quantity of features present in a tile:

- GeoPackage 5km² tile range: Varies (dependent on AOI selection)
- Vector tile GB Supply: Approx. 20GB
- GML 5km² tile range: Varies (dependent on AOI selection)
- GML GB Supply: Approx. 47GB

4.4 Product update schedule

OS MasterMap Topography Layer is updated every 6 weeks. Information about the current product version, and information about future and past releases, can be found on the '[OS MasterMap refresh dates page](https://www.ordnancesurvey.co.uk/business-government/tools-support/os-mastermap-refresh-dates)' of the OS website (<https://www.ordnancesurvey.co.uk/business-government/tools-support/os-mastermap-refresh-dates>).

4.5 Product supply mechanism and options

OS MasterMap Topography Layer incorporates a web-based ordering system that allows users 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 its various formats from the [OS Data Hub](https://osdatahub.os.uk/) (<https://osdatahub.os.uk/>).

Please note that some formats are only available via [OS Orders](https://www.ordnancesurvey.co.uk/business-government/tools-support/orders) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/orders>), Ordnance Survey's legacy ordering system; these formats are indicated in the following table:

Table 1: The supply options available to customers for OS MasterMap Topography Layer.

| Formats | AOI Supply | | GB Supply | |
|---------------------|---------------------------------------|-----------------------|---------------------------------------|-----------------------|
| | Geographic chunks | Non-geographic chunks | Geographic chunks | Non-geographic chunks |
| GeoPackage | Six files (one file per feature type) | | N/A | |
| Vector tiles | N/A | | Six files (one file per feature type) | |
| GML | 2km ² tiles*† | 10MB files*† | 5km ² tiles | 30MB files |
| | 5km ² tiles* | 30MB files* | | |
| | 10km ² tiles*† | 50MB files*† | | |

* Feature Validation Dataset (FVDS) and Change-Only Update (COU) available.

† Only available via OS Orders.

Note: Full GB coverage of OS MasterMap Topography Layer in GeoPackage format as a single AOI will be too large for the majority of GIS to handle.

There are two main supply options available for OS MasterMap Topography Layer: Full Supply or COU.

Initial Supply refers to the first order of OS MasterMap Topography Layer that a user makes, which will contain all features for all the layers selected for the area covered by the order. Upon Initial Supply, users can select whether they would like to receive future data updates as COU (user receives only the tiles / features that have changed since the last update) or a Full Supply (user receives all tiles / features regardless of whether they have changed since the last product update). COU data contains new and updated versions of features (known as Inserts and Updates, respectively), and information about departed features (known as Deletes); any feature within the area covered by the order that has not undergone any change will not be supplied.

The advantage of taking a COU Supply rather than a Full Supply is that, if applied regularly, the amount of data that must be processed and loaded is much smaller with a COU Supply. Users may request updates of the latest changes in their AOI, at any time, using the online service. Updates can either be for specified AOIs or GB wide.

Note: It is advisable to apply COU updates for all the OS MasterMap layers to which you have subscribed at the same time to ensure cross-product synchronicity. OS MasterMap layers include the following products: OS MasterMap Topography Layer, OS MasterMap Sites Layer, OS MasterMap Building Height Attribute, OS MasterMap Greenspace Layer, OS MasterMap Highways Network – Roads, OS MasterMap Highways Network – Routing and Asset Management Information (RAMI), OS MasterMap Highways Network – Paths, and OS MasterMap Water Network Layer.

4.6 Updating data holdings

The underlying database for OS MasterMap Topography Layer is live and undergoes continuous revision. When a user orders COU, a 'change since' date is specified, and all features that have changed since midnight on the date specified are supplied. This will normally be the date the data was last extracted from the Ordnance Survey main database but could be a previous date. The last extraction date can be found on the '[OS MasterMap refresh dates page](https://www.ordnancesurvey.co.uk/business-government/tools-support/os-mastermap-refresh-dates)' of the OS website (<https://www.ordnancesurvey.co.uk/business-government/tools-support/os-mastermap-refresh-dates>) along with the update history and release notes for the product.

To be able to resolve changes to the data holding, the system used to translate or load the data must check the TOID and version of every feature in the update against the current data holding to determine whether it should be loaded, and if so, what existing feature(s) it replaces. This makes it possible to request and load COU with a date preceding the last data supply date without damaging the data holding. This process can be used to correct a data holding if inconsistencies have occurred due to partially loaded or non-sequential COU, by ordering a single COU with a change since date that precedes the problem updates.

4.6.1 Managed Great Britain Sets

For users taking a Full Great Britain (GB) Supply of OS MasterMap Topography Layer, there is a Managed Great Britain Sets (MGBS) service. The MGBS service is available for GML or vector tiles formats only (full GB coverage of OS MasterMap Topography Layer in GeoPackage format as a single AOI will be too large for the majority of GIS to handle).

OS Data Hub users will be automatically notified (via email) when their Full Supply or COU MGBS is available from their 'Data Package' area on the OS Data Hub, in accordance with product refresh dates as stated on the '[OS MasterMap refresh dates page](https://www.ordnancesurvey.co.uk/business-government/tools-support/os-mastermap-refresh-dates)' of the OS website (<https://www.ordnancesurvey.co.uk/business-government/tools-support/os-mastermap-refresh-dates>).

OS Orders users will automatically receive their updates (Full Supply or COU) on DVD or hard drive, either quarterly or every six weeks (whichever option was selected at initial order).

MGBS users and Ordnance Survey Licensed Partners that take GB coverage can benefit from:

- Data arriving faster and in a more predictable and timely manner
- Seeing the same version of features as other organisations
- Easier data management
- A Feature Validation Dataset (FVDS) with all COU orders or with Full Supplies on request (GML format only)

4.7 GML supply options

There are several options available to customers when ordering data in GML format that provide additional metadata or aid data management.

4.7.1 Chunk files

To make the management of large areas easier, data is split into chunks, each of which covers a nominal square area. Data can also be supplied as part of a squared area to complete a predefined area as part of a nominated file size. Two types of chunks are available: geographic and non-geographic chunks. 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 (whether COU or Full Resupply) are chunked.

Geographic chunking option

As OS MasterMap Topography Layer data is seamless, GML files containing large areas could be very data intensive. In order to provide files of a manageable size, data supplies are divided into chunks of user-specified size, each of which is supplied in a separate GML file. Figure 5 illustrates how geographic chunks work:

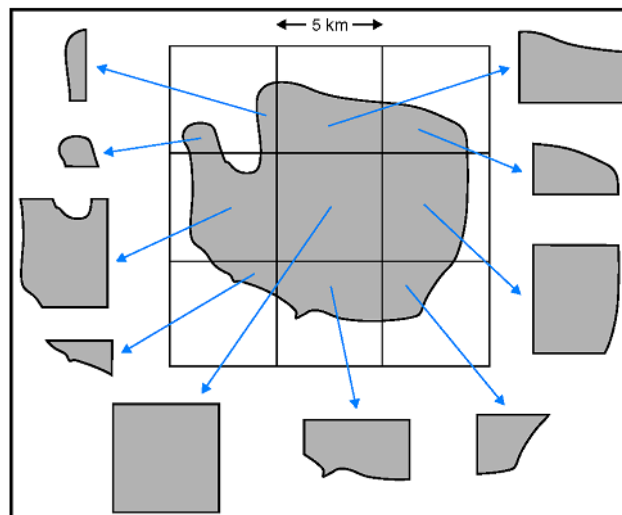


Figure 5: An example of how geographic chunking works in OS MasterMap Topography Layer data.

The process of chunking has the following steps:

1. The user submits an AOI by either drawing an AOI or uploading a pre-defined AOI to the OS Data Hub platform (or OS Orders).
2. Both online ordering systems create a grid covering the entire area based on the user-specified size (for example, 5km²).
3. Each square within the grid forms a chunk file.
4. Each feature that intersects that square goes into the chunk file.

Note: National cover of OS MasterMap Topography Layer in GML format is supplied in 5km² chunks.

In the case shown in Figure 5, 10 chunks have been created. The central chunk is a complete grid square; the other chunks are partly bounded by the data selection polygon. The upper-left square shows the effect when the data selection polygon crosses a grid square twice – i.e. two or more separate chunks are created.

A consequence of chunking is that some features are supplied in more than one chunk. Systems reading OS MasterMap Topography Layer data must identify and provide the option to remove these duplicated features.

If a chunk contains no information relating to a user’s selected themes, then it is not supplied.

Chunks cannot be treated as persistent data management units; as it is a floating grid, the origin of the chunking grid may differ between orders, particularly if the contract area changes or if a different chunk size is ordered.

Supply of OS MasterMap Topography Layer features in chunk files

The packaging of a seamless dataset into chunks means that where a feature lies across or touches the boundary of several chunks, it is supplied in all the related chunks. This is because an individual feature is the smallest unit within the OS MasterMap Topography Layer, and it cannot be physically split into two or more parts.

When a polygon falls across a chunk edge, but its bounding line(s) lie outside, it may not be included in that chunk. It will be included in the adjacent chunk, unless the polygon is at the edge of the contract area, in which case, the line will not be supplied at all.

When a polygon changes so that it no longer falls in the same chunk, for instance, when an OS MasterMap Topography Layer feature used to lie partly inside a chunk and instead is now reduced in size so it is wholly within an adjacent chunk, it is reported as a deleted feature (a Delete) in one chunk and as a modified feature (new version, known as an Update) in the adjacent chunk. This is shown in Figure 6. For more information on deleted features (Deletes), see [Section 5](#).

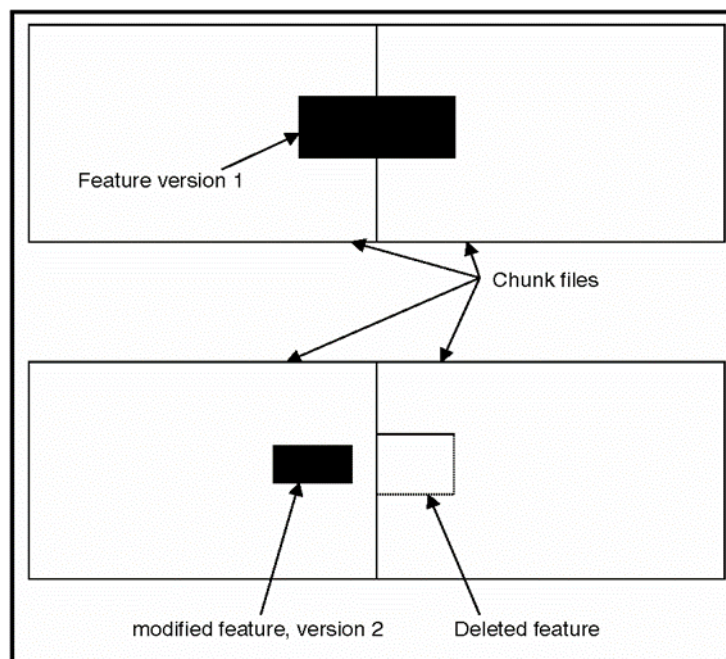


Figure 6: Feature types and geographic chunk boundaries in OS MasterMap Topography Layer data.

It is possible for OS MasterMap Topography Layer features with point geometry to be included in multiple adjacent chunk files. This is because the query used to populate a chunk file includes all features that touch its boundary, and this boundary is shared with adjacent chunks. Therefore, loading software must be able to identify and remove duplicate point features across multiple files in the same way as features represented by lines and polygon geometries.

Non-geographic chunking option

This supply format delivers the files in a fixed nominal size, as opposed to a given geographic area depending on user preference.

Unlike in geographic chunking, each feature in non-geographic chunking appears in only one chunk file. It is possible for features from various geographic locations to appear in a single file, and for adjacent features to appear in different files. Non-geographic chunk files are designed for use as a set to load spatial databases but can be used in a file format if all chunks are translated or imported into the system at the same time. It is not possible to tell in which file a particular feature will be found before reading the files. With non-geographic chunks, there are no duplicate features lying across chunk edges; this speeds up the translation process.

The features shown in red in Figure 7 can end up in the same non-geographic chunk even though they are not adjacent to each other.

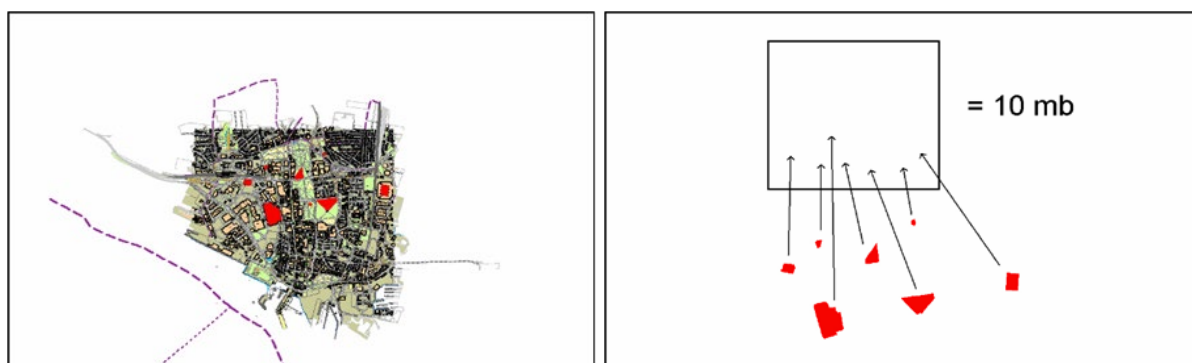


Figure 7: Non-geographic chunking in OS MasterMap Topography Layer data.

4.7.2 Feature Validation Dataset

The Feature Validation Dataset (FVDS) is a set of files that can optionally be supplied with either a Full Supply COU or an AOI COU of an OS MasterMap Topography Layer order in GML format. The FVDS allows a user to validate that the data holding contains the correct set of features after loading. It does this by reporting on all the data it expects to find in the holding after the application of the supply, **not just what is contained in the supply.**

The FVDS is intended to be used for periodic checks on data holdings maintained by a COU regime. It is not necessary for users to order it with every supply, as processing it will slow the translating process. It can also be used to check that an initial supply of OS MasterMap Topography Layer data has been correctly loaded. The FVDS can be used with both geographic and non-geographic chunk file options. The FVDS is itself divided into files on a non-geographic basis, using a 10MB nominal file size.

The FVDS is a comma-separated value (.csv) text file format that gives the TOID, version number and version date of every feature that should exist in the current data holding, based on the polygon extent, themes, polygon format and extraction date of the current order. Each .csv file is compressed to a .gz file using the same compression algorithm used for OS MasterMap Topography Layer GML files.

4.7.3 GML summary file

An order summary file in GML format will be supplied with all OS MasterMap Topography Layer orders, containing the order information specified by the user. This information includes:

- The order number
- Query extent polygon(s) of the order
- The order type: Full Supply or COU (for COU orders, the change since date will be included)
- The themes requested
- The chunk type: Non-geographic or geographic
- The chunk size (in MB for non-geographic chunks; in km² for geographic chunks)

5. Change management and data association

This section introduces two aspects of deriving additional value from OS MasterMap Topography Layer:

- The first aspect is utilising the referencing and change-tracking attributes to identify and manage the impact of change on a user's data. It discusses the process of applying change and the implications for archiving data.
- The second aspect is associating user data and OS MasterMap Topography Layer using the TOID as a common reference. This creates the potential to share data between departments and organisations. It explains what data association is and it gives examples of how data association can bring benefits to organisations.

5.1 Change management

The feature-reference and change-tracking attributes provide the opportunity for users to put in place a change-management regime. The system that the user uses to translate and load OS MasterMap Topography Layer should use the TOID and version information to update their local holding when a COU is taken onboard.

The software used to manage the holding needs to handle three types of situation: features that have been deleted (known as Deletes), features that are new (known as Inserts), and features that have changed (known as Updates). The software should resolve Deletes as a priority. It is important that COUs are processed with Deletes first, then Inserts and Updates. This is to ensure that updates are applied in the correct order.

Deletes

- In the COU, there is a list of features that have been deleted since the last time the user took data. There are some additional considerations with deleted features, but in essence, the software should find all the TOIDs and versions on the deleted features list in the COU, locate them in the main holding, and remove those features.
- In the case of superseded and deleted features, these could be removed totally from the user's holding, but it may better suit the requirements of the user to archive them for future reference.

Inserts

- With a new feature, called an Insert, the software compares each TOID in the COU against the TOIDs in the existing holding. If the TOID exists in the COU but not in the main holding, it is considered an Insert and the software should put it into the holding.

Updates

- If the TOID already exists in the holding, the software needs to compare the version number in the existing holding against the version number in the COU. If the version number in the COU is higher than in the existing holding, the software needs to take out the existing version of the feature and replace it with the version contained in the COU. If, on the other hand, the COU version number is lower than the COU version number, the feature should be ignored.

5.2 Archiving the OS MasterMap data holding

As OS MasterMap features progress through their lifecycles, it is possible to develop snapshots of the features by holding superseded versions in a local data archive. By holding and maintaining a local data archive, users will be able to interrogate previous views of the world straight from their local data holding.

It is important to consider carefully how to archive OS MasterMap Topography Layer features, and what requirements the applications and users will have to access the older information. Archiving may be done by simply writing older versions of the data to hard media, or by a more sophisticated system of keeping historical data live. It is important for users to recognise their own unique requirements (be they user, statutory or regulatory requirements) as archiving can become a significant overhead in terms of storage.

Before designing or implementing an archive of OS MasterMap Topography Layer, it is advisable for a user to discuss requirements with their system supplier.

Annex A: Product support links

Guides

You can find additional information and documentation about the OS MasterMap Topography Layer product on the '[OS MasterMap Topography Layer Product Support page](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support)' on the OS website (<https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support>).

We recommend you read the following guides:

- *OS MasterMap Topography Layer – Getting Started Guide*
- *OS MasterMap Topography Layer – Technical Specification*
- *Getting Started with GeoPackage*
- *Getting Started with Vector Tiles*

Additional information and guidance about geographic information systems (GIS) is available on the '[Geographic Information Systems page](https://www.ordnancesurvey.co.uk/business-government/tools-support/gis)' of the OS website (<https://www.ordnancesurvey.co.uk/business-government/tools-support/gis>).

Styling

Styling guides

There are two styling guides available for OS MasterMap Topography Layer:

- The *OS MasterMap Topography Layer – Standard Styling Specification* is available from the '[OS MasterMap Topography Layer Product Support page](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support)' on the OS website (<https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-topography-support>).
- The *OS MasterMap Topography Layer – Styling Getting Started Guide* is available for download from the [Ordnance Survey OSMM-Topography-Layer-stylesheets GitHub repository](https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets) (<https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets>).

Stylesheets

Predefined stylesheets for OS MasterMap Topography Layer are available for download from the [Ordnance Survey OSMM-Topography-Layer-stylesheets GitHub repository](https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets) (<https://github.com/OrdnanceSurvey/OSMM-Topography-Layer-stylesheets>).

To download a ZIP containing all stylesheets, navigate to *Code > Download ZIP*.