



PRODUCT GROUP/DEPARTMENT

OS MasterMap Topography Layer

Technical Specification

Responsibility for this document

The Product Strategy and Management team is responsible for the content of this document.

Change history

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Introduction

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The documentation is supplied in portable document format (PDF) only. Free Adobe® Reader® software, which displays the specification, incorporates search and zoom facilities and allows you to navigate within. Hyperlinks are used to navigate between associated parts of the specification and to relevant Internet resources by clicking on the blue hyperlinks and the table of contents.

Chapter 1 Introduction

OS MasterMap Topography Layer provides the most detailed and accurate large scale representation of Great Britain available from Ordnance Survey.

Key Concepts

In this section, the three key concepts underlying OS MasterMap Topography Layer are outlined. These are:

1. A feature model with identifiable and persistent features
2. Feature lifecycles defined to match actual change
3. Integration of the OS MasterMap suite of products

Feature Model

OS MasterMap Topography Layer is created on the premise of a feature-based model. This models the real world at the level of the feature, which represents an object in the real world. Each feature has an identity, location and other additional attribution.

Feature Lifecycle

The features that comprise OS MasterMap Topography Layer are managed by feature lifecycle rules. These manage how changes in real world objects are represented by the features in OS MasterMap Topography Layer. These rules define what real-world change constitutes a modification to an existing feature, and what change is represented by a new feature. This management allows a consistent representation of changes in the real world, based upon the capture specification.

Integration of the OS MasterMap layers

The suite of layers that make up OS MasterMap have been modelled to allow simple integration with each other. All of the layers are managed in a single capture and maintenance environment, meaning the geometries of the different layers are in sympathy with each other, allowing easy integration. Additionally, they all invoke the principle of the Topographic Object Identifier (TOID®), and use this as their unique IDs. This principle is expanded upon in [Chapter 3](#).

Available Formats

OS MasterMap Topography Layer is supplied in GML 2.1.2

File compression is performed using the UNIX gzip utility.

Supply Mechanisms

OS MasterMap Topography Layer supplies are fulfilled via either CD, DVD, through an FTP server or a download service, on a minimum six-week cycle.

Great Britain coverage is available by ordering a Managed Great Britain (GB) set, while smaller areas can be ordered by selecting an Area of Interest (AOI) through the online ordering system.

Chunking

OS MasterMap Topography Layer is split into chunks in order to allow file sizes to be kept at a manageable level. Two types of chunks are available; geographic and non-geographic. A more detailed description of these options is available in the [Product Guide](#).

Geographic Chunking

Geographic chunking divides supply areas into manageable sizes in a geographically meaningful way. Chunks are created to a user-specified size, either 2km by 2km, 5km by 5km or 10km by 10km. Features that fall within two or more chunks are supplied in both chunks, meaning some features around the chunk edges will be duplicated.

Non-geographic Chunking

Non-geographic chunking divides supply into files that have a fixed nominal size, regardless of geographic area. There are three compressed file size options available; 10MB, 30MB or 50MB. Each feature will only appear in one chunk file. It is possible for features from various geographic locations to appear in one file, and for adjacent features to be supplied in different files.

File Naming

Geographic chunks (Zipped)

If geographic chunk data supply is used, the filename will be constructed as:

orderNumber-ngxxyy.gz

Where:

orderNumber	is your customer order number
Ngxxyy	is the four-digit grid reference belonging to the 1km south-west corner of the 5km chunk being supplied

For example:

1234567-SU4020.gz

Non-geographic chunks (Zipped)

If non-geographic chunk data supply is selected, the filename will be constructed as:

orderNumber-vvvvvv.gz

Where:

orderNumber	is your customer order number
Vvvvvv	is the volume number of the file

For example:

1234567-000001.gz

Adherence to Standards

UML Diagram and Table Conventions

The data structure in this document is described by means of Unified Modelling Language (UML) class diagrams and accompanying tables containing text.

Colour conventions have been used in the diagrams and tables. In the UML diagram, feature types from the Ordnance Survey product specification are Orange and enumerations are Green.

Chapter 2 OS MasterMap Topography Layer structure

In OS MasterMap Topography Layer, features are classified using feature type and feature description attributes. This section describes the feature types and shows their permitted attribution. The tables below provide the following information about each attribute:

Attribute Name and Definition

The name of the attribute and what it is describing.

Attribute Type

The nature of the attribute. The following values may occur:

Type	Description
Boolean	Value of 'true' or 'false'.
Date	Specifies a day within the Gregorian calendar in the format YYYY-MM-DD.
Integer	Any positive or negative whole number or zero.
MultiLine	A set of Polyline geometries. See geometric data types for details.
Point	A pair of easting and northing coordinates in metres, defining a horizontal location in the British National Grid spatial reference system. See geometric data types for details.
Polygon	A closed area defined by one outer boundary and zero or more inner boundaries. Each boundary is a closed ring of coordinate pairs, interpolated as for a polyline. See geometric data types for details.
Polyline	An ordered set of points that are connected with a straight line between each pair. See geometric data types for details.
Real	A floating point number.
Rectangle	A rectangle defined in the British National Grid.
String	An ordered set of characters.
TOID	OS MasterMap unique feature identifier.

Multiplicity

[1] indicates that the attribute is mandatory and can only occur once.

[1..*] indicates that the attribute is mandatory and can occur many times.

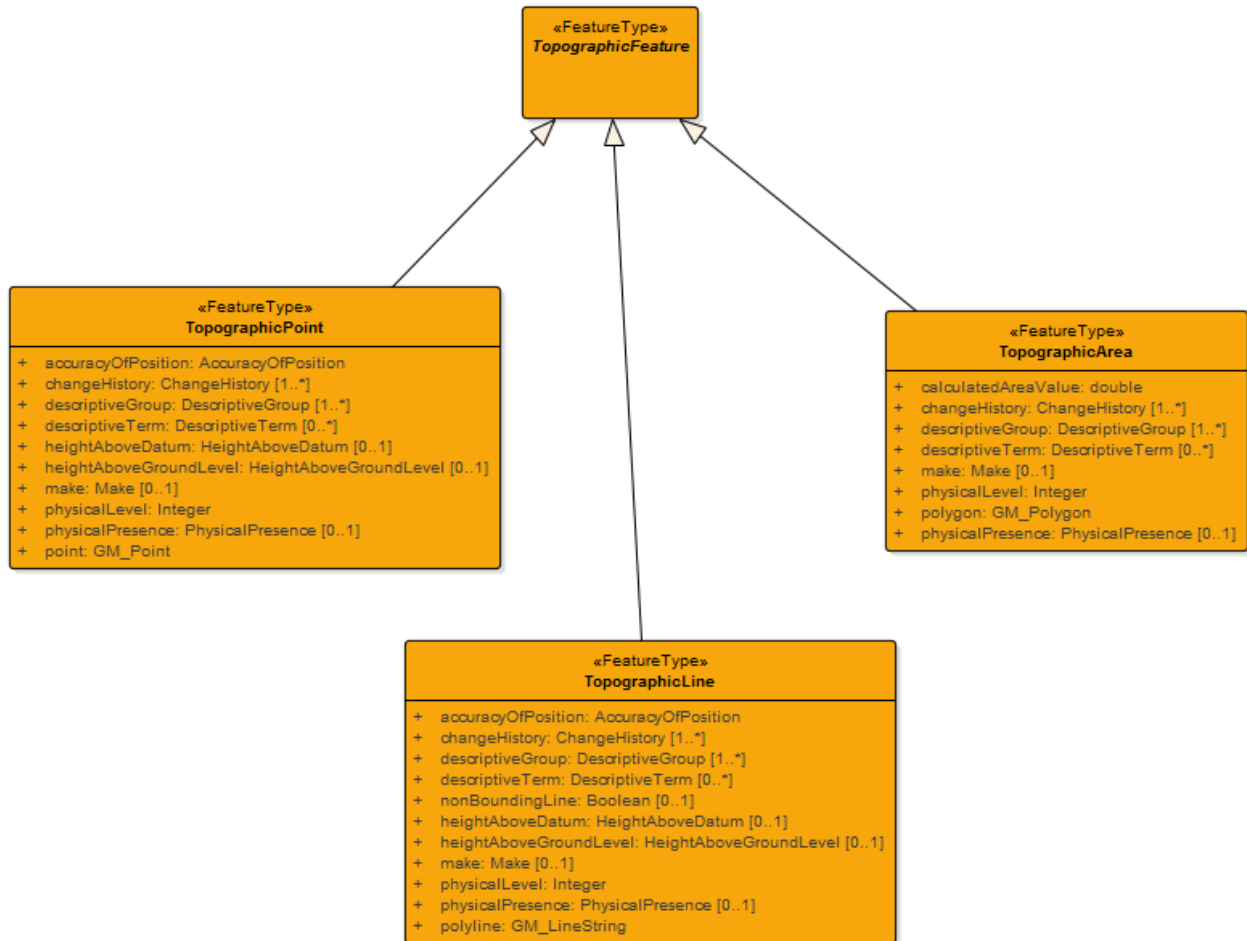
[0..1] indicates that the attribute is optional; if present, it only occurs once.

[0..*] indicates that the attribute is optional; if present, it can occur many times.

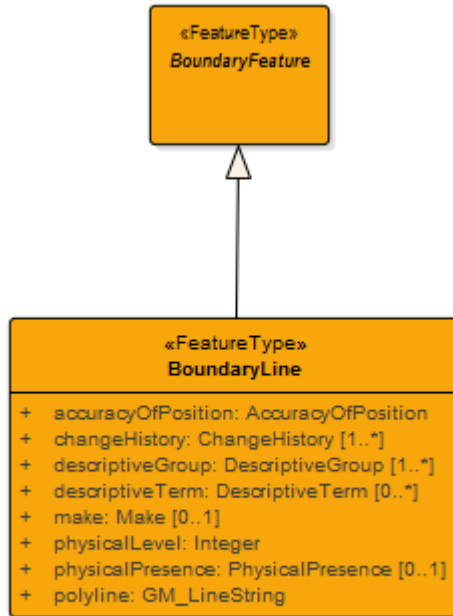
Feature types and their attributes

The product is comprised of six feature types:

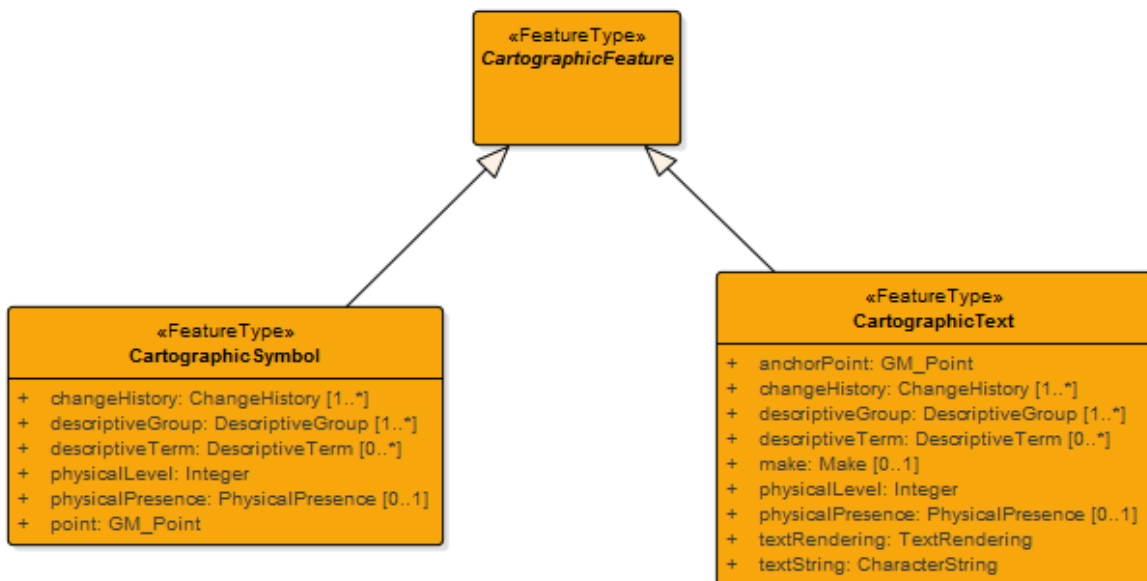
- Three topographic feature types: **Topographic Point** (such as post), **TopographicLine** (such as Mean High Water) and **TopographicArea** (such as coniferous trees);



- One boundary feature type – **BoundaryLine** (such as unitary authority boundary);



- And two cartographic feature types: [CartographicSymbol](#) and [CartographicText](#).



In addition, if change only update (COU) supply has been provide, the data may contain information about the movement and deletion of features. These are represented by the feature type called **DepartedFeature**. More information about change only update is contained in [Chapter 5 - Change Only Update Overview](#).

TopographicPoint

«FeatureType» TopographicPoint	
Definition: Features representing topographic objects and other concepts that have a point-based geometry.	
Spatial attribute: point	
Data type attribute: Point	
Attribute: TOID or <i>gml:id</i>	
Definition: The unique topographic reference number. It consists of the letters 'osgb' followed by sixteen digits. The TOID must always be retained / stored in its entirety and it is recommended that any leading zeros on the TOID are retained to permit linking of the feature to other MasterMap products.	
Type: String	Multiplicity: [1]
Attribute: featureCode	
Definition: Topographic features have a numerical feature code (a five-digit integer) assigned to each feature. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s). The feature code does not add any information to that contained in these attributes. The <i>physicalLevel</i> , <i>physicalPresence</i> and <i>make</i> attributes do not affect the feature code. The feature code itself is arbitrarily assigned, and is therefore not informative without the look-up table that gives the feature type and attribute values corresponding to each feature code.	
Type: Integer	Multiplicity: [0..1]
Attribute: version	
Definition: The version number of the feature (in the range 1 to 4294967295). This uniquely identifies a specific version of a feature with a given TOID.	
Type: Integer	Multiplicity: [1]
Attribute: versionDate	
Definition: The date on which this version of the feature became the current version. This is the date on which the feature was changed in the database, and is not the date of any associated real-world change.	
Type: Date	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]
Attribute: accuracyOfPosition	
Definition: The accuracy of a horizontal position in metres at the 95% confidence level.	
Type: String; see AccuracyOfPositionValue	Multiplicity: [1]
Attribute: changeHistory	
Definition: Information about the change history of a feature that comprises the reason for the change (<i>reasonForChange</i> attribute – see below) and the date for this change (<i>changeDate</i> attribute – see below). Each feature may have many change history records and these are ordered chronologically. A complex attribute .	
Multiplicity: [1..*]	
Attribute: reasonForChange	
Definition: The reason for a change made to a feature. Forms part of the feature's complex attribute <i>changeHistory</i> – see above.	
Type: String ; see reasonForChangeValue	Multiplicity: [1..*]
Attribute: changeDate	

Definition: The date a change was made to the feature by an editor. Forms part of the feature's complex attribute <i>changeHistory</i> – see above.	
<i>NOTE: this may not match the versionDate attribute.</i>	
Type: Date	Multiplicity: [1..*]
Attribute: descriptiveGroup	
Definition: This is the primary classification attribute of a feature. It assigns a feature to one or more of 21 groups, most of which are categories of real-world topographic objects, such as path, building or natural environment; others are categories of supportive or administrative features, such as network or polygon closing geometry and political or administrative. In general, values of this attribute are not specific to particular feature types. Due to limitations in the source data from which OS MasterMap was created, there are some exceptions to this principle. For instance, the <i>descriptiveGroup</i> buildings or structure contains text describing or naming buildings and structures, while the topographic features have the <i>descriptiveGroup</i> values of building, glasshouse or structures.	
Type: String; see DescriptiveGroupValue	Multiplicity: [1..*]
Attribute: descriptiveTerm	
Definition: This attribute, if present, gives further classification information about the feature. A feature may have multiple <i>descriptiveTerm</i> attributes. Most features have zero or one <i>descriptiveTerm</i> attributes. Multiple <i>descriptiveTerm</i> attributes occur in several different scenarios, such as where point features have a <i>descriptiveGroup</i> with the value of 'Structure' or 'Inland Water'. These features can have one or more <i>descriptiveTerm</i> attributes specifying the type of feature shown by the point.	
Type: String; see DescriptiveTermValue	Multiplicity: [0..*]
Attribute: heightAboveDatum	
Definition: The height of the feature above the Ordnance Datum Newlyn (ODN) vertical datum, in metres. Part of the <i>heightAboveDatum</i> complex attribute .	
Type: Real	Multiplicity: [0..1]
Attribute: heightAboveGroundLevel	
Definition: Height of the feature above ground level, in metres. Part of the <i>heightAboveGroundLevel</i> complex attribute .	
Type: Real	Multiplicity: [0..1]
Attribute: make	
Definition: Where known, indicates whether the real-world nature of the feature is man-made or natural.	
Type: String; see MakeValue	Multiplicity: [0..1]
Attribute: physicalLevel	
Definition: This attribute states whether the feature is underground, obscured below normal cartographic level, at normal cartographic level, or overhead. Normal cartographic level is that perceived to be the normal surface level. Where area features overlie others – for example, bridges – they are at normal cartographic level and the features below them are recorded as obscured. Indicates the physical level of a feature with reference to the normal cartographic surface level. Only four values are used:	
<ul style="list-style-type: none"> • -1 = Underground detail • 49 = Obscured detail below the normal cartographic level • 50 = Detail at the normal cartographic level • 51 = Overhead detail above normal cartographic level 	
Type: Integer	Multiplicity: [1]
Attribute: physicalPresence	

Definition: This attribute indicates the nature of the object represented by the feature. This is normally used for <i>TopographicLine</i> , for example, a value of 'obstructing' indicates that the feature prevents pedestrian access, whereas a value of 'edge/limit' means that the feature represents a change of surface type and does not generally impede access. This attribute is also used to identify administrative boundary and inferred line features, and moveable area features (for example, moveable cranes).	
Type: String; see PhysicalPresenceValue	Multiplicity: [0..1]
Attribute: point	
Definition: A pair of easting and northing ordinates in metres, defining a horizontal location in the British National Grid spatial reference system.	
Type: GM_Point	Multiplicity: [1]

TopographicLine

«FeatureType» TopographicLine	
Definition: Feature representing topographic objects and concepts that have a line-based geometry.	
Spatial attribute: polyline	
Data type attribute: Polyline or Multiline	
Attribute: TOID or <i>gml:id</i>	
Definition: The unique topographic reference number. It consists of the letters 'osgb' followed by sixteen digits. The TOID must always be retained / stored in its entirety and it is recommended that any leading zeros on the TOID are retained to permit linking of the feature to other MasterMap products.	
Type: String	Multiplicity: [1]
Attribute: featureCode	
Definition: Topographic features have a numerical feature code (a five-digit integer) assigned to each feature. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s). The feature code does not add any information to that contained in these attributes. The <i>physicalLevel</i> , <i>physicalPresence</i> and <i>make</i> attributes do not affect the feature code. The feature code itself is arbitrarily assigned, and is therefore not informative without the look-up table that gives the feature type and attribute values corresponding to each feature code.	
Type: Integer	Multiplicity: [1]
Attribute: version	
Definition: The version number of the feature (in the range 1 to 4294967295). This uniquely identifies a specific version of a feature with a given TOID.	
Type: Integer	Multiplicity: [1]
Attribute: versionDate	
Definition: The date on which this version of the feature became the current version. This is the date on which the feature was changed in the database, and is not the date of any associated real-world change.	
Type: Date	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]
Attribute: accuracyOfPosition	
Definition: The accuracy of a horizontal position in metres at the 95% confidence level.	
Type: String; see AccuracyOfPositionValue	Multiplicity: [1]
Attribute: changeHistory	

Definition: Information about the change history of a feature that comprises the reason for the change (<i>reasonForChange</i> attribute – see below) and the date for this change (<i>changeDate</i> attribute – see below). Each feature may have many change history records and these are ordered chronologically. A complex attribute .	
Multiplicity: [1..*]	
Attribute: reasonForChange	
Definition: The reason for a change made to a feature. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above.	
Type: String ; see reasonForChangeValue	Multiplicity: [1..*]
Attribute: changeDate	
Definition: The date a change was made to the feature by an editor. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above. <i>NOTE: this may not match the versionDate attribute.</i>	
Type: Date	Multiplicity: [1..*]
Attribute: descriptiveGroup	
Definition: This is the primary classification attribute of a feature. It assigns a feature to one or more of 21 groups, most of which are categories of real-world topographic objects, such as path, building or natural environment; others are categories of supportive or administrative features, such as network or polygon closing geometry and political or administrative. In general, values of this attribute are not specific to particular feature types. Due to limitations in the source data from which OS MasterMap was created, there are some exceptions to this principle. For instance, the <i>descriptiveGroup</i> buildings or structure contains text describing or naming buildings and structures, while the topographic features have the <i>descriptiveGroup</i> values of building, glasshouse or structures.	
Type: String; see DescriptiveGroupValue	Multiplicity: [1..*]
Attribute: descriptiveTerm	
Definition: This attribute, if present, gives further classification information about the feature. A feature may have multiple <i>descriptiveTerm</i> attributes. Most features have zero or one <i>descriptiveTerm</i> attributes. A situation where multiple <i>descriptiveTerm</i> attributes are used is where line features have a <i>descriptiveGroup</i> with the value of ‘Tidal Water’. These features may have multiple <i>descriptiveTerm</i> attributes, for example where Mean High Water (Springs) and Mean Low Water (Springs) are co-incident.	
Type: String; see DescriptiveTermValue	Multiplicity: [0..*]
Attribute: nonBoundingLine	
Definition: Indicates that a TopographicLine feature is not on the boundary of a TopographicArea feature.	
Type: Boolean	Multiplicity: [0..1]
Attribute: heightAboveDatum	
Definition: The height of the feature above the Ordnance Datum Newlyn (ODN) vertical datum, in metres. Part of the <i>heightAboveDatum</i> complex attribute .	
Type: Real	Multiplicity: [0..1]
Attribute: heightAboveGroundLevel	
Definition: Height of the feature above ground level, in metres. Part of the <i>heightAboveGroundLevel</i> complex attribute .	
Type: Real	Multiplicity: [0..1]
Attribute: make	
Definition: Where known, indicates whether the real-world nature of the feature is man-made or natural.	
Type: String; see MakeValue	Multiplicity: [0..1]
Attribute: physicalLevel	
Definition: This attribute states whether the feature is underground, obscured below normal cartographic level, at normal cartographic level, or overhead.	

<p>Normal cartographic level is that perceived to be the normal surface level. Where area features overlies others – for example, bridges – they are at normal cartographic level and the features below them are recorded as obscured.</p> <p>Indicates the physical level of a feature with reference to the normal cartographic surface level. Only four values are used:</p> <ul style="list-style-type: none"> • -1 = Underground detail • 49 = Obscured detail below the normal cartographic level • 50 = Detail at the normal cartographic level • 51 = Overhead detail above normal cartographic level 	
Type: Integer	Multiplicity: [1]
Attribute: physicalPresence	
<p>Definition: This attribute indicates the nature of the object represented by the feature. This is normally used for <i>TopographicLine</i>, for example, a value of ‘obstructing’ indicates that the feature prevents pedestrian access, whereas a value of ‘edge/limit’ means that the feature represents a change of surface type and does not generally impede access. This attribute is also used to identify administrative boundary and inferred line features, and moveable area features (for example, moveable cranes).</p>	
Type: String; see PhysicalPresenceValue	Multiplicity: [0..1]
Attribute: polyline	
<p>Definition: This is either a Polyline or a Multiline geometry. In <i>TopographicLine</i> features, this will only be a Multiline if there is a problem with the geometry that is indicated by the broken metadata flag.</p>	
Type: GM_LineString	Multiplicity: [1]

TopographicArea

«FeatureType» TopographicArea	
<p>Definition: Features representing topographic objects that have a polygon-based geometry.</p> <p>Spatial attribute: polygon</p> <p>Data type attribute: Polygon</p>	
Attribute: TOID or <i>gml:id</i>	
<p>Definition: The unique topographic reference number. It consists of the letters ‘osgb’ followed by sixteen digits. The TOID must always be retained / stored in its entirety and it is recommended that any leading zeros on the TOID are retained to permit linking of the feature to other MasterMap products.</p>	
Type: String	Multiplicity: [1]
Attribute: featureCode	
<p>Definition: Topographic features have a numerical feature code (a five-digit integer) assigned to each feature. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s). The feature code does not add any information to that contained in these attributes. The <i>physicalLevel</i>, <i>physicalPresence</i> and <i>make</i> attributes do not affect the feature code.</p> <p>The feature code itself is arbitrarily assigned, and is therefore not informative without the look-up table that gives the feature type and attribute values corresponding to each feature code.</p>	
Type: Integer	Multiplicity: [1]
Attribute: version	
<p>Definition: The version number of the feature (in the range 1 to 4294967295). This uniquely identifies a specific version of a feature with a given TOID.</p>	
Type: Integer	Multiplicity: [1]
Attribute: versionDate	

Definition: The date on which this version of the feature became the current version. This is the date on which the feature was changed in the database, and is not the date of any associated real-world change.	
Type: Date	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]
Attribute: calculatedAreaValue	
Definition: This is the calculated area of a polygon feature in square metres.	
Type: double	Multiplicity: [1]
Attribute: changeHistory	
Definition: Information about the change history of a feature that comprises the reason for the change (<i>reasonForChange</i> attribute – see below) and the date for this change (<i>changeDate</i> attribute – see below). Each feature may have many change history records and these are ordered chronologically. A complex attribute .	
Multiplicity: [1..*]	
Attribute: reasonForChange	
Definition: The reason for a change made to a feature. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above.	
Type: String ; see reasonForChangeValue	Multiplicity: [1..*]
Attribute: changeDate	
Definition: The date a change was made to the feature by an editor. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above.	
<i>NOTE: this may not match the versionDate attribute.</i>	
Type: Date	Multiplicity: [1..*]
Attribute: descriptiveGroup	
Definition: This is the primary classification attribute of a feature. It assigns a feature to one or more of 21 groups, most of which are categories of real-world topographic objects, such as path, building or natural environment; others are categories of supportive or administrative features, such as network or polygon closing geometry and political or administrative. In general, values of this attribute are not specific to particular feature types. Due to limitations in the source data from which OS MasterMap was created, there are some exceptions to this principle. For instance, the <i>descriptiveGroup</i> buildings or structure contains text describing or naming buildings and structures, while the topographic features have the <i>descriptiveGroup</i> values of building, glasshouse or structures.	
Type: String; see DescriptiveGroupValue	Multiplicity: [1..*]
Attribute: descriptiveTerm	
Definition: This attribute, if present, gives further classification information about the feature. A feature may have multiple <i>descriptiveTerm</i> attributes, but this is little used at present. Most features have zero or one <i>descriptiveTerm</i> attributes. A situation where multiple <i>descriptiveTerm</i> attributes are used is where area features have a <i>descriptiveGroup</i> with the value of ‘Natural Environment’. These features can have one or more <i>descriptiveTerm</i> attributes specifying the natural land cover types present in the area.	
Type: String; see DescriptiveTermValue	Multiplicity: [0..*]
Attribute: make	
Definition: Where known, indicates whether the real-world nature of the feature is man-made or natural.	
Type: String; see MakeValue	Multiplicity: [0..1]
Attribute: physicalLevel	
Definition: This attribute states whether the feature is underground, obscured below normal cartographic level, at normal cartographic level, or overhead.	

<p>Normal cartographic level is that perceived to be the normal surface level. Where area features overlies others – for example, bridges – they are at normal cartographic level and the features below them are recorded as obscured.</p> <p>Indicates the physical level of a feature with reference to the normal cartographic surface level. Only four values are used:</p> <ul style="list-style-type: none"> • -1 = Underground detail • 49 = Obscured detail below the normal cartographic level • 50 = Detail at the normal cartographic level • 51 = Overhead detail above normal cartographic level 	
Type: Integer	Multiplicity: [1]
Attribute: physicalPresence	
<p>Definition: This attribute indicates the nature of the object represented by the feature. This is normally used for <i>TopographicLine</i>, for example, a value of ‘obstructing’ indicates that the feature prevents pedestrian access, whereas a value of ‘edge/limit’ means that the feature represents a change of surface type and does not generally impede access. This attribute is also used to identify administrative boundary and inferred line features, and moveable area features (for example, moveable cranes).</p>	
Type: String; see PhysicalPresenceValue	Multiplicity: [0..1]
Attribute: polygon	
<p>Definition: A polygon is a single closed region defined by a set of lines that represent the boundaries.</p>	
Type: GM_Polygon	Multiplicity: [1]

BoundaryLine

«FeatureType» BoundaryLine	
<p>Definition: Features representing the boundaries of administrative areas that have a line-based geometry.</p> <p>Spatial attribute: polyline</p> <p>Data type attribute: Polyline or Multiline</p>	
Attribute: TOID or <i>gml:id</i>	
<p>Definition: The unique topographic reference number. It consists of the letters ‘osgb’ followed by sixteen digits. The TOID must always be retained / stored in its entirety and it is recommended that any leading zeros on the TOID are retained to permit linking of the feature to other MasterMap products.</p>	
Type: String	Multiplicity: [1]
Attribute: featureCode	
<p>Definition: Topographic features have a numerical feature code (a five-digit integer) assigned to each feature. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s). The feature code does not add any information to that contained in these attributes. The <i>physicalLevel</i>, <i>physicalPresence</i> and <i>make</i> attributes do not affect the feature code.</p> <p>The feature code itself is arbitrarily assigned, and is therefore not informative without the look-up table that gives the feature type and attribute values corresponding to each feature code.</p>	
Type: Integer	Multiplicity: [1]
Attribute: version	
<p>Definition: The version number of the feature (in the range 1 to 4294967295). This uniquely identifies a specific version of a feature with a given TOID.</p>	
Type: Integer	Multiplicity: [1]
Attribute: versionDate	
<p>Definition: The date on which this version of the feature became the current version. This is the date on which the feature was changed in the database, and is not the date of any associated real-world change.</p>	

Type: Date	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]
Attribute: accuracyOfPosition	
Definition: The accuracy of a horizontal position in metres at the 95% confidence level.	
Type: String; see AccuracyOfPositionValue	Multiplicity: [1]
Attribute: changeHistory	
Definition: Information about the change history of a feature that comprises the reason for the change (<i>reasonForChange</i> attribute – see below) and the date for this change (<i>changeDate</i> attribute – see below). Each feature may have many change history records and these are ordered chronologically. A complex attribute .	
Multiplicity: [1..*]	
Attribute: reasonForChange	
Definition: The reason for a change made to a feature. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above.	
Type: String ; see reasonForChangeValue	Multiplicity: [1..*]
Attribute: changeDate	
Definition: The date a change was made to the feature by an editor. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above.	
<i>NOTE: this may not match the versionDate attribute.</i>	
Type: Date	Multiplicity: [1..*]
Attribute: descriptiveGroup	
Definition: This is the primary classification attribute of a feature. It assigns a feature to one or more of 21 groups, most of which are categories of real-world topographic objects, such as path, building or natural environment; others are categories of supportive or administrative features, such as network or polygon closing geometry and political or administrative. In general, values of this attribute are not specific to particular feature types. Due to limitations in the source data from which OS MasterMap was created, there are some exceptions to this principle. For instance, the <i>descriptiveGroup</i> buildings or structure contains text describing or naming buildings and structures, while the topographic features have the <i>descriptiveGroup</i> values of building, glasshouse or structures. <i>NOTE: There is only ever one descriptiveGroup with the value of ‘Political Or Administrative’ on a BoundaryLine feature.</i>	
Type: String; see DescriptiveGroupValue	Multiplicity: [1]
Attribute: descriptiveTerm	
Definition: This attribute, if present, gives further classification information about the feature. A feature may have multiple <i>descriptiveTerm</i> attributes, but this is little used at present. Most features have zero or one <i>descriptiveTerm</i> attributes. A situation where multiple <i>descriptiveTerm</i> attributes are used is where area features have a <i>descriptiveGroup</i> with the value of ‘Natural Environment’. These features can have one or more <i>descriptiveTerm</i> attributes specifying the natural land cover types present in the area.	
Type: String; see DescriptiveTermValue	Multiplicity: [0..*]
Attribute: physicalLevel	
Definition: This attribute states whether the feature is underground, obscured below normal cartographic level, at normal cartographic level, or overhead. Normal cartographic level is that perceived to be the normal surface level. Where area features overlies others – for example, bridges – they are at normal cartographic level and the features below them are recorded as obscured. Indicates the physical level of a feature with reference to the normal cartographic surface level. Only four values are used:	
<ul style="list-style-type: none"> • -1 = Underground detail 	

<ul style="list-style-type: none"> • 49 = Obscured detail below the normal cartographic level • 50 = Detail at the normal cartographic level • 51 = Overhead detail above normal cartographic level 	
Type: Integer	Multiplicity: [1]
Attribute: physicalPresence	
Definition: This attribute is also used to identify administrative or political boundary.	
Type: String; see PhysicalPresenceValue	Multiplicity: [1]
Attribute: polyline	
Definition: A polyline is an ordered set of points forming a line feature.	
Type: GM_LineString	Multiplicity: [1]

CartographicSymbol

«FeatureType» CartographicSymbol	
Definition: Features providing information on symbols used when rendering OS MasterMap graphically.	
Spatial attribute: point	
Data type attribute: Point	
Attribute: TOID or <i>gml:id</i>	
Definition: The unique topographic reference number. It consists of the letters 'osgb' followed by sixteen digits. The TOID must always be retained / stored in its entirety and it is recommended that any leading zeros on the TOID are retained to permit linking of the feature to other MasterMap products.	
Type: String	Multiplicity: [1]
Attribute: featureCode	
Definition: Topographic features have a numerical feature code (a five-digit integer) assigned to each feature. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s). The feature code does not add any information to that contained in these attributes. The <i>physicalLevel</i> , <i>physicalPresence</i> and <i>make</i> attributes do not affect the feature code. The feature code itself is arbitrarily assigned, and is therefore not informative without the look-up table that gives the feature type and attribute values corresponding to each feature code.	
Type: Integer	Multiplicity: [0..1]
Attribute: version	
Definition: The version number of the feature (in the range 1 to 4294967295). This uniquely identifies a specific version of a feature with a given TOID.	
Type: Integer	Multiplicity: [1]
Attribute: versionDate	
Definition: The date on which this version of the feature became the current version. This is the date on which the feature was changed in the database, and is not the date of any associated real-world change.	
Type: Date	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]
Attribute: changeHistory	
Definition: Information about the change history of a feature that comprises the reason for the change (<i>reasonForChange</i> attribute – see below) and the date for this change (<i>changeDate</i> attribute – see below). Each feature may have many change history records and these are ordered chronologically. A complex attribute .	

Multiplicity: [1..*]	
Attribute: reasonForChange	
Definition: The reason for a change made to a feature. Forms part of the feature's complex attribute <i>changeHistory</i> – see above.	
Type: String ; see reasonForChangeValue	Multiplicity: [1..*]
Attribute: changeDate	
Definition: The date a change was made to the feature by an editor. Forms part of the feature's complex attribute <i>changeHistory</i> – see above. <i>NOTE: this may not match the versionDate attribute.</i>	
Type: Date	Multiplicity: [1..*]
Attribute: descriptiveGroup	
Definition: This is the primary classification attribute of a feature. It assigns a feature to one or more of 21 groups, most of which are categories of real-world topographic objects, such as path, building or natural environment; others are categories of supportive or administrative features, such as network or polygon closing geometry and political or administrative. In general, values of this attribute are not specific to particular feature types. Due to limitations in the source data from which OS MasterMap was created, there are some exceptions to this principle. For instance, the <i>descriptiveGroup</i> buildings or structure contains text describing or naming buildings and structures, while the topographic features have the <i>descriptiveGroup</i> values of building, glasshouse or structures.	
Type: String; see DescriptiveGroupValue	Multiplicity: [1..*]
Attribute: descriptiveTerm	
Definition: This attribute, if present, gives further classification information about the feature. A feature may have multiple <i>descriptiveTerm</i> attributes, but this is little used at present. Most features have zero or one <i>descriptiveTerm</i> attributes. A situation where multiple <i>descriptiveTerm</i> attributes are used is where area features have a <i>descriptiveGroup</i> with the value of 'Natural Environment'. These features can have one or more <i>descriptiveTerm</i> attributes specifying the natural land cover types present in the area.	
Type: String; see DescriptiveTermValue	Multiplicity: [0..*]
Attribute: orientation	
Definition: The orientation of symbol features for cartographic placement. Given in tenths of a degree anticlockwise from due east (0–3599).	
Type: Integer	Multiplicity: [1]
Attribute: physicalLevel	
Definition: This attribute states whether the feature is underground, obscured below normal cartographic level, at normal cartographic level, or overhead. Normal cartographic level is that perceived to be the normal surface level. Where area features overlie others – for example, bridges – they are at normal cartographic level and the features below them are recorded as obscured. Indicates the physical level of a feature with reference to the normal cartographic surface level. Only four values are used:	
<ul style="list-style-type: none"> • -1 = Underground detail • 49 = Obscured detail below the normal cartographic level • 50 = Detail at the normal cartographic level • 51 = Overhead detail above normal cartographic level 	
Type: Integer	Multiplicity: [1]
Attribute: physicalPresence	

Definition: This attribute indicates the nature of the object represented by the feature. This is normally used for <i>TopographicLine</i> , for example, a value of 'obstructing' indicates that the feature prevents pedestrian access, whereas a value of 'edge/limit' means that the feature represents a change of surface type and does not generally impede access. This attribute is also used to identify administrative boundary and inferred line features, and moveable area features (for example, moveable cranes).	
Type: String; see PhysicalPresenceValue	Multiplicity: [0..1]
Attribute: point	
Definition: A pair of easting and northing ordinates in metres, defining a horizontal location in the British National Grid spatial reference system.	
Type: GM_Point	Multiplicity: [1]
Attribute: referenceToFeature	
A reference by TOID to a related feature. In cartographic symbol features, it is used to point from the symbol feature to the topographic feature to which it refers. <i>NOTE: ReferenceToFeature is only used for culverts and in that case it is singular and mandatory.</i>	
Type: TOID or gml:id	Multiplicity: [1]

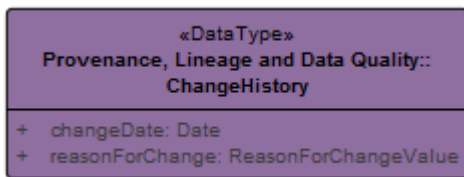
CartographicText

«FeatureType» CartographicText	
Definition: Features that define the content and placement of text when rendering OS MasterMap graphically.	
Spatial attribute: point	
Data type attribute: Point	
Attribute: TOID or gml:id	
Definition: The unique topographic reference number. It consists of the letters 'osgb' followed by sixteen digits. The TOID must always be retained / stored in its entirety and it is recommended that any leading zeros on the TOID are retained to permit linking of the feature to other MasterMap products.	
Type: String	Multiplicity: [1]
Attribute: featureCode	
Definition: Topographic features have a numerical feature code (a five-digit integer) assigned to each feature. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s). The feature code does not add any information to that contained in these attributes. The <i>physicalLevel</i> , <i>physicalPresence</i> and <i>make</i> attributes do not affect the feature code. The feature code itself is arbitrarily assigned, and is therefore not informative without the look-up table that gives the feature type and attribute values corresponding to each feature code.	
Type: Integer	Multiplicity: [0..1]
Attribute: version	
Definition: The version number of the feature (in the range 1 to 4294967295). This uniquely identifies a specific version of a feature with a given TOID.	
Type: Integer	Multiplicity: [1]
Attribute: versionDate	
Definition: The date on which this version of the feature became the current version. This is the date on which the feature was changed in the database, and is not the date of any associated real-world change.	
Type: Date	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]

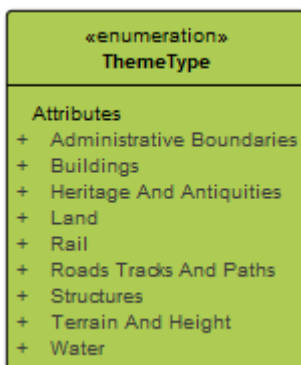
Attribute: anchorPoint	
Definition: The coordinate position that a piece of text is positioned relative to. Measured in metres in the British National Grid spatial reference system.	
Type: point	Multiplicity: [1]
Attribute: changeHistory	
Definition: Information about the change history of a feature that comprises the reason for the change (<i>reasonForChange</i> attribute – see below) and the date for this change (<i>changeDate</i> attribute – see below). Each feature may have many change history records and these are ordered chronologically. A complex attribute .	
Multiplicity: [1..*]	
Attribute: reasonForChange	
Definition: The reason for a change made to a feature. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above.	
Type: String ; see reasonForChangeValue	Multiplicity: [1..*]
Attribute: changeDate	
Definition: The date a change was made to the feature by an editor. Forms part of the feature’s complex attribute <i>changeHistory</i> – see above. <i>NOTE: this may not match the versionDate attribute.</i>	
Type: Date	Multiplicity: [1..*]
Attribute: descriptiveGroup	
Definition: This is the primary classification attribute of a feature. It assigns a feature to one or more of 21 groups, most of which are categories of real-world topographic objects, such as path, building or natural environment; others are categories of supportive or administrative features, such as network or polygon closing geometry and political or administrative. In general, values of this attribute are not specific to particular feature types. Due to limitations in the source data from which OS MasterMap was created, there are some exceptions to this principle. For instance, the <i>descriptiveGroup</i> buildings or structure contains text describing or naming buildings and structures, while the topographic features have the <i>descriptiveGroup</i> values of building, glasshouse or structures.	
Type: String; see DescriptiveGroupValue	Multiplicity: [0..*]
Attribute: descriptiveTerm	
Definition: This attribute, if present, gives further classification information about the feature. A feature may have multiple <i>descriptiveTerm</i> attributes, but this is little used at present. Most features have zero or one <i>descriptiveTerm</i> attributes. A situation where multiple <i>descriptiveTerm</i> attributes are used is where area features have a <i>descriptiveGroup</i> with the value of ‘Natural Environment’. These features can have one or more <i>descriptiveTerm</i> attributes specifying the natural land cover types present in the area.	
Type: String; see DescriptiveTermValue	Multiplicity: [0..*]
Attribute: make	
Definition: Where known, indicates whether the real-world nature of the feature is man-made or natural.	
Type: String; see MakeValue	Multiplicity: [0..1]
Attribute: physicalLevel	
Definition: This attribute states whether the feature is underground, obscured below normal cartographic level, at normal cartographic level, or overhead. Normal cartographic level is that perceived to be the normal surface level. Where area features overlies others – for example, bridges – they are at normal cartographic level and the features below them are recorded as obscured. Indicates the physical level of a feature with reference to the normal cartographic surface level. Only four values are used:	
<ul style="list-style-type: none"> • -1 = Underground detail • 49 = Obscured detail below the normal cartographic level • 50 = Detail at the normal cartographic level 	

<ul style="list-style-type: none"> 51 = Overhead detail above normal cartographic level 	
Type: Integer	Multiplicity: [1]
Attribute: physicalPresence	
Definition: This attribute indicates the nature of the object represented by the feature. This is normally used for <i>TopographicLine</i> , for example, a value of 'obstructing' indicates that the feature prevents pedestrian access, whereas a value of 'edge/limit' means that the feature represents a change of surface type and does not generally impede access. This attribute is also used to identify administrative boundary and inferred line features, and moveable area features (for example, moveable cranes).	
Type: String; see PhysicalPresenceValue	Multiplicity: [0..1]
Attribute: textRendering	
Definition: provides the information to graphically display a text string in harmony with the underlying map detail and consists of <i>anchorPosition</i> , <i>font</i> , <i>height</i> and <i>orientation</i> . TextRendering is a complex attribute .	
Type: point	Multiplicity: [1]
Attribute: textString	
Definition: Textual information that can be rendered using the <i>textRendering</i> attribute.	
Type: String	Multiplicity: [1]

Data Types

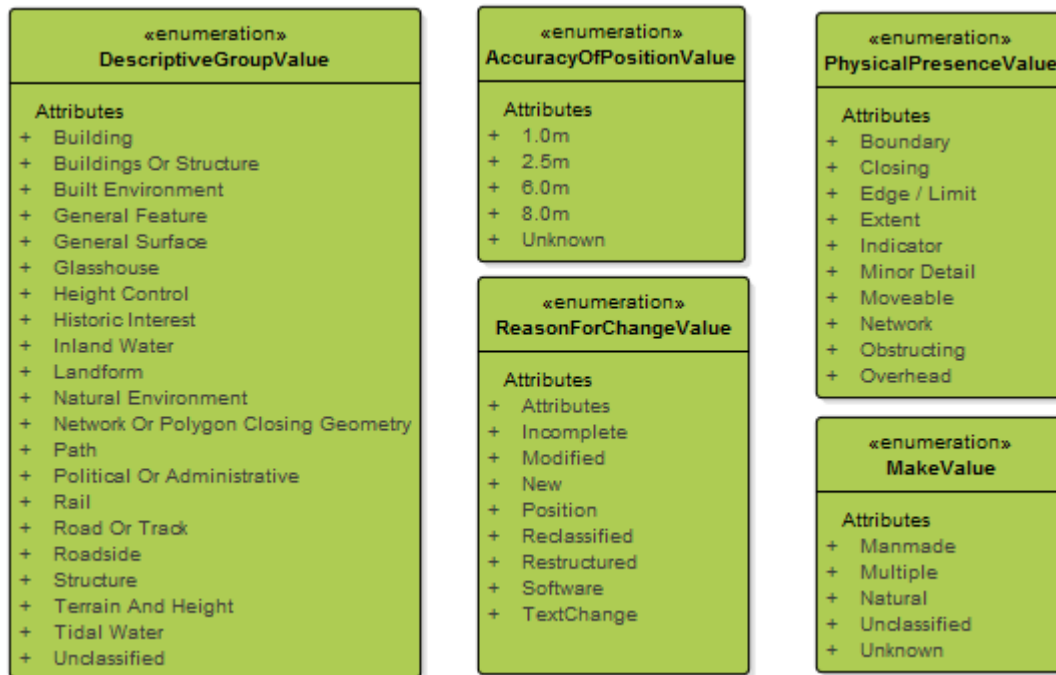


Enumerations



«enumeration» DescriptiveTermValue
Attributes
+ Agricultural Land
+ Aqueduct
+ Archway
+ Bench Mark
+ Bottom Of Cliff
+ Bottom Of Slope
+ Boulders
+ Boulders (Scattered)
+ Boundary Half Mereing
+ Boundary Post Or Stone
+ Bridge
+ Buffer
+ Canal
+ Canal Feeder
+ Capstan
+ Cattle Grid
+ Cave
+ Chimney
+ Cliff
+ Collects
+ Compound
+ Conduit
+ Coniferous Trees
+ Coniferous Trees (Scattered)
+ Conveyor
+ Coppice Or Osiers
+ County
+ Course Of Heritage
+ Crane
+ Cross
+ Culvert
+ Direction Of Flow
+ Distance Marker
+ District
+ Disused Feature
+ Division
+ Drain
+ Electoral
+ Electricity Sub Station
+ Emergency Telephone
+ Flagstaff
+ Footbridge
+ Ford
+ Foreshore
+ Fountain
+ Gantry
+ Gas Governor
+ Groyne
+ Guide Post
+ Heath
+ Inferred Property Closing Link
+ Issues
+ Landfill
+ Landfill (Inactive)
+ Letter Box
+ Level Crossing
+ Lighting Gantry
+ Line Of Mooring Posts
+ Line Of Posts
+ Lock
+ Lock Gate
+ Marsh
+ Marsh Reeds Or Saltmarsh
+ Mast
+ Mean High Water (Springs)
+ Mean Low Water (Springs)
+ Mill Leat
+ Mine Leat
+ Mineral Workings
+ Mineral Workings (Inactive)
+ Mooring Post

«enumeration» DescriptiveTermValue
«2»
+ Mud
+ Multi Surface
+ Narrow Gauge
+ Nonconiferous Trees
+ Nonconiferous Trees (Scattered)
+ Normal Tidal Limit
+ Orchard
+ Outline
+ Overhead Construction
+ Parish
+ Parliamentary
+ Pole
+ Polygon Closing Link
+ Positioned Boulder
+ Positioned Coniferous Tree
+ Positioned Nonconiferous Tree
+ Post
+ Public
+ Public Convenience
+ Public Telephone
+ Pylon
+ Rail Signal Gantry
+ Reeds
+ Reservoir
+ Ridge Or Rock Line
+ Road Name Or Classification
+ Road Related Flow
+ Rock
+ Rock (Scattered)
+ Rough Grassland
+ Saltmarsh
+ Sand
+ Scree
+ Scrub
+ Shingle
+ Signal
+ Sinks
+ Site Of Heritage
+ Slag Heap
+ Slag Heap (Inactive)
+ Slipway
+ Slope
+ Sloping Masonry
+ Sluice
+ Spoil Heap
+ Spoil Heap (Inactive)
+ Spot Height
+ Spreads
+ Spring
+ Standard Gauge Track
+ Static Water
+ Step
+ Structure
+ Swimming Pool
+ Switch
+ Tank
+ Telecommunications Mast
+ Top Of Cliff
+ Top Of Slope
+ Track
+ Traffic Calming
+ Triangulation Point Or Pillar
+ Tunnel Edge
+ Unmade Path Alignment
+ Upper Level Of Communication
+ Watercourse
+ Waterfall
+ Waterfall (Vertical)
+ Weir
+ Well
+ Wind Turbine



Notes on complex attributes

A complex attribute is an attribute that consists of two or more simple attributes that go together to convey some composite information about a feature.

changeHistory

Information about the change history of a feature that comprises the reason for the change (*reasonForChange* attribute) and the date for this change (*changeDate* attribute). Each feature may have many change history records and these are ordered chronologically in the GML.

heightAboveGroundLevel

This defines the height above ground level of a feature (*heightAboveGroundLevel* attribute) and defines the accuracy of this where known (*accuracyOfHeightAboveGroundLevel* attribute).

heightAboveDatum

This contains information about the height above ODN (*heightAboveDatum* attribute) and where known, the accuracy of this value (*accuracyOfHeightAboveDatum* attribute).

textRendering

Provides the information to graphically display a text string in harmony with the underlying map detail and consists of *anchorPosition*, *font*, *height* and *orientation*.

anchorPosition	A number between 0 and 8 that specifies which part of the text is bound to the <i>anchorPoint</i> .
font	A value of 0, 1, 2 or 3 that can be used as a basis for determining which font to use when displaying the text. For example, a user application could associate Verdana® with 2 to display all text with a font of 2 in Verdana.

height	The height of CartographicText. The height is expressed as the distance on the ground covered by the text, in metres.
orientation	The orientation of text or symbol features for cartographic placement, and for text. Given in tenths of a degree anticlockwise from due east (0–3599).

Geometric data types

All feature types are presented in [British National Grid \(BNG\)](#) as one of the data types specified below:

Point

A point is used to specify a single x,y location by a coordinate pair in a given spatial reference system.

Example: A point defined in the BNG reference system has easting and northing ordinates in units of metres, where the easting is in the range 0 to 700000 and the northing is in the range 0 to 1300000. Ordinates are output to mm precision and are output in the data as float64 real types.

X
(BNG: 176554.565, 987654.545)

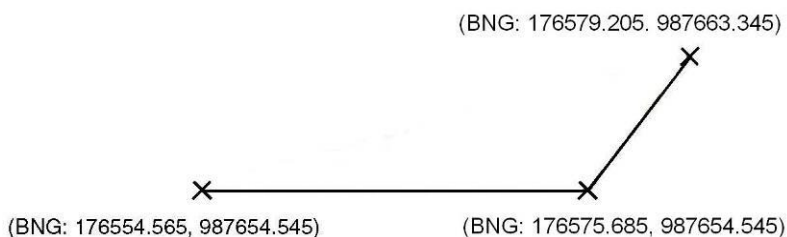
Example class model

Point (from BNG)
- easting : float64
- northing : float64

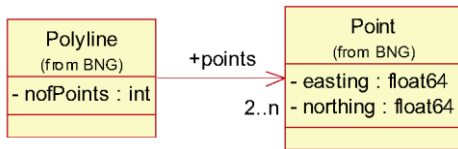
Polyline

A polyline is an ordered set of points that are interpolated linearly. A polyline may not intersect itself or contain repeated points.

Example



Example class model



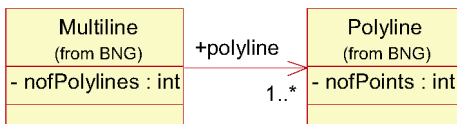
Multiline

A multiline is a collection of polyline geometries. There are no specific semantics or rules applied to the collection.

Example



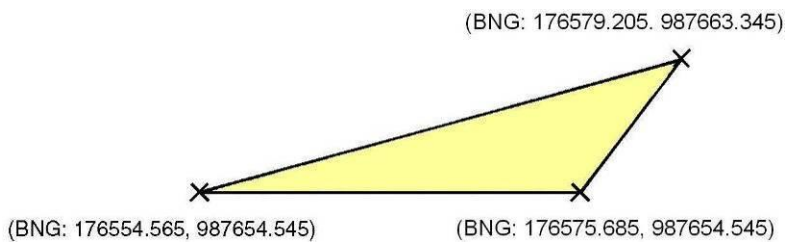
Example class model



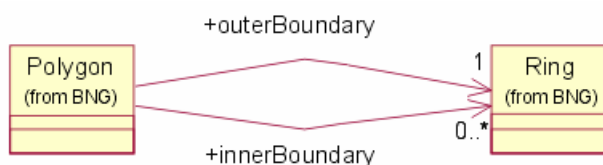
Polygon

A polygon is a single closed region on the spatial reference system projection plane, defined by a set of geometric rings that represent the boundaries. A polygon has one outer boundary and zero or more inner boundaries (holes in the polygon). The inner boundaries must not cross each other or contain other inner boundaries. Coordinates in outer boundaries are oriented in an anticlockwise direction; coordinates in inner boundaries are oriented in a clockwise direction.

Example



Example class model



British National Grid (BNG)

OS MasterMap Topography Layer uses the British National Grid (BN) 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.

Introductory material on the BNG and ODN and the full definition of the BNG (OSGB36 National Grid) is available on the Ordnance Survey OS Net® GPS site: <http://www.ordnancesurvey.co.uk/oswebsite/gps/>

A guide to coordinate systems in Great Britain is available at:

<http://www.ordnancesurvey.co.uk/docs/support/guide-coordinate-systems-great-britain.pdf>

A general introductory guide to BNG is provided at: <http://www.ordnancesurvey.co.uk/resources/maps-and-geographic-resources/the-national-grid.html>

Topology

Within the Topography Layer, there are four topological structuring layers that determine how features interact with each other. A structuring layer contains features that do not cut across each other and are permitted to connect to each other spatially, sharing common geometry at their edges. Most topographic features participate in a single topological structuring layer, but features that are underground or above cartographic level, or that represent pylons, cliffs and slopes are not considered to interact with other features in the topography structuring layer. During capture and maintenance of the data, processes ensure that vertices of the geometry of features are coincident where they should be, so that the features topologically structure with each other. The full structuring layer definitions are given in the following table;

Structuring layer	Rule
Topography	Feature Type = 'TopographicLine' or 'TopographicArea' descriptiveGroup not equal to 'Landform' physicalLevel = '50' physicalPresence = 'Closing', 'Edge/Limit', 'Obstructing', 'Overhead' or 'Moveable'
Landform	Feature Type = 'TopographicLine' or 'TopographicArea' descriptiveGroup = 'Landform' physicalPresence = 'Closing', 'Edge/Limit', 'Obstructing' or 'Overhead'
Pylons	Feature Type = 'TopographicLine' or 'TopographicArea' physicalLevel = '51' physicalPresence = 'Closing', 'Edge/Limit', 'Obstructing' or 'Overhead'
Boundaries	Feature Type = 'BoundaryLine' or 'CartographicSymbol' descriptiveGroup = 'Political Or Administrative'

Seamless data supply

A principle of OS MasterMap is that data is seamless, that is, there are no fixed units of data supply. The nominal boundary of each packet of OS MasterMap data is defined by the user's data selection polygon and by the data chunking method applied to break the supply into manageable units (if used).

With respect to the nominal boundary, data is supplied unclipped. This means that all features with geometry that overlaps the nominal boundary are supplied in their entirety.

Inconsistent features

There are occasions when data update will temporarily leave a feature in an inconsistent state. This occurs when neighbouring data are updated and the edits are applied to the seamless database at different times. According to the type of feature, the following results may be realised:

Polygon boundary duplication

A break in a polygon boundary on the edge of an update area will cause neighbouring features to take on identical geometric properties and the broken line work to be removed from all polygon structuring. Once the update is completed, the polygons will resume their respective boundaries.

Example



Disappearing polygon features

Where a polygon boundary is broken and there is no neighbouring polygon, the feature will be temporarily removed from supply. A query on this area between updates will not return the broken feature. A change-only query will return a departed feature to indicate that this feature has been removed from supply. Once the complete edit has been applied to the database the feature will be supplied with its original identity and history.

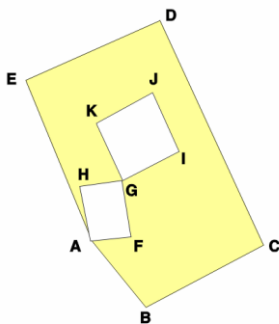
Broken lines

A polyline that crosses an updated area boundary may occasionally be broken by a partial update. Where this occurs, the line is flagged as broken and the component parts output separately in a multiline geometry.

Intersecting polygon boundaries

Some polygons have inner boundaries that have a common point with each other or with the outer boundary. In this case each loop formed where the boundary returns to the common point is treated as a separate boundary.

Example



This polygon has an outer boundary (ABCDEA) and two inner boundaries (AHGFA and GKJIG).

Chapter 3 Feature life cycles and tracking change

Features within OS MasterMap Topography Layer have a life cycle which is matched, where possible, to that of the real-world object they represent. For example, a new building becomes a new object in the Ordnance Survey main database and is treated as the same feature – even if it undergoes change – until the building is demolished. With this approach, Ordnance Survey is emulating real-world behaviour within a digital model and therefore creating a more realistic version of the real world in a computer.

Feature life cycles are established and maintained in accordance with a set of rules indicating when a feature will be retained and when it will be replaced, for different types of feature and different change scenarios. These rules guide our data capture practices for collecting and attributing the features, and provide users with a consistent definition of how real-world change is handled by Ordnance Survey.

Not all changes to the real-world object will be reflected in changes to the feature. For example, the addition of a new porch to a house would usually be considered too minor a change to capture.

Different applications will require different views of feature life cycles. For some users, any change to the geometry or classification of a feature means it is no longer the same feature for their application, whilst others need persistence of features – so a feature continues to exist through extensive modification. Users may wish to compare their own definitions of change with Ordnance Survey definitions. Understanding change is important to understanding the OS MasterMap Topography Layer and deriving the optimum value from it.

Life cycle rules adopt the approach of allowing features to persist through changes, so far as is reasonable. There is inevitably some subjectivity involved in judging that a real-world object has changed so much it can no longer be considered the same object, so specific rules exist to govern this.

Unique feature references (TOIDs)

Ordnance Survey provides persistent managed identifiers as TOIDs. A TOID is a unique identifier, consisting of the letters 'osgb' followed by up to sixteen digits between 0 and 9. The TOID is allocated sequentially, when a feature is created by Ordnance Survey and is never reassigned to a different feature. One of the key principles of unique referencing is that **the TOID will stay the same throughout the life of a feature**. This gives the feature continuity within its life cycle and makes managing change in a holding of the product easier.

The TOID is provided in the XML attribute 'fid' of the *osgb:Feature* element as shown below:

```
<osgb:TopographicArea fid='osgb1000000324268289'>
```

TOIDs enable explicit, maintained references between features in different layers. Other OS MasterMap products reference Topography Layer polygon features within which they are located, allowing the user to navigate between the products using the TOID.

Feature version numbers

Although the nature of a feature might remain essentially the same throughout its life, it is likely to undergo change to its geometry or attributes. Each feature has a version number which is incremented each time there is change of any kind to the feature via one of its attributes. The change can be due either to real-world change or to processes not connected with real-world change, such as error correction or geometric cleaning and structuring of the data.

The previous version is referred to as the **superseded** version, and the new version as the **superseding** version. In a small minority of cases, a new version of a feature can be created without any apparent change to the product. This is due to change to internal database attributes used in the maintenance process, but not included in product data.

Feature version date

The date on which the new version is created is recorded in the feature version date attribute. The date is important for tracking and identifying when change has taken place. Using the TOID, the version number and the version date, it is possible to track a feature's changes over time. The date the version changed for Ordnance Survey will be different from the date on which the feature is loaded into the user's file or database holding. Many translators provide an additional column to record the load date. It is important for the user to identify these dates in their holdings and to understand the difference between them if they want to be able to track changes.

One of the key differences between OS MasterMap features and other products is that, with the correct data storage model, a data holding can be rolled back and forward to a given point in time. It must be emphasised that this is the user's responsibility, since only the current version is available in the product; none of the previous versions are included.

Life cycle rules

The following sections set out the rules that define the life cycles of features in OS MasterMap Topography Layer. By understanding how change is defined and recorded within the product, users can start to identify what kind of change has a bearing on their applications and develop their own management regimes.

Polygon feature life cycle rules

The flowchart below shows the process followed whenever a real-world object represented as an OS MasterMap polygon feature appears, changes or is removed from the physical environment. The rules are described in more detail in the following sections, particularly the guidelines used to answer the question in the centre.

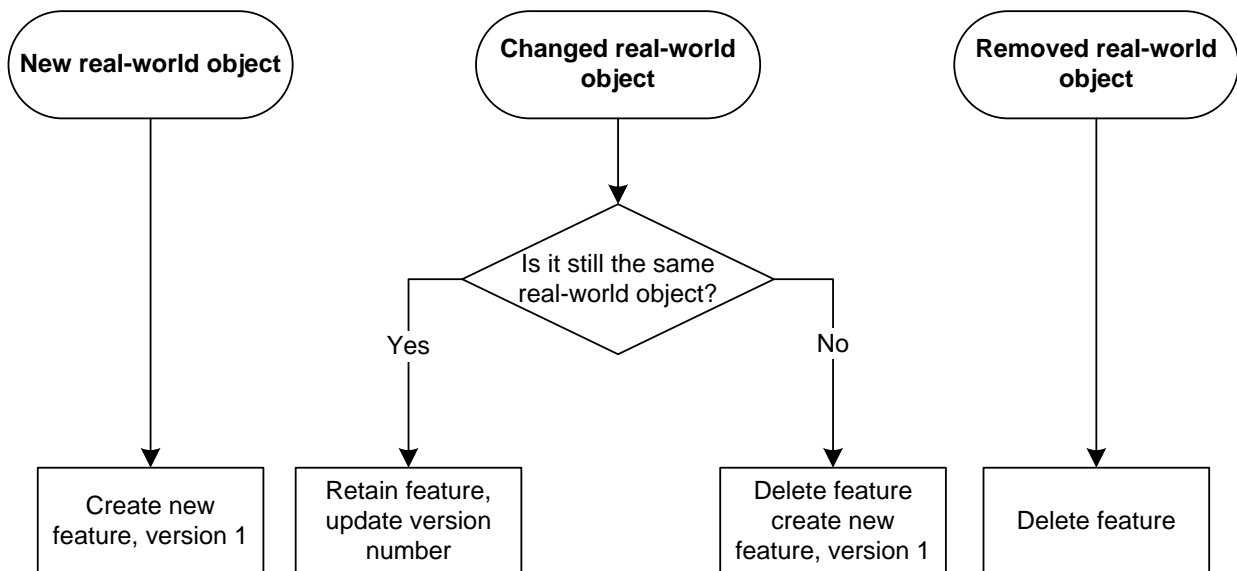


Figure 1: feature creation in OS MasterMap

Creation of polygon features due to real-world change

When a new real-world object with an area (e.g. a building or pond) comes into being, a new polygon feature is created in the data, with a new TOID and version number. Users with local holdings of OS MasterMap data will be informed of new features in their holding via COU.

Deletion of polygon features due to real-world change

When a real-world object represented as a polygon feature no longer exists in the real world, the polygon feature is deleted from the database. A record is kept in the database to indicate that a feature with this TOID used to exist and when it was deleted. Users with local holdings of OS MasterMap data are informed of the deletion in their next COU.

Modification of polygon features due to real-world change

When a real-world object represented as a polygon feature changes, but is considered to be still the same real-world object, the corresponding modified feature is retained in the database. The version number is incremented and the date on which the new version became current is stored.

If, however, the real-world object has undergone change to such a degree that it is not considered to be the same object as before, the polygon feature representing it is deleted and one or more new features created.

Changes to geometry of polygon features

When a real-world polygon object expands or contracts, due to alteration to its bounding lines, it is considered to be the same real-world object, and as such retains its TOID. For example, the polygon feature representing the back garden of a property is retained, even if it is greatly reduced in size due to extension work done to the house. This is because its identity and association to a property remains unchanged despite extensive changes to its geometry.

If it is not clear whether the real-world object after modification is the same object or a new one, the following considerations are used as a guideline:

- Is there topographic information to suggest the function of the resultant real-world object is the same as that of the original?
- Is the resultant real-world object more than half the size and less than twice the size of the original?
- Does the majority of the extent of the resultant real-world object lie within the bounds of the original?
- Is the resultant real-world object the obvious logical successor to the original?

If the continuation of the feature cannot be justified on one or more of these grounds, the feature is deleted and replaced with a new feature.

1.1.1.1.1 Examples

- A private house is extended. The building and garden features are retained.
- A field changes shape and reduces in size due to the realignment of one of its boundary fences alongside a road. The field feature and the adjacent road features are retained.

Splitting of polygon features

When a real-world polygon object is split into two or more separate real-world objects, one of the features may be clearly recognisable as the original real-world object. If this is the case, then the feature is retained.

If it is not clear whether one of the resultant features represents the same real-world object as the original feature then the following considerations are used as a guideline:

- Is the function of one of the resultant real-world objects the same as the original?
- Is one of the resultant real-world objects the obvious logical successor to the original?
- Does one of the resultant real-world objects occupy more than half the area of the original?

If the continuation of the feature cannot be justified on one or more of these grounds, the original feature is deleted and replaced with new features.

1.1.1.1.2 Examples

- A new housing development is completed within an agricultural field. Part of the field remains and continues to be used for agriculture. The feature representing the remainder of the field is recognisable as the original with the same function, therefore it is retained. New polygon features are created to represent the new development.
- An agricultural field is subdivided into three approximately equal parts that continue to be in similar usage. Using the guidelines above, none of the fields can be considered the obvious successor to the same as the original field: all have an area less than half of the original; therefore three new features are created.
- A house is divided equally in two by an externally surveyable division. The original feature is deleted and new features created. This is because neither of the resultant houses is the obvious successor to the original.
- A large agricultural building is split into two by the addition of an externally surveyable division enclosing approximately 25% of the original area. The original feature is retained to represent the larger part, and a new feature is created to represent the smaller part.
- Most of the large garden of a residential property is sold off for development. The garden feature is retained to represent the much reduced garden.

Joining of polygon features

When two or more real-world polygon objects are merged by the removal of physical boundaries, it may be that one of the original real-world objects is clearly recognisable as subsuming the other. If that is the case, the feature representing the dominant real-world object is retained and the other feature deleted.

If one of the original real-world objects is not clearly dominant, the following considerations are used as a guideline to determine whether a feature is retained.

- Is the function of the resultant real-world object the same as one of the originals?
- Can one of the original real-world objects be considered the obvious predecessor to the resultant real-world object?
- Is the area of the resultant real-world object less than twice that of one of the original real-world objects?

If the continuation of the feature cannot be justified on one or more of these grounds, all the original features are deleted and replaced with new features.

1.1.1.1.3 Examples

- Two fields, one of which is larger than the other, are merged into one, such that the resultant real-world object is recognisable as the larger field subsuming the smaller field. The feature representing the larger field is retained. The smaller field feature is deleted.
- Three fields, which are broadly similar in size, are merged into one, such that none of the original fields are recognisable as the obvious predecessor of the resultant field. The original features are deleted and a new feature is created to represent the field.
- A pond within a field is filled in. The feature representing the pond is deleted and the field feature is retained.
- Two semi-detached cottages of equal size are combined into one dwelling, with no alteration to the external geometry of the building. Both of the original features are deleted and a new feature is created.
- A large greenhouse lies within a parcel of land only marginally larger than itself. The greenhouse is demolished. The feature representing the greenhouse is deleted, and the feature representing the land parcel is deleted as it has increased significantly and can no longer be considered as the same object.

Change of polygon feature classification

When a real-world object represented by an polygon feature changes such that the nature of the feature changes, the feature is retained, unless changes to its geometry indicate deletion of the feature under the guidelines above.

1.1.1.1.4 Examples

- An area of agricultural land is wholly planted with trees; there are no changes to its bounding features. The descriptive group of the feature changes but its geometry is unchanged. The feature is retained.
- An area of woodland is felled and the area now consists of rough grass and scrub. The feature is retained.
- A barn is converted into a private dwelling. There is no change to the nature of the building (it is still a building) and the feature is retained.

Modification of polygon features due to error correction

When a polygon feature is changed solely to correct errors either in geometry or other attributes, the feature is retained. If the feature has been moved to correct an error and simultaneously modified for real-world change; for example, when natural movement of a physical feature occurs, such as a river bank or foreshore, then the feature modification rules above are followed.

1.1.1.1.5 Examples

- A line feature representing an old fence is found to have an error in its position and is corrected. The line feature and the polygon features bounded by it are retained. The version numbers of the features are incremented.
- The feature representing an area of road has been assigned an incorrect descriptive group. The feature is reclassified and retained. The feature version number is incremented.
- An area of non-coniferous trees has been incorrectly assigned the descriptive term coniferous trees by photogrammetric revision techniques. The feature is reclassified and retained. The feature version number is incremented.
- A building foundation captured as a feature with descriptive group of 'unclassified' is completed, and the feature is reclassified to descriptive group of 'building'. The feature is retained. The feature version number is incremented.
- A feature is no longer included within Ordnance Survey's capture specification. The feature is not retained.

Line feature life cycle rules

Line features in OS MasterMap are not as persistent in the same way as polygon and point features. This is because line features are maintained by what are called [topological structuring rules](#). If a line feature is intersected by another line, it is broken at the intersection. This means that a single linear real-world object is often represented by several line features – no real world object should ever be made up with a partial line feature. There is no concept in OS MasterMap of a line feature that is made up of multiple line geometry elements. An illustration of this rule is shown in figure 2. A fence cuts a field into two real-world objects. A new fence is built at right-angles to the original to further divide one half of the field. Although the old fence has not changed at all, it will be split into two separate line features.

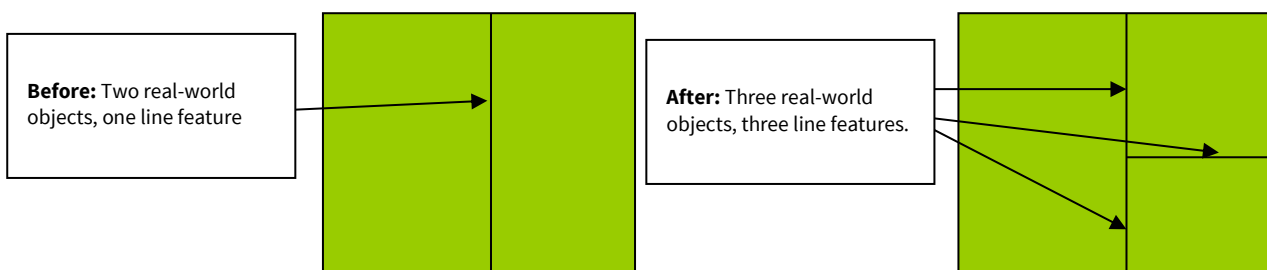


Figure 2: line life cycle rules

As there is no recorded relationship between OS MasterMap line features and discrete real-world objects, a change to a line feature may result in deletion or significant modification of that feature and creation of new line features. This change is not necessarily caused by real-world change to the linear object. In the example above, the original line feature is retained as one of the resultant line features; the other line feature is new. The user cannot predict which of the resultant line features will bear the original TOID. The major exception to this is that when the reason for change is a correction of error rather than real-world change, then features are retained whenever possible.

The more rapidly changing life cycle means that associating user data with OS MasterMap line features by TOID references needs to be considered very carefully, as there will be greater overheads in terms of managing change. In most cases, it will be more practical to associate with points and polygons, rather than lines.

Inferred links

Inferred links are a particular type of line feature that do not actually exist in the real world. An inferred link is a line that Ordnance Survey has introduced into the data to make some types of polygons into more manageable units. There are two main uses.

Network closing links are frequently found where road polygons meet at junctions. If the roads were not split in this way, the road theme would contain many very large polygons that would not be particularly useful in terms of being able to derive data or attach meaningful attribution to them. Roads with comparatively few junctions, such as motorways, are also split where another feature crosses them, such as a road bridge or footbridge.

Polygon closing links are used to make more manageable, or logical, polygons. The types of link are shown in figure 3. One example would be the creation of a link to separate an open-plan garden around a pair of semi-detached houses into two distinct entities, reflecting that there are two properties there in the real world. It must be stressed that these polygon closing links do not constitute the legal boundary of any property any more than a physical line feature does. These links are clearly identified in the 'descriptive group' attribution and could be filtered out in most GIS if a user wished to not display them.

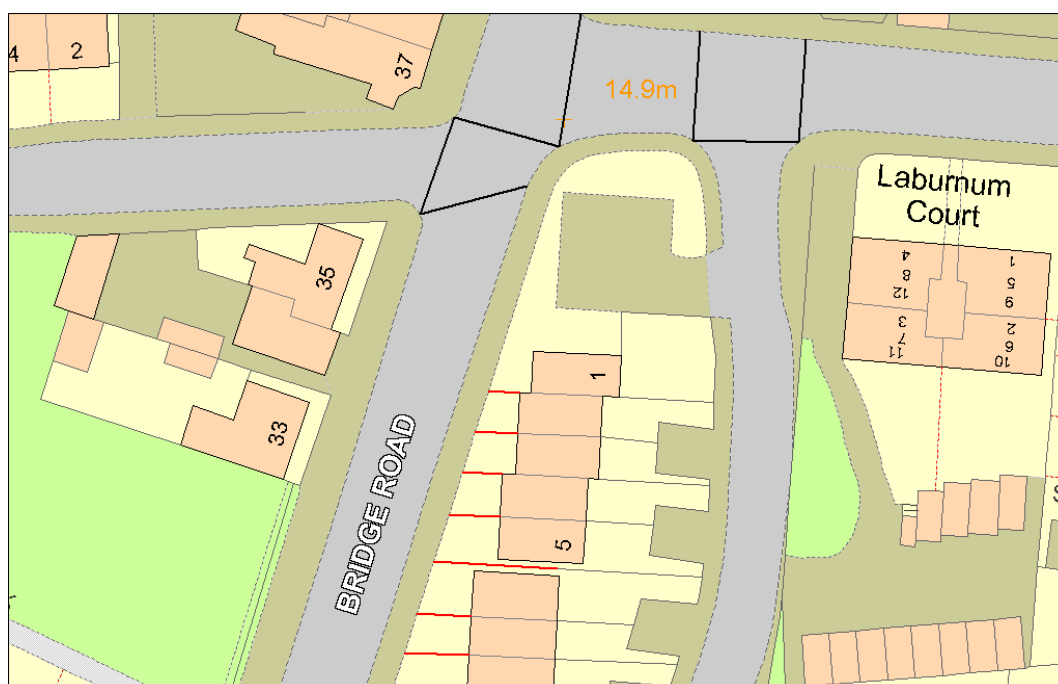


Figure 3: inferred links showing both types of inferred link; the links highlighted in black are network closing links and the lines highlighted in red are polygon closing links.

Creation of line features

When a new linear real-world object comes into being, a new line feature is created to represent it.

Deletion of line features

When a real-world object is no longer present in the real world, the corresponding line feature is deleted from the Ordnance Survey main holding. A record is kept in the database to indicate that a feature with this TOID used to exist. Users with local holdings of OS MasterMap data are informed of the deletion in their next COU.

Modification of line features due to real-world change

As noted above, a line feature may be modified due to changes to the real-world object, or due to changes in adjacent real-world objects. The original feature may be retained if a portion of its geometry remains and one or more new features may be created to reflect the change. If the classification attributes of a line change then it will usually be retained and the version number incremented. Occasionally, a line feature may be replaced with a seemingly-identical line feature that is considered a new feature. For example where a line is created to represent a newly-erected fence placed along the alignment of an existing line boundary between a garden and the pavement.

Modification of line features due to error correction

When a line feature is changed solely to correct a surveying or cartographic error, the feature is retained, unless the resulting topological changes with adjacent features make this inappropriate.

General point feature life cycle rules

The life cycles of point features are simpler than those of lines or polygons, since they cannot change in size or be split into multiple features.

Creation of point features

When a new real-world object comes into being, a new point feature is created to represent it. If, however, the object is a replacement for a previous real-world object in the same position, the original feature is retained. An example would be if an existing postbox was replaced by another postbox in the same location.

Deletion of point features

When a real-world object is no longer present in the real world, the point feature is removed from Ordnance Survey's holding. Ordnance Survey keeps a record to indicate that the feature with this TOID used to exist and notifies the user at the next date of COU supply.

Modification of point features due to real-world change

By the nature of the real-world objects represented as point features in OS MasterMap data, it is unlikely that one will be modified without changing its identity. Therefore, any modification to a point feature as a result of real-world change will result in the deletion of the original feature and creation of a new feature, unless there is a clear reason to identify the resultant real-world object with the original. This applies to both geometric change and change of descriptive group or descriptive term.

Modification of point features due to error correction

When a point feature is found to be incorrectly attributed due to an error, or is moved due to the correction of a positional accuracy error, the original feature is retained and appropriately modified.

This chapter has explained in some detail the life cycles of features so that users can understand how the data is managed by Ordnance Survey. The next chapter focuses on the content of themes.

Chapter 4 GML Overview

The OS MasterMap Topography Layer product is supplied in Geography Markup Language (GML) version 2.1.2. This chapter describes how OS MasterMap is defined in GML. It is recommended that you read this in conjunction with the Open Geospatial Consortium (OGC) document, Geography Markup Language v2.1.2. An understanding of XML (eXtensible Mark-up Language) and XML schemas is required. The XML specifications that GML is based on are available from the World Wide Web Consortium (W3C) website: <http://www.w3.org>.

XML schema

Schema overview and Internet location

XML schemas are used to validate the format and content of the GML. The GML 2.1.2 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 schemas that are referenced by the data are available from our website at <http://www.ordnancesurvey.co.uk/xml/schema>.

These schemas make use of XML Schema Definitions (XSDs) and Document Type Definitions (DTDs) produced by the W3C that are available from the W3C website at <http://www.w3.org/XML/1998/namespace.html>.

NOTE: some recent parsers now fail to validate OS MasterMap using these schemas as working practices and XML schema specification clarifications have led to GML 2.1.2 being rendered invalid.

Schema descriptions

The W3C-provided XSDs and DTDs are:

- **xml.xsd** – to allow the use of the *xml:lang* attribute for language qualification.
- **XMLSchema.dtd** – required by *xml.xsd*.
- **datatypes.dtd** – required by *XMLSchema.dtd*.

The OGC-provided schemas are:

- **feature.xsd** – the feature and property constructs.
- **geometry.xsd** – the geometric constructs such as polygon and point.
- **xlinks.xsd** – a schema based on the W3C XLINK recommendation provided by the OGC to make use of the XLINK constructs.

The Ordnance Survey application schemas are:

- **OSDNFFeatures.xsd** – the definition of the Ordnance Survey features and their properties.
- **OSComplexTypes.xsd** – the complex property types, including *changeHistoryType*.
- **OSSimpleTypes.xsd** – the basic property types, including *descriptiveGroupType* and *accuracyOfPositionType*.
- **OSMeasures.xsd** – the definition of measure-qualified types used in OS MasterMap data.
- **OSQueryresult.xsd** – the definition of a query result with its properties.
- **OSGeometryTopology.xsd** – geometry and topology extensions to the GML 2.1.2 specification required by Ordnance Survey, including rectangles and polygon topology.

XML namespaces

xlink – <http://www.w3.org/1999/xlink>

gml – <http://www.opengis.net/gml>

osgb – <http://www.ordnancesurvey.co.uk/xml/namespaces/osgb>

xml – <http://www.w3.org/XML/1998/namespace>

Use of examples

Any examples in this chapter that mention specific data content are to be taken as examples only. All data content is defined in the Topography Layer separately and the examples are not necessarily in harmony with the data specification.

XML declaration

The XML declaration to all query results is:

```
<?xml version='1.0' encoding='UTF-8'?>
```

Document type

All information returned from a query is provided in an *osgb:FeatureCollection*. If no features lie inside a query then an empty collection is returned with its required collection properties.

The document defines the XML namespaces:

osgb <http://www.ordnancesurvey.co.uk/xml/namespaces/osgb>

gml <http://www.opengis.net/gml>

xsi <http://www.w3.org/2001/XMLSchema-instance>

xlink <http://www.w3.org/1999/xlink>

The location of the schema is defined as:

<http://www.ordnancesurvey.co.uk/xml/namespaces/osgb>

<http://www.ordnancesurvey.co.uk/xml/schema/vX/OSDNFFeatures.xsd>

The fid is set to the Ordnance Survey identifier given to the query.

For example:

```
<osgb:FeatureCollection
  xmlns:osgb='http://www.ordnancesurvey.co.uk/xml/namespaces/osgb'
  xmlns:gml='http://www.opengis.net/gml'
  xmlns:xlink='http://www.w3.org/1999/xlink'
  xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
  xsi:schemaLocation='http://www.ordnancesurvey.co.uk/xml/namespaces/osgb
  http://www.ordnancesurvey.co.uk/xml/schema/vX/OSDNFFeatures.xsd'
  fid='queryId'>
  ...
</osgb:FeatureCollection>
```


Query result properties

The *gml:description* element is the first property of the feature collection; this contains a copyright statement and the date of the query.

The *gml:boundedBy* element is the next property of the feature collection; this contains a *gml:null* element with the value of 'unknown'.

The start time of the query is specified at GMT as a feature property. The name of the property is *queryTime*.

The following optional properties are provided for the *osgb:FeatureCollection* if they were provided as part of the query. The ordering of these properties is according to the order they appear in the table:

Name	Type	Format	Description
queryExtent	Geometric property	<i>gml:Polygon</i> or <i>osgb:Rectangle</i> (see Geometry).	The query extent provided as part of a spatial query.
queryChangeSinceDate	Date	CCYY-MM-DD	The date that was given as part of a change-only query.

For geographically-chunked data, if there are features in the collection, the last element in the feature collection is an *osgb:boundedBy* element. This is a *gml:Box* defining the minimum bounding rectangle of all items in the collection, including the query extent. If the collection is empty, no *osgb:boundedBy* element is provided.

For example:

```
<osgb:FeatureCollection
  xmlns:osgb='http://www.ordnancesurvey.co.uk/xml/namespaces/osgb'
  xmlns:gml='http://www.opengis.net/gml'
  xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
  xmlns:xlink='http://www.w3.org/1999/xlink'
  xsi:schemaLocation='http://www.ordnancesurvey.co.uk/xml/namespaces/osgb
  http://www.ordnancesurvey.co.uk/xml/schema/v3/OSDNFFeatures.xsd'
  fid='queryId'>
  <gml:description>
    OrdnanceSurvey, (C) CrownCopyright. All rights reserved, 2002-05-16
  </gml:description>
  <gml:boundedBy><gml:null>unknown</gml:null></gml:boundedBy>
  <osgb:queryTime>2001-03-28T14:31:54</osgb:queryTime>
  <osgb:queryExtent'>
    <osgb:Rectangle srsName='osgb:BNG'>
      <gml:coordinates>4000000,3094763 4000010,3094820</gml:coordinates>
    </osgb:Rectangle>
  </osgb:queryExtent>
  <osgb:queryChangeSinceDate>2001-01-31</osgb:queryChangeSinceDate>
  <!--features go here-->
  <osgb:boundedBy>
    <gml:Box srsName='osgb:BNG'>
      <gml:coordinates>3999350,3089542 4005602,3095673</gml:coordinates>
    </gml:Box>
  </osgb:boundedBy>
</osgb:FeatureCollection>
```

Features

Each feature within the *osgb:FeatureCollection* is encapsulated in one of the following member elements according to its feature type:

Member element	Feature type
----------------	--------------

boundaryMember	BoundaryLine
cartographicMember	CartographicText, CartographicSymbol
topographicMember	TopographicPoint, TopographicLine, TopographicArea
departedMember	DepartedFeature (<i>see chapter on COU</i>)

Each member element contains a single feature element that has the name of the feature type, for example, *TopographicPoint*, *TopographicLine* and so on.

The TOID of the feature is provided in the XML attribute 'fid' of the *osgb:Feature* element. A TOID has a maximum of 16 digits and is prefixed with 'osgb'. The 'osgb' prefix is required to form a valid XML ID type.

A feature element does not contain a name, description or *boundedBy* element.

For example:

```
<osgb:topographicMember>
  <osgb:TopographicPoint fid='osgb15789329786'>
    ....
  </osgb:TopographicPoint>
</osgb:topographicMember>
```

Properties

Our application schema defines three main types of properties that are present inside a feature element. These are simple, complex and geometric properties.

The ordering of properties within a feature element is important as XML validation is reliant on elements being in a specified order. The order of properties is specified within the XML schema.

Each type of property may additionally have associated metadata encoded using an XML attribute. This metadata provides some qualification of the status or accuracy of the content provided in the attribute.

Simple

A *simple* property is one that contains a single piece of non-geometric information. These properties correspond to simple feature attributes. The value of each feature attribute is enclosed in an element that takes its name from the feature attribute.

A feature association is a special type of simple property that defines a relationship between one feature and another. The feature association is defined by the XML attribute *xlink:href*. This shall refer to a feature as if it was locally available, even though this is not guaranteed to be the case; that is, it shall be set to the character '#' followed by 'osgb' and then the TOID of the feature being referenced.

For example:

```
<osgb:descriptiveGroup>Rail</osgb:descriptiveGroup>
<osgb:calculatedAreaValue>13254</osgb:calculatedAreaValue>
<osgb:referenceToFeature xlink:href='#osgb5798572675343543' />
```

Geometry

A geometric property is one that describes a specific geometry. All geometric properties are encoded according to the GML specification. We have extended the GML v2.1.2 specification to include a rectangle that is defined by two points. The first point defines the minimum coordinate whilst the second point defines the maximum coordinate.

All geometric properties are encoded by placing the GML geometry elements inside an element that takes its name from the feature attribute.

The XML attribute *srsName* shall be set to 'osgb:BNG' (BNG stands for British National Grid), which uses eastings and northings specified in metres.

If a line is broken or a polygon has bled into another because of a partial update (see [inconsistent features](#)) then the XML attribute *broken* shall be set to 'true'. A line that is broken will be encoded as a *gml:MultiLineString*.

All polygon outer boundaries have an anticlockwise orientation and all inner boundaries have a clockwise orientation.

For example:

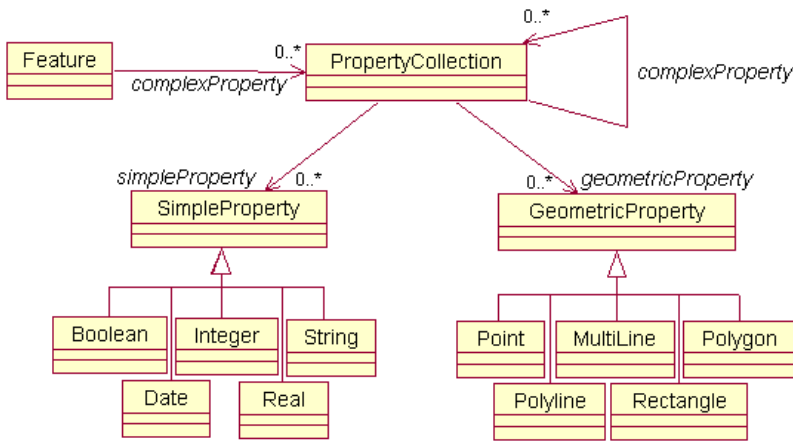
```
<osgb:anchorPoint>
  <gml:Point srsName='osgb:BNG'>
    <gml:coordinates>12365.563,8975.676</gml:coordinates>
  </gml:Point>
</osgb:anchorPoint>
<osgb:queryExtent>
  <osgb:Rectangle srsName='osgb:BNG'>
    <gml:coordinates>0,0 700000,1300000</gml:coordinates>
  </osgb:Rectangle>
</osgb:queryExtent>
<osgb:polyline broken='true'>
  <gml:MultiLineString srsName='osgb:BNG'>
    <gml:lineStringMember>
      <gml:LineString>
        <gml:coordinates>
          01289.2,970344.5 301300.0,970352.6
        </gml:coordinates>
      </gml:LineString>
    </gml:lineStringMember>
    <gml:lineStringMember>
      <gml:LineString>
        <gml:coordinates>
          301300.0,970354.1 301304.6,970369.8
        </gml:coordinates>
      </gml:LineString>
    </gml:lineStringMember>
  </gml:MultiLineString>
</osgb:polyline>
```

Complex

A *complex* property is one that contains more than one piece of information. These properties correspond to the [complex feature attributes](#).

Class model

The definition of a complex property here is recursive, so complex properties may be nested. Currently, within OS MasterMap, this recursion is not used.



XML mapping

The complex property element takes its name from the complex feature attribute. Each part of a complex property shall be encoded as a simple, complex, geometry or topology property, as appropriate, inside the complex property element.

For example:

```

<osgb:textRendering>
  <osgb:anchorPosition>4</osgb:anchorPosition>
  <osgb:font>2</osgb:font>
  <osgb:height>24</osgb:height>
  <osgb:orientation>3476</osgb:orientation>
</osgb:textRendering>

<osgb:heightAboveDatum>
  <osgb:heightAboveDatum>3456</osgb:heightAboveDatum>
  <osgb:accuracyOfPosition>2.0m</osgb:accuracyOfPosition>
</osgb:heightAboveDatum>
  
```

GML examples of feature types and their attributes

This section provide examples of how different feature types are presented in GML format.

TopographicPoint

```

<osgb:topographicMember>
  <osgb:TopographicPoint fid='osgb5000005118992763'>
    <osgb:featureCode>10085</osgb:featureCode>
    <osgb:version>1</osgb:version>
    <osgb:versionDate>2014-01-15</osgb:versionDate>
    <osgb:theme>Water</osgb:theme>
    <osgb:accuracyOfPosition>8.0m</osgb:accuracyOfPosition>
    <osgb:changeHistory>
      <osgb:changeDate>2013-11-12</osgb:changeDate>
      <osgb:reasonForChange>New</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:descriptiveGroup>Inland Water</osgb:descriptiveGroup>
    <osgb:descriptiveTerm>Culvert</osgb:descriptiveTerm>
    <osgb:make>Manmade</osgb:make>
    <osgb:physicalLevel>50</osgb:physicalLevel>
    <osgb:point>
      <gml:Point srsName='osgb:BNG'>
  
```

```

        <gml:coordinates>451492.790,1204378.760</gml:coordinates>
      </gml:Point>
    </osgb:point>
  </osgb:TopographicPoint>
</osgb:topographicMember>

```

TopographicLine

```

<osgb:topographicMember>
  <osgb:TopographicLine fid='osgb1000000042088587'>
    <osgb:featureCode>10046</osgb:featureCode>
    <osgb:version>2</osgb:version>
    <osgb:versionDate>2014-01-15</osgb:versionDate>
    <osgb:theme>Land</osgb:theme>
    <osgb:accuracyOfPosition>8.0m</osgb:accuracyOfPosition>
    <osgb:changeHistory>
      <osgb:changeDate>2008-10-30</osgb:changeDate>
      <osgb:reasonForChange>New</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:changeHistory>
      <osgb:changeDate>2010-03-15</osgb:changeDate>
      <osgb:reasonForChange>Restructured</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:changeHistory>
      <osgb:changeDate>2013-12-06</osgb:changeDate>
      <osgb:reasonForChange>Modified</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:descriptiveGroup>General Feature</osgb:descriptiveGroup>
    <osgb:descriptiveTerm>Overhead Construction</osgb:descriptiveTerm>
    <osgb:nonBoundingLine>true</osgb:nonBoundingLine>
    <osgb:make>Manmade</osgb:make>
    <osgb:physicalLevel>51</osgb:physicalLevel>
    <osgb:polyline>
      <gml:LineString srsName='osgb:BNG'>
        <gml:coordinates>454659.199,1201041.044
454727.470,1201075.210</gml:coordinates>
      </gml:LineString>
    </osgb:polyline>
  </osgb:TopographicLine>
</osgb:topographicMember>

```

TopographicArea

```

<osgb:topographicMember>
  <osgb:TopographicArea fid='osgb1000000042007204'>
    <osgb:featureCode>10203</osgb:featureCode>
    <osgb:version>3</osgb:version>
    <osgb:versionDate>2008-11-18</osgb:versionDate>
    <osgb:theme>Water</osgb:theme>

```

```

<osgb:calculatedAreaValue>2.085024</osgb:calculatedAreaValue>
<osgb:changeHistory>
  <osgb:changeDate>2001-02-17</osgb:changeDate>
  <osgb:reasonForChange>New</osgb:reasonForChange>
</osgb:changeHistory>
<osgb:changeHistory>
  <osgb:changeDate>2005-11-10</osgb:changeDate>
  <osgb:reasonForChange>Attributes</osgb:reasonForChange>
</osgb:changeHistory>
<osgb:changeHistory>
  <osgb:changeDate>2008-11-13</osgb:changeDate>
  <osgb:reasonForChange>Attributes</osgb:reasonForChange>
</osgb:changeHistory>
<osgb:descriptiveGroup>Tidal Water</osgb:descriptiveGroup>
<osgb:descriptiveTerm>Foreshore</osgb:descriptiveTerm>
<osgb:make>Natural</osgb:make>
<osgb:physicalLevel>50</osgb:physicalLevel>
<osgb:polygon>
  <gml:Polygon srsName='osgb:BNG'>
    <gml:outerBoundaryIs>
      <gml:LinearRing>
        <gml:coordinates>454554.900,1202300.000
454554.000,1202300.100 454553.300,1202299.500 454553.400,1202299.000 454553.800,1202298.400
454554.600,1202298.500 454554.900,1202299.200 454554.900,1202300.000</gml:coordinates>
      </gml:LinearRing>
    </gml:outerBoundaryIs>
  </gml:Polygon>
</osgb:polygon>
</osgb:TopographicArea>
</osgb:topographicMember>

```

BoundaryLine

```

<osgb:boundaryMember>
  <osgb:BoundaryLine fid='osgb1000001554000051'>
    <osgb:featureCode>10131</osgb:featureCode>
    <osgb:version>4</osgb:version>
    <osgb:versionDate>2008-04-20</osgb:versionDate>
    <osgb:theme>Administrative Boundaries</osgb:theme>
    <osgb:accuracyOfPosition>2.5m</osgb:accuracyOfPosition>
    <osgb:changeHistory>
      <osgb:changeDate>1999-05-12</osgb:changeDate>
      <osgb:reasonForChange>New</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:changeHistory>
      <osgb:changeDate>2002-06-26</osgb:changeDate>
      <osgb:reasonForChange>Attributes</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:changeHistory>
      <osgb:changeDate>2005-11-10</osgb:changeDate>
      <osgb:reasonForChange>Attributes</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:changeHistory>
      <osgb:changeDate>2008-04-16</osgb:changeDate>
      <osgb:reasonForChange>Reclassified</osgb:reasonForChange>
    </osgb:changeHistory>
  </osgb:BoundaryLine>
</osgb:boundaryMember>

```

```

</osgb:changeHistory>
<osgb:descriptiveGroup>Political Or Administrative</osgb:descriptiveGroup>
<osgb:descriptiveTerm>District</osgb:descriptiveTerm>
<osgb:physicalLevel>50</osgb:physicalLevel>
<osgb:physicalPresence>Boundary</osgb:physicalPresence>
<osgb:polyline>
  <gml:LineString srsName='osgb:BNG'>
    <gml:coordinates>454331.400,1202522.200 454332.400,1202517.400</gml:coordinates>
  </gml:LineString>
</osgb:polyline>
</osgb:BoundaryLine>
</osgb:boundaryMember>

```

CartographicSymbol

```

<osgb:cartographicMember>
  <osgb:CartographicSymbol fid='osgb1000001545000121'>
    <osgb:featureCode>10082</osgb:featureCode>
    <osgb:version>2</osgb:version>
    <osgb:versionDate>2006-03-01</osgb:versionDate>
    <osgb:theme>Water</osgb:theme>
    <osgb:changeHistory>
      <osgb:changeDate>1994-02-14</osgb:changeDate>
      <osgb:reasonForChange>New</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:changeHistory>
      <osgb:changeDate>2005-11-10</osgb:changeDate>
      <osgb:reasonForChange>Position</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:descriptiveGroup>Inland Water</osgb:descriptiveGroup>
    <osgb:descriptiveTerm>Direction Of Flow</osgb:descriptiveTerm>
    <osgb:orientation>3303</osgb:orientation>
    <osgb:physicalLevel>50</osgb:physicalLevel>
    <osgb:physicalPresence>Indicator</osgb:physicalPresence>
    <osgb:point>
      <gml:Point srsName='osgb:BNG'>
        <gml:coordinates>452648.430,1204142.340</gml:coordinates>
      </gml:Point>
    </osgb:point>
  </osgb:CartographicSymbol>
</osgb:cartographicMember>

```

CartographicText

```

<osgb:cartographicMember>
  <osgb:CartographicText fid='osgb1000001545006542'>
    <osgb:featureCode>10090</osgb:featureCode>
    <osgb:version>2</osgb:version>
    <osgb:versionDate>2002-07-13</osgb:versionDate>
    <osgb:theme>Water</osgb:theme>
    <osgb:anchorPoint>
      <gml:Point srsName='osgb:BNG'>
        <gml:coordinates>450063.500,1203882.000</gml:coordinates>
      </gml:Point>
    </osgb:anchorPoint>
  </osgb:CartographicText>
</osgb:cartographicMember>

```

```
        </gml:Point>
    </osgb:anchorPoint>
    <osgb:changeHistory>
        <osgb:changeDate>1994-11-25</osgb:changeDate>
        <osgb:reasonForChange>New</osgb:reasonForChange>
    </osgb:changeHistory>
    <osgb:descriptiveGroup>Inland Water</osgb:descriptiveGroup>
    <osgb:make>Natural</osgb:make>
    <osgb:physicalLevel>50</osgb:physicalLevel>
    <osgb:textRendering>
        <osgb:anchorPosition>4</osgb:anchorPosition>
        <osgb:font>1</osgb:font>
        <osgb:height>11</osgb:height>
        <osgb:orientation>0</osgb:orientation>
    </osgb:textRendering>
    <osgb:textString>Ponds</osgb:textString>
</osgb:CartographicText>
</osgb:cartographicMember>
```


Chapter 5 Change Only Update (COU) Overview

COU is data that is provided to bring a user's data holdings up to date with the most recent data available from Ordnance Survey. COU contains, for a user's defined area, only the features that are new or have changed, as well as departed features (those that have moved or been deleted from the user's data extent). Any feature that is new or changed since the COU date the user provides will be supplied in its latest version and departed features will indicate which features have been moved or deleted since that date.

COU will not provide intermediate versions of features that have existed between the previous order and the most recent version. Conversely, COU may supply departed information for features that the user has never had, as they have appeared and subsequently disappeared between order dates.

COU data format

COU data is supplied in GML 2.1.2 format. Inclusion of features in the COU file is triggered by a new version of a feature appearing in the database with a version date between the previous and new order dates. In the data, these new and modified features are represented in the same way they would for a full supply. Departed feature is a specific feature type only present in COU supply and that represent features to be removed from a user's holding. The departed features records contain the TOID of the deleted feature, its bounding rectangle, its theme or themes and the date and reason for its departure.

DepartedFeature

«FeatureType» DepartedFeature	
Definition: Features that indicate that a feature in a previous supply may no longer be relevant, for example, it may have been deleted or moved. This is used in COU data supply only.	
Attribute: TOID or <i>gml:id</i>	
Definition: The unique topographic reference number. It consists of the letters 'osgb' followed by sixteen digits. The TOID must always be retained / stored in its entirety.	
Type: String	Multiplicity: [1]
Attribute: boundedBy	
Definition: The minimum enclosing rectangle that encompasses a geometry. For departedFeatures this encompasses all geometries that a feature has had in its life cycle.	
Type: Rectangle	Multiplicity: [1]
Attribute: theme	
Definition: A theme that the feature belongs to.	
Type: String; see ThemeType	Multiplicity: [1..*]
Attribute: reasonForDeparture	
Definition: This is set to 'Deleted' or 'Vacated' to indicate whether a feature has physically been deleted from the database or is no longer relevant due to change in COU supply.	
Type: String	Multiplicity: [1]
Attribute: deletionDate	
Definition: The date the feature was deleted from the Ordnance Survey maintenance database.	
Type: Date	Multiplicity: [0..1]

COU requires that information be provided for features that were present in a spatial query but no longer meet the query criteria. Such features may have changed theme so that they are no longer in any of the themes being requested, had their geometry modified between queries so that they no longer meet the spatial criteria, or been deleted. These features are represented using the *DepartedFeature* feature type explained above. These are encoded the same way as other features.

For example:

```

<osgb:departedMember>
  <osgb:DepartedFeature fid='osgb5000005194950566'>
    <osgb:boundedBy>
      <gml:Box srsName='osgb:BNG'>
        <gml:coordinates>224628.890,641571.220
224628.890,641571.220</gml:coordinates>
      </gml:Box>
    </osgb:boundedBy>
    <osgb:theme>Buildings</osgb:theme>
    <osgb:reasonForDeparture>Deleted</osgb:reasonForDeparture>
    <osgb:deletionDate>2017-02-02</osgb:deletionDate>
  </osgb:DepartedFeature>
</osgb:departedMember>

```

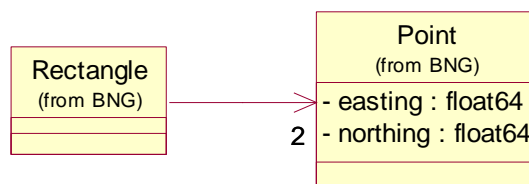
Rectangle

A rectangle is a pair of points that are used to define a rectangular area that is aligned to the National Grid. One point defines the minimum easting and northing of the rectangle, the other defines the maximum easting and northing.

Example



Example class model



Applying COU

All the information to update a user’s holding is provided in the COU file. How this is processed by the user’s software is obviously critical to ensuring that these changes are correctly applied. The basic principles that need to be followed to help ensure consistency are:

- Ensure initial supply or latest full supply or COU has been correctly loaded. This can be checked with the feature validation dataset (FVDS), which gives a full list of the TOIDs that should be in a user’s current holding at time of full supply.
- Ensure that the COU to be applied covers the period from the date of last supply (‘Extraction date’) through to the update date required.
- Apply the COU to existing holding. How this is applied will be dependent upon the user’s system.
- Check holding using FVDS at appropriate intervals to ensure currency and consistency of data holdings.

Annexe A Feature Code LookUp Table

This table gives descriptions for each feature code value. The feature code itself is arbitrarily assigned and so carries no information without this table.

In the descriptive term column, a blank box means multiple, other or none. This code is used for features with multiple descriptive terms, with no descriptive term, or with one descriptive term that does not have its own feature code. The column feature type has been abbreviated by omitting the words topographic, boundary and cartographic from the feature type names. Where 'line' appears in this column, it includes both TopographicLine and BoundaryLine feature types.

Descriptive group	Feature type	Descriptive term	Feature code
Building	Area		10021
Building	Line		10017
Building	Point		10022
Building	Symbol		10016
Building	Text		10020
Building	Line	Division	10018
Building	Line	Outline	10019
Buildings Or Structure	Area		10025
Buildings Or Structure	Line		10023
Buildings Or Structure	Point		10024
Buildings Or Structure	Symbol		10027
Buildings Or Structure	Text		10026
Buildings Or Structure	Text	Compound	10028
Built Environment	Area		10031
Built Environment	Line		10032
Built Environment	Point		10029
Built Environment	Symbol		10030
Built Environment	Text		10034
Built Environment	Text	Compound	10033
General Feature	Area		10044
General Feature	Line		10046
General Feature	Point		10045
General Feature	Symbol		10042
General Feature	Text		10043
General Feature	Point	Positioned Boulder	10051
General Feature	Point	Positioned Coniferous Tree	10050
General Feature	Point	Positioned Nonconiferous Tree	10048
General Feature	Line	Tunnel Edge	10041
General Surface	Area		10056
General Surface	Line		10052
General Surface	Point		10057
General Surface	Symbol		10055
General Surface	Text		10059
General Surface	Area	Multi Surface	10053
General Surface	Area	Step	10054

General Surface	Line	Step	10058
Glasshouse	Area		10062
Glasshouse	Line		10064
Glasshouse	Point		10063
Glasshouse	Symbol		10061
Glasshouse	Text		10060
Height Control	Area		10065
Height Control	Line		10071
Height Control	Point		10068
Height Control	Symbol		10070
Height Control	Text		10069
Height Control	Point	Bench Mark	10067
Height Control	Symbol	Bench Mark	10066
Historic Interest	Area		10076
Historic Interest	Line		10075
Historic Interest	Point		10080
Historic Interest	Symbol		10073
Historic Interest	Text		10074
Historic Interest	Text	Compound	10077
Historic Interest	Point	Site Of Heritage	10072
Inland Water	Area		10089
Inland Water	Line		10087
Inland Water	Point		10088
Inland Water	Symbol		10084
Inland Water	Text		10090
Inland Water	Text	Compound	10086
Inland Water	Line	Culvert	10092
Inland Water	Point	Culvert	10085
Inland Water	Symbol	Culvert	10091
Inland Water	Symbol	Direction Of Flow	10082
Inland Water	Line	Tunnel Edge	10083
Landform	Area		10093
Landform	Line		10095
Landform	Point		10094
Landform	Symbol		10106
Landform	Text		10102
Landform	Line	Bottom Of Cliff	10103
Landform	Line	Bottom Of Slope	10097
Landform	Area	Cliff	10099
Landform	Text	Compound	10105
Landform	Point	Disused Feature	10100
Landform	Line	Ridge Or Rock Line	10101
Landform	Area	Slope	10096
Landform	Line	Top Of Cliff	10104
Landform	Line	Top Of Slope	10098
Natural Environment	Area		10111

Natural Environment	Line		10110
Natural Environment	Point		10109
Natural Environment	Symbol		10108
Natural Environment	Text		10107
Network Or Polygon Closing Geometry	Area		10116
Network Or Polygon Closing Geometry	Line		10115
Network Or Polygon Closing Geometry	Point		10118
Network Or Polygon Closing Geometry	Symbol		10117
Network Or Polygon Closing Geometry	Text		10112
Network Or Polygon Closing Geometry	Line	Inferred Property Closing Link	10114
Network Or Polygon Closing Geometry	Line	Polygon Closing Link	10113
Path	Area		10123
Path	Line		10124
Path	Point		10120
Path	Symbol		10121
Path	Text		10122
Path	Area	Step	10119
Path	Line	Tunnel Edge	10125
Political Or Administrative	Area		10126
Political Or Administrative	Line		10137
Political Or Administrative	Point		10132
Political Or Administrative	Symbol		10134
Political Or Administrative	Text		10133
Political Or Administrative	Symbol	Boundary Half Mereing	10130
Political Or Administrative	Point	Boundary Post Or Stone	10129
Political Or Administrative	Line	County	10127
Political Or Administrative	Line	District	10131
Political Or Administrative	Line	Electoral	10128
Political Or Administrative	Line	Parish	10136
Political Or Administrative	Line	Parliamentary	10135
Rail	Area		10167
Rail	Line		10155
Rail	Point		10159
Rail	Symbol		10161
Rail	Text		10166
Rail	Line	Buffer	10160
Rail	Text	Compound	10156
Rail	Line	Narrow Gauge	10164
Rail	Line	Standard Gauge	10162
Rail	Line	Standard Gauge Track	10163
Rail	Point	Structure	10158
Rail	Symbol	Switch	10165
Rail	Line	Tunnel Edge	10157
Road Or Track	Area		10172
Road Or Track	Line		10175
Road Or Track	Point		10176

Road Or Track	Symbol		10170
Road Or Track	Text		10171
Road Or Track	Line	Public	10168
Road Or Track	Text	Road Name Or Classification	10169
Road Or Track	Symbol	Road Related Flow	10177
Road Or Track	Line	Tunnel Edge	10173
Roadside	Area		10183
Roadside	Line		10180
Roadside	Point		10182
Roadside	Symbol		10181
Roadside	Text		10178
Roadside	Point	Structure	10179
Structure	Area		10185
Structure	Line		10195
Structure	Point		10186
Structure	Symbol		10194
Structure	Text		10184
Structure	Area	Archway	10190
Structure	Line	Network Closing Link	10188
Structure	Area	Pylon	10193
Structure	Line	Pylon	10189
Structure	Point		10192
Structure	Point	Structure	10191
Structure	Area	Upper Level Of Communication	10187
Terrain And Height	Area		10199
Terrain And Height	Line		10201
Terrain And Height	Point		10200
Terrain And Height	Symbol		10196
Terrain And Height	Text		10198
Terrain And Height	Point	Air Height	10202
Terrain And Height	Point	Spot Height	10197
Tidal Water	Area		10210
Tidal Water	Line		10208
Tidal Water	Point		10209
Tidal Water	Symbol		10206
Tidal Water	Text		10204
Tidal Water	Text	Compound	10207
Tidal Water	Area	Foreshore	10203
Tidal Water	Text	Foreshore	10205
Tidal Water	Line	Mean High Water (Springs)	10211
Tidal Water	Line	Mean Low Water (Springs)	10212
Unclassified	Area		10217
Unclassified	Line		10216
Unclassified	Point		10215
Unclassified	Symbol		10214
Unclassified	Text		10213

Annexe B Product and service performance report form

Ordnance Survey welcomes feedback from its customers about OS MasterMap Topography Layer.

If you would like to share your thoughts with us, please print a copy of this form and when completed post or email 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 Topography Layer Product Manager, Ordnance Survey, Adanac Drive, SOUTHAMPTON, SO16 0AS.

If e-mailing this form, please send it to: customerservices@os.uk

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.