ORDNANCE SURVEY GB

OS MASTERMAP HIGHWAYS NETWORK – PRODUCT GUIDE

Ordnance Survey

Version history

Version	Date	Description
1.0	03/2016	Initial release.
2.0	10/2016	Minor updates.
2.1	04/2017	Minor updates.
2.2	10/2017	Minor updates.
2.3	07/2018	Minor updates.
2.4	03/2021	Addition of Scottish Street information.
2.5	02/2022	Introduction of GeoPackage and Vector Tiles formats to the product. New template attached to the document.
2.6	07/2023	Paths coverage extended from urban only to GB-wide. Figure 1 was updated.
2.7	12/2023	Removed section 4.9, Ten-T look-up table, and all references to Ten-T.

Purpose of this document

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

The terms and conditions on which OS MasterMap Highways Network is made available to you and your organisation are contained in that Ordnance Survey customer contract. Please ensure your organisation has signed a valid current customer contract to be able to use OS MasterMap Highways Network.

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

Contents

1. Introduction

The OS MasterMap Highways Network product family provides an authoritative road and path network for Great Britain. The products are the result of collaboration between Ordnance Survey, GeoPlace and Improvement Service to bring together Ordnance Survey's detailed road and path information, the National Street Gazetteer (NSG), the Trunk Road Street Gazetteer (TRSG) and the Scottish Street Gazetteer (SSG) (Figure 1).

The Highways Network integrates the Unique Street Reference Number (USRN) from the gazetteers with the most detailed definitive geometry from Ordnance Survey. The OS MasterMap Highways Network was produced in partnership with GeoPlace and the Local Government Association, and as of March 2021, it contains data created and maintained by Scottish Local Government.
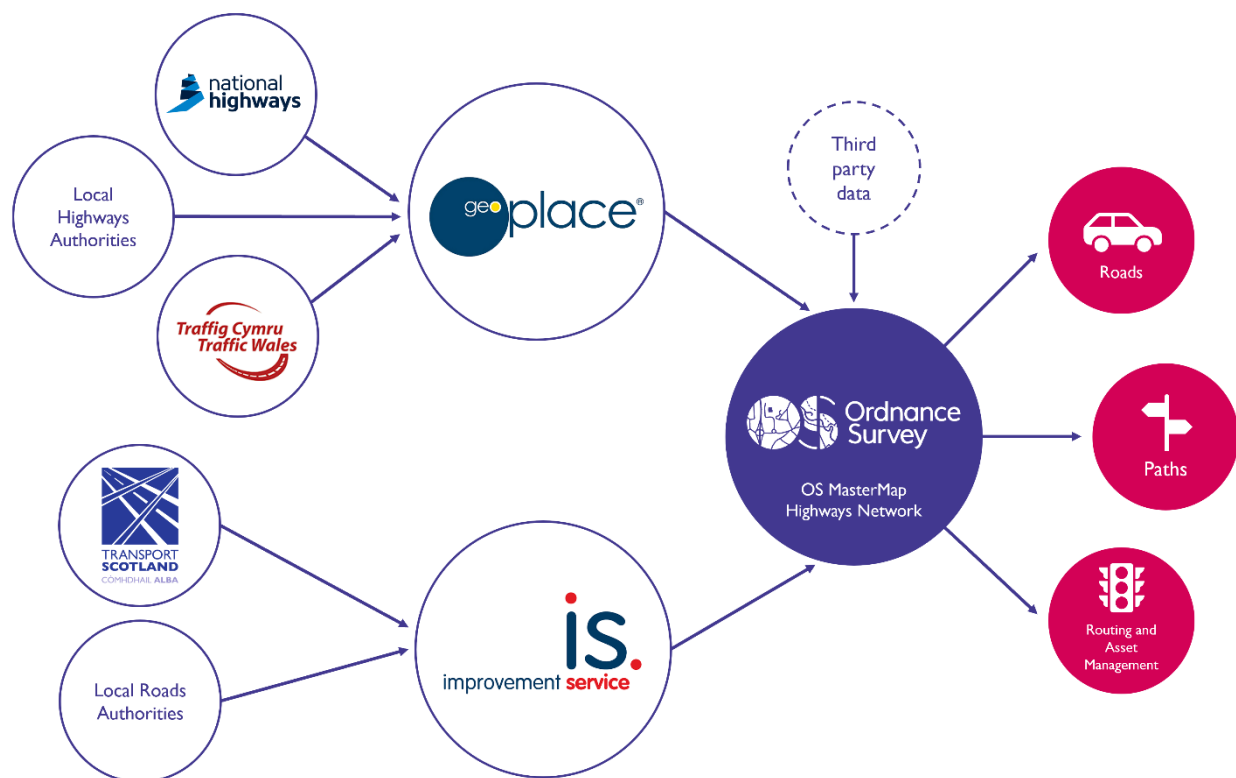
Figure 1. Bringing together data to create OS MasterMap Highways Network.

The OS MasterMap Highways Network product family includes a road network, a path network, connectivity across British islands through a ferry network, routing and asset management information, as well as detailed speed information on all roads.

The OS MasterMap Highways Network product family includes three core products:

- OS MasterMap Highways Network – Roads

- OS MasterMap Highways Network – Routing and Asset Management Information (RAMI)

- OS MasterMap Highways Network – Paths

In addition to these three core products, the OS MasterMap Highways Network product family is enhanced by three speed data products:

- OS MasterMap Highways Network with Routing and Asset Management Information and Average Speed

- OS MasterMap Highways Network with Routing and Asset Management Information and Speed Limits

- OS MasterMap Highways Network with Routing and Asset Management Information and Average Speed and Speed Limits

These three speed data products are supplied with an additional data file which will be either Average Speed, Speed Limits or a combination of both.

The OS MasterMap Highways Network with Speed products are not available under the PSGA contract, but are available via our Partner channel under the Framework Contract Partners (https://www.ordnancesurvey.co.uk/business-government/licensing-agreements/partner-licence).

New OS MasterMap Highways Network with Speed contracts cannot be entered into after 29th March 2023. Supply of product updates to customers with existing contracts continues until March 2024.

1.1 About GeoPlace

GeoPlace is a limited liability partnership jointly owned by the Local Government Association and Ordnance Survey. It is responsible for compiling and maintaining the National Street Gazetteer (NSG).

This is the definitive referencing system used in the notification process and the coordination of street works. Under legislation, each highway authority in England and Wales is required to create and maintain its own Local Street Gazetteer (LSG) and Associated Street Data (ASD). These are then compiled into the only master index built to the national standard (BS 7666).

1.2 Standards

The OS MasterMap Highways Network has been designed to be INSPIRE compliant (https://inspire.ec.europa.eu/). INSPIRE is the Infrastructure for Spatial Information in Europe. It is designed to ensure that the spatial data infrastructures of the Member States of the European Community are compatible and usable between member states to improve decision making and operations. The INSPIRE Transport Networks Data Specification forms the basis of the specifications for the Roads, Routing and Asset Management Information and Paths products.

1.3 Technical Specifications

- [OS MasterMap Highways Network – Roads – Technical Specification](https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-roads-technical-specification.pdf) (https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-roads-technical-specification.pdf)

- [OS MasterMap Highways Network – Routing and Asset Management Information – Technical Specification](https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-routing-and-asset-management-technical-specification.pdf) (https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-routing-and-asset-management-technical-specification.pdf)

- [OS MasterMap Highways Network – Paths – Technical Specification](https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-paths-technical-specification.pdf) (https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-paths-technical-specification.pdf)

OS MasterMap Highways Network specifications have also been extended to include additional properties included in British Standard 7666-1:2006, Spatial datasets for geographical referencing.

1.4 Coordinate reference system

The coordinate reference system used by OS MasterMap Highways Network is the [British National Grid](https://getoutside.ordnancesurvey.co.uk/guides/beginners-guide-to-grid-references/) (https://getoutside.ordnancesurvey.co.uk/guides/beginners-guide-to-grid-references/). The British National Grid (BNG) spatial reference system uses the OSGB36 geodetic datum and a single Transverse Mercator projection for the whole of Great Britain. Positions on this projection are described using easting and northing coordinates in units of metres. The BNG is a horizontal spatial reference system only; it does not include a vertical (height) reference system.

In the Geography Markup Language (GML) data, this is represented by reference to its entry in the EPSG registry, as http://www.opengis.net/def/crs/EPSG/0/27700.

1.5 Key features of the products

OS MasterMap Highways Network products contain several features, including the following:

- Unique Street Reference Number (USRN)

- Road names from the naming and numbering authority

- Department for Transport (DfT) road classifications

- Road maintenance authority

- Motorway junction to junction information

- Routing information

- Vehicle height, weight, width and length restrictions information

- Special designations

- Road reinstatement information

- Connected network across Great Britain, including islands, through the Ferry Network

- Average Speed information broken down into six time periods for each day

- Speed Limits

One of the key strengths of the products is the collection of street information at the local highway authority level. The benefit of this is that the data capture is at the earliest point of creation within a local highway authority and there is detailed local knowledge driven by statutory requirements.

1.6   Product applications

OS MasterMap Highways Network is designed to be used as a single source of highway asset management by private and public sectors alike. It can be used for the following applications:

- As a source for legal road identifications

- To estimate costs or benefits of road policies

- For efficient funding allocations and evidence-based policy making
  - Managing policies
  - Producing statistics
  - Allocating funding
  - Supporting legislation

- Asset management

- Journey planning, routing and navigation

- Emergency service and civil contingency planning

- Transport planning

- Smart cities

- For speed data calculations and analysis:
  - Congestion analysis and drive time studies
  - Environmental analysis to monitor emissions and carry out standing time analysis
  - Routing and route optimisation
  - Planning emergency response routing
  - Planning and development using traffic and infrastructure modelling
  - Autonomous vehicles usage of speed limits

2.   Overview of the products

OS MasterMap Highways Network integrates Ordnance Survey's detailed road and path information with the authoritative sources of the National Street Gazetteer (NSG), the Trunk Road Street Gazetteer (TRSG) and the Scottish Street Gazetteer (SSG). These sources contain the definitive information provided by the Local and National Roads and Highways Authorities.

To bring this information together, where possible the geometry of streets captured by a Roads or Highway Authority is spatially matched to the geometry of OS RoadLinks and PathLinks. Where this match is successful, the Ordnance Survey geometry is the base geometry used for the Highways Network, enabling the amalgamation of the NSG, SSG and TRSG with Ordnance Survey data. Where spatial matching cannot match the geometry captured by the Roads or Highway Authority to OS geometry, the Roads or Highway Authority geometry is used as the source geometry to represent the extent of the Street, ensuring that all USRNs and associated data provided are included in the product.

Additionally, OS MasterMap Highways Network is enriched with third-party information on speed data which is connected to the Ordnance Survey road network and will provide detailed information on average speed and speed limits across Great Britain.

The combination of this information has brought the following products into the market under the OS MasterMap Highways Network product family.

2.1   OS MasterMap Highways Network – Roads

The Roads product provides a topologically structured link and node representation of the road network and gives connectivity across Great Britain through Ferry features. It provides information on names associated with the road network, being either the legal definitive view of a road name or the plated road name, plus road numbering, junction names and junction numbers. In addition to naming information, the product also provides information on road classification, road function, primary routes and road node classification.

2.2   OS MasterMap Highways Network – Routing and Asset Management Information

The Routing and Asset Management Information product provides the same functionality as the Roads product, with additional information on both managing the road as an asset and routing information, which aids navigation. The routing and asset management information integrates data from Ordnance Survey's large-scale information and the Additional Street Data held within the NSG and SSG. The routing information covers such aspects as vehicle restrictions, covering access, manoeuvres and physical characteristics. The asset management information, on the other hand, provides details on the authority responsible for maintaining a road, how a road should be restored following street works and if there are any unusual conditions that the local highway authority have associated with a road.

2.3   OS MasterMap Highways Network – Routing and Asset Management Information and Speed Data

The Speed data is made available alongside the OS MasterMap Highways Network – Routing and Asset Management Information product and is supplied in three separate products which will provide Average Speed, Speed Limits and the combined version of both Average Speed and Speed Limits.

OS MasterMap Highways Network with Routing and Asset Management Information and Average Speed will provide detailed historical speed information on the average speed travelled for the entire road network in Great Britain. The average speed is provided for each road link and for six distinct times of each day, in both directions of travel. This dataset is based on a year's worth of information and will aid in calculating congestion and drive times, routing optimisation and planning.

OS MasterMap Highways Network with Routing and Asset Management Information and Speed Limits will provide the speed limit for each road link in Great Britain based on road traffic signs. This dataset will enable you to determine speed restrictions on the road, optimise routing and calculate congestion and drive times.

Both Average Speed and Speed Limits data are linked to the corresponding OS MasterMap Highways Network Road Link feature to which it belongs, identified by the Road Link topographic identifier (TOID).

2.4   OS MasterMap Highways Network – Paths

The Paths product provides a topologically structured link and node representation of the pedestrian path and ferry network throughout Great Britain. The path network will provide connectivity between the road network but will not provide a route which can be inferred from the road network. Instead, the path network can be connected to the road network within the Roads or Routing and Asset Management Information products. The Paths product provides information on names associated with the path network, the path function and its surface type. In addition to the network information, the product also provides asset management information which identifies the authority responsible for maintaining the path, how the path should be restored following street works and if there are any unusual conditions that the local highways or roads authority have associated to the path.

3. Feature types

3.1 Overview of feature types included in the products

OS MasterMap Highways Network products' features are classified into feature types. Each feature type has associated attribution, and further detail of this can be found in the Technical Specifications.

Core features included in the Roads product		
Road Link	Street	Ferry Node
Road Node	Road Junction	Ferry Terminal
Road	Ferry Link	

Core features included in the Routing and Asset Management Information product		
Road Link	Ferry Node	Structures
Road Node	Ferry Terminal	Maintenance
Road	Access Restrictions	Reinstatement
Street	Turn Restrictions	Highways Dedication
Road Junction	Restrictions For Vehicles	Special Designation
Ferry Link	Hazards	

Core features included in the Paths product		
Path Link	Street	Reinstatement
Path Node	Ferry Link	Highways Dedication
Connecting Link	Ferry Node	Special Designation
Connecting Node	Ferry Terminal	
Path	Maintenance	

Core features and speed features included in the Routing and Asset Management Information and Speed product suite		
Road Link	Ferry Terminal	Reinstatement
Road Node	Access Restrictions	Highways Dedication
Road	Turn Restrictions	Special Designation
Street	Restrictions For Vehicles	Average Speed
Road Junction	Hazards	Speed Limits
Ferry Link	Structures	
Ferry Node	Maintenance	

The following table details the feature types present within the OS MasterMap Highways Network products. The letter *Y* indicates that a feature type is present in a product, whereas the letter *N* indicates that a feature type is not present in a product.

Feature type	OS MasterMap Highways Network products			
	Roads	RAMI	Paths	RAMI and Speed
Road Link	Y	Y	N	Y
Road Node	Y	Y	N	Y
Path Link	N	N	Y	N
Path Node	N	N	Y	N
Connecting Link	N	N	Y	N
Connecting Node	N	N	Y	N
Road	Y	Y	N	Y
Path	N	N	Y	N
Street	Y	Y	Y	Y
Road Junction	Y	Y	N	Y
Ferry Link	Y	Y	Y	Y
Ferry Node	Y	Y	Y	Y
Ferry Terminal	Y	Y	Y	Y
Access Restrictions	N	Y	N	Y
Turn Restrictions	N	Y	N	Y
Restrictions For Vehicles	N	Y	N	Y
Hazards	N	Y	N	Y
Structures	N	Y	N	Y
Maintenance	N	Y	Y	Y

Feature type	OS MasterMap Highways Network products			
	Roads	**RAMI**	**Paths**	**RAMI and Speed**
Reinstatement	N	Y	Y	Y
Highways Dedication	N	Y	Y	Y
Special Designation	N	Y	Y	Y
Average Speed	N	N	N	Y
Speed Limits	N	N	N	Y
Feature Validation Data Set	Y	Y	Y	Y
OS Open Roads lookup table	Y	Y	N	Y

3.2 Road Link (present in Roads, RAMI, and RAMI and Speed products)
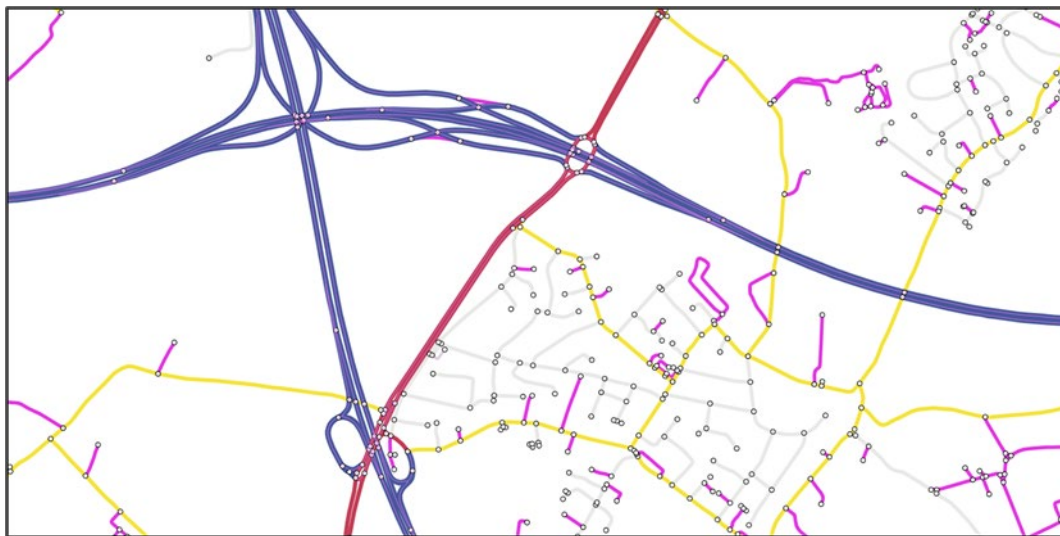

Figure 2. Road Links and Road Nodes forming the base network geometry of the OS MasterMap Highways Network – Roads product.

A Road Link is a line segment representing the general alignment of the road carriageway. It can represent single carriageways, dual carriageways, slip roads, roundabouts and indicative trajectories across traffic squares (Figure 2). It defines the geometry and connectivity of a road network between two points. Road Links hold information on the road name, classification, form, length and other attributes which are specified in the [OS MasterMap Highways Network – Roads – Technical Specification](https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-roads-technical-specification.pdf) (https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-roads-technical-specification.pdf).

3.3   Road Node (present in Roads, RAMI, and RAMI and Speed products)

A Rode Node is a topological node connecting to at least one Road Link, providing network connectivity (Figure 2). It is a point used to represent connectivity between road links or the end of a road. A Road Node will hold information on its classification, and if it forms a part of a numbered junction, then the Road Node will provide this number.

3.4   Path Link (present in Paths product)

A Path Link is a line segment representing the alignment of a path. Path links hold information about the name of the path, its length and its nature, alongside other attribution which is detailed in the [OS MasterMap Highways Network – Paths – Technical Specification](https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-paths-technical-specification.pdf) (https://www.ordnancesurvey.co.uk/documents/os-mastermap-highways-network-paths-technical-specification.pdf). Path Links define the geometry and connectivity of the Path Network between two points.

Path Links will be captured where:

- They provide a route that cannot be inferred from the Road Network

- They provide connectivity between road networks

- There is a canal path or tow path

- There are paths over footbridges and under subways

Path Links will not be captured where:

- They run parallel to the Road Network, for example, a pavement

- They are within school boundaries and cemeteries where there are closing times

- They are connected to a Motorway

- There is a physical obstruction which prevents connectivity

- There are multiple paths that essentially serve the same purpose when some rationalisation is applied

3.5 Path Node (present in Paths product)

A Path Node is a topological node connecting to at least one Path Link, providing network connectivity. It is a point used to represent connectivity between path links or the end of a road.

3.6 Connecting Link (present in Paths product)

The Road and Path Network are topologically structured together. Connecting Links enable this connection between the Road Network and the Path Network (Figure 3). A Connecting Link is a line segment which represents a logical connection between the Path Network and the Road Network; it does not represent a real-world feature.

3.7 Connecting Node (present in Paths product)

A Connecting Node is a point feature which identifies where a Path connects to the Road Network. The Connecting Node connects to the start or end of one or more RoadLinks and are spatially coincident with RoadNodes.

Figure 3. How Connecting Links and Connecting Nodes connect the road and path networks together. Connecting Nodes are coincident with Road Nodes.

3.8   Road (present in Roads, RAMI, and RAMI and Speed products)

A Road feature holds information about road names and road numbers which have been captured by Ordnance Survey. A Road feature will reference the Road Links which share the same name (for example, Wellington Road; Figure 4) or number (for example, the A41; Figure 5), irrespective of which local authority is responsible for it. The link set may not be contiguous across junctions or where a road consists of separate sections, which may be separated by some considerable distance. A Road Link could be referenced by multiple Road features.
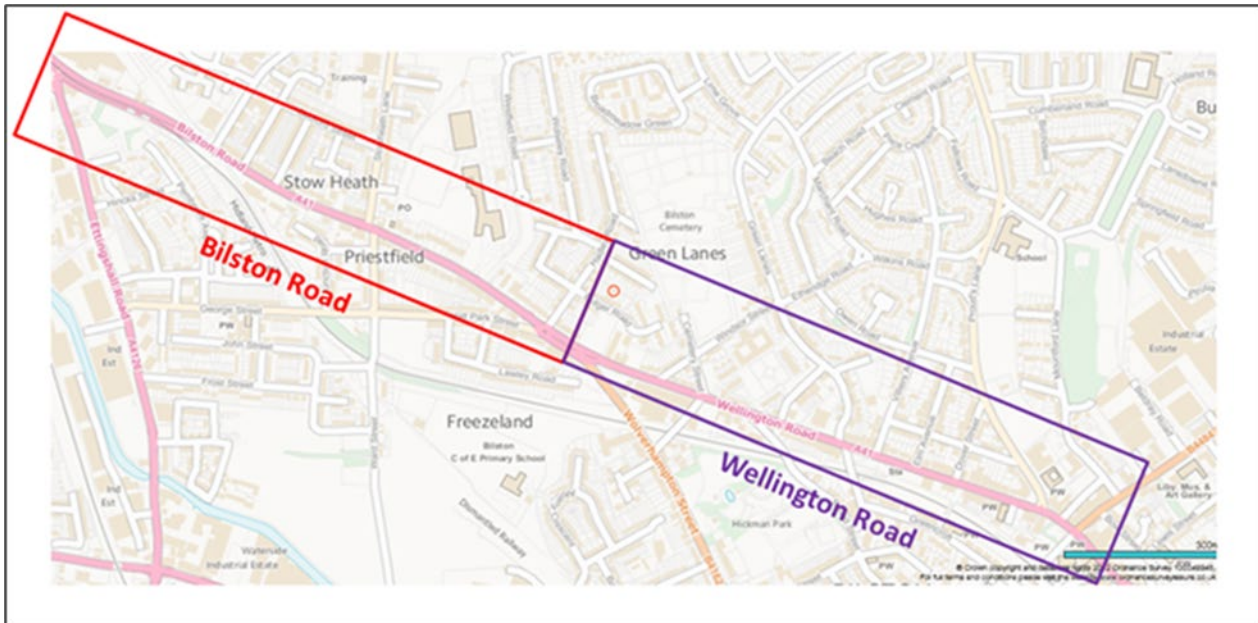

Figure 4. A Road feature references all the Road Links that represent individually named roads, for example, Bliston Road.

Figure 5. A Road feature references all the Road Links that represent a numbered road, for example, the A41.

3.9   Path (present in Paths product)

A Path feature is like a Road feature as it holds information about path names which have been captured by Ordnance Survey. A Path feature is a link set which will reference the Path Links which share the same name, irrespective of which local authority is responsible for it. A Path Link could be referenced by multiple Path features.

3.10   Street (present in all OS MasterMap Highways Network products)

The Street feature is the definition of the street as defined in the National or Scottish Street Gazetteer. Local authorities have a statutory responsibility which means that they are the source of information for both street naming and managing the highways/roads network.

Each Street feature has a USRN, a unique and persistent identifier for a street contained in either the National or Scottish Street Gazetteer. Every street, road, track, path, cycle track or way is assigned a USRN by a Roads Authority, Local Highway Authority or Highways England. Each authority is provided a USRN range that is centrally allocated and managed by GeoPlace in England and Wales and by Improvement Service in Scotland.

A Street feature encompasses both Roads and Paths. Therefore, a Street feature will reference the Road Links or Path Links. Where a Street crosses an administrative boundary, a new Street feature will be created (Figure 6). A Road Link or Path Link could be referenced by multiple Street features.

The Street features which are supplied with the Routing and Asset Management Information product will contain all Street features which have either been matched to at least one Road Link or have not been matched. The Street features which are supplied with the Paths product will only contain Street features which have only been matched to a Path Link.
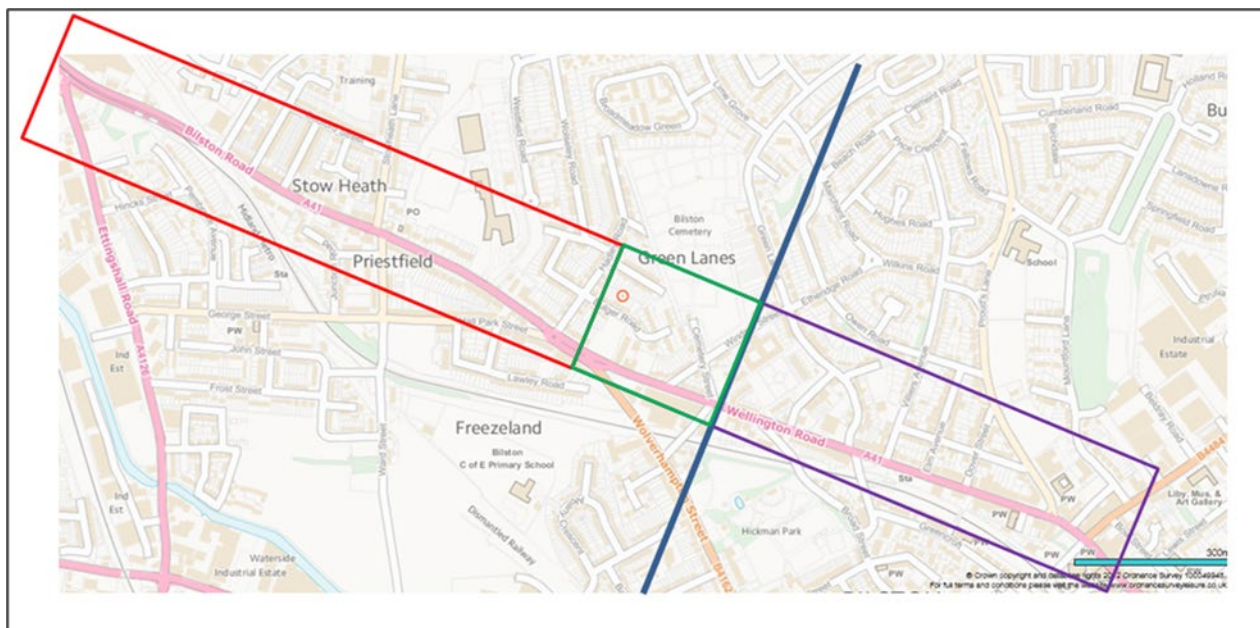

Figure 6. Where a named road crosses an administrative boundary, a new Street feature will be created, as can be seen in the above example for Wellington Road.

3.11 Road Junction (present in Roads, RAMI, and RAMI and Speed products)

A Road Junction holds information about junction names and numbers. The feature will reference all the Road Nodes which correspond to the junction the feature is representing (Figure 7). Multiple Road Junction features could reference a Road Node. In the current release, the Road Junction feature will only identify Numbered Motorway Junctions.
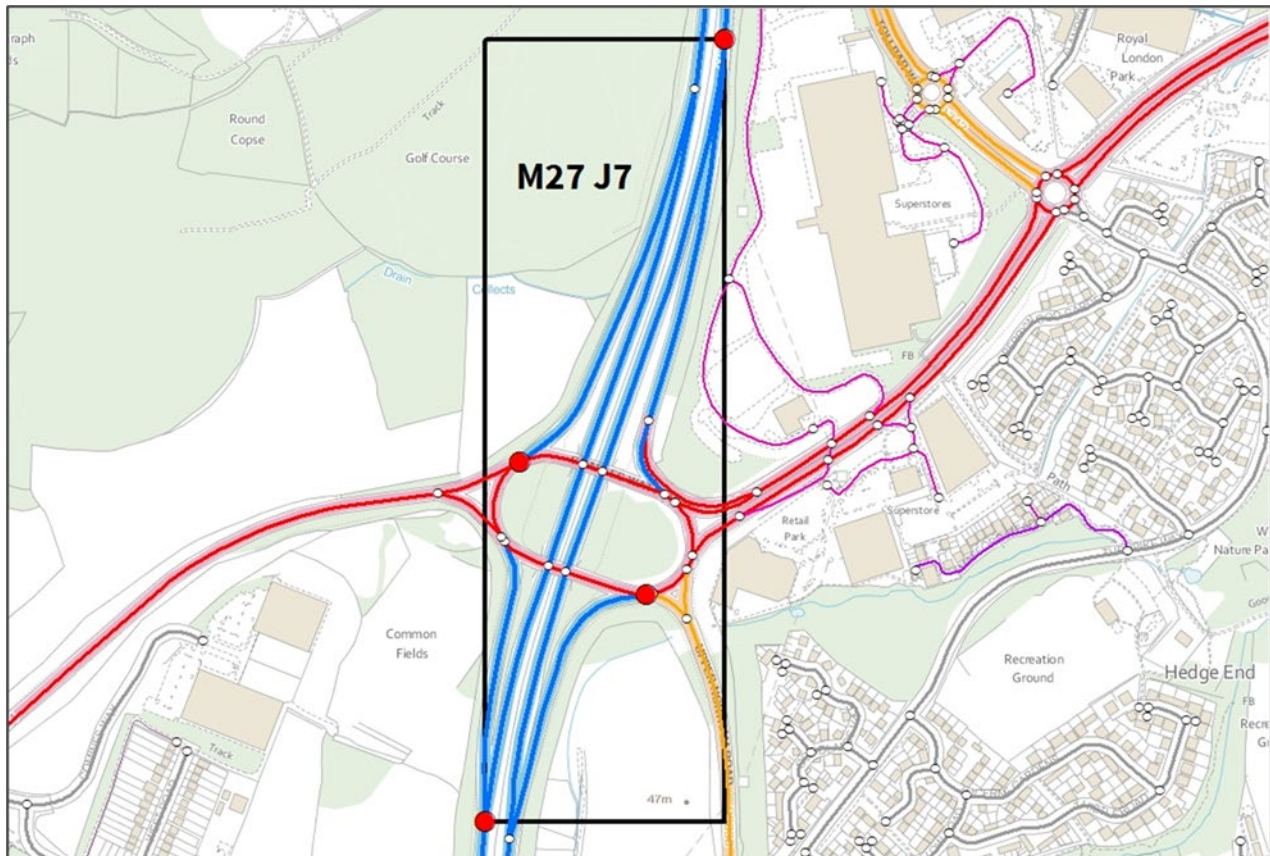
Figure 7. A Road Junction feature references all the Road Nodes that represent it.

3.12 Ferry Link (present in all OS MasterMap Highways Network products)

A Ferry Link is a line segment that connects the road network and path networks across bodies of water. The link can represent the route a ferry may take between terminals; otherwise, the link will be a straight line between two terminals. In addition to connectivity information, a Ferry Link also provides data on who operates the service and if the service is limited to pedestrians. A Ferry Link will only be captured where both terminals are within Great Britain and where there is a timetabled service available to the public.

3.13 Ferry Node (present in all OS MasterMap Highways Network products)

A Ferry Node is a point feature which identifies where the Ferry Network terminates. They will always be referenced by at least one Ferry Link.

3.14 Ferry Terminal (present in all OS MasterMap Highways Network products)

The road and path networks are connected to the ferry network through the Ferry Terminal feature, which acts as a network connection feature. The Ferry Terminal is a logical connection and therefore no geometry is supplied. In addition to connecting the networks together, the Ferry Terminal feature will also provide the terminal name and the three-letter NaPTAN code used by the Government to identify terminals uniquely.

3.15 Access Restrictions (present in RAMI and RAMI and Speed products)

An Access Restriction is a feature where access to a road or area by vehicles can be legally prohibited. Prohibited access restrictions are indicated by regulatory signs with a red circle (Figure 8) or a no entry sign. In addition, access could be limited for use by particular classes of vehicle; these are indicated by regulatory signs with a blue circle (Figure 9). Access restrictions may also include exemptions to the restriction. The Access Restriction feature type comprises these types of restrictions.

Figure 8. Examples of prohibited access restrictions which will be included in OS MasterMap Highways Network.
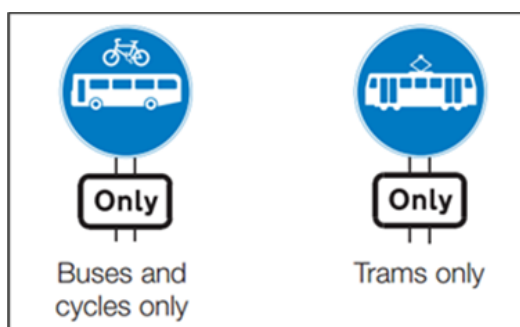
Figure 9. Examples of 'access limited to' access restrictions which will be included in OS MasterMap Highways Network.

3.16   Turn Restrictions (present in RAMI and RAMI and Speed products)

A Turn Restriction is a restriction based upon a vehicle manoeuvre. The types of restriction include a prohibitive driving instruction, a mandatory driving instruction and implicit restrictions. Prohibited instructions are indicated by road signs within a red circle; examples include No U-turns, No Right Turn and No Left Turn (Figure 10). These can include exceptions to the instruction and are typically elements like Except for Buses. Mandatory driving instructions are indicated by road signs within a blue circle (Figure 11) or are painted on the roadway; examples include Turn Right and Ahead Only. Implicit restrictions occur where a turn is not signed as prohibited but would not be a normal manoeuvre, for example, where a road splits around a traffic island or at complex junctions where additional geometry has been captured to reflect the traffic flow. These are not differentiated from actual signed restrictions.

Figure 10.Examples of prohibitive driving instructions.

Figure 11.Examples of mandatory driving instructions.

3.17   Restrictions For Vehicles (present in RAMI and RAMI and Speed products)

Restrictions For Vehicles are restrictions that apply to the physical characteristics of vehicles. These are required to protect structures such as bridges and tunnels from damage, or to restrict/prohibit use by vehicles that exceed dimensions, usually for physical reasons. In addition, Restrictions For Vehicles includes exemption to the restriction when specific use conditions apply (for example, loading and unloading). The restrictions include:

- Maximum Height
- Maximum Width
- Maximum Length
- Maximum Weight

Height, width, length and weight restrictions may be defined using either regulatory signs (Figure 12) or warning signs. By default, the restriction is always provided in the metric unit, and the imperial measure will be provided where it is signed.
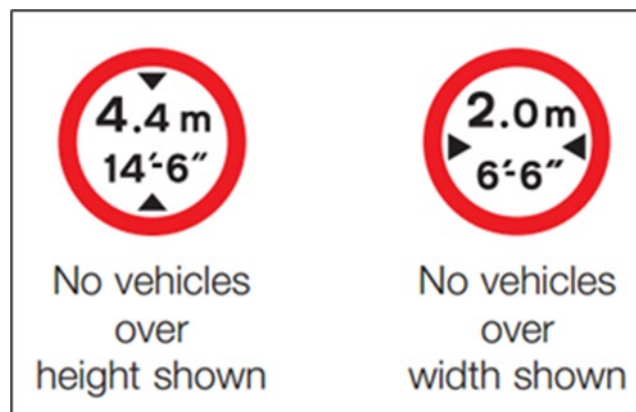
Figure 12.Examples of a regulatory vehicle restrictions.

3.18   Hazards (present in RAMI and RAMI and Speed products)

Hazards are locations which are hazardous and where caution should be taken to ensure safe travel. Hazards are usually signed using a warning sign. Hazards include Fords and Dangerous Bends.

3.19   Structures (present in RAMI and RAMI and Speed products)

Structures are the location of key built features that relate to the highway network. The types of features provided include bridges; barriers which can control, obstruct or prevent passage or access; tunnels, and equipment which would control the flow of traffic.

3.20 Maintenance (present in RAMI, Paths, and RAMI and Speed products)

Maintenance provides information about whether a path is maintained at public expense by a national or local highway authority, by a road authority or is maintained by another responsible organisation (i.e., not maintained at public expense). If a path is prospectively maintainable at public expense, then this is not currently maintained by a road or highway authority, but the responsible organisation has started the process for a highway or road authority to become responsible for the maintenance of the street at public expense.

Note: Maintenance responsibility is not an indication of ownership.

3.21 Reinstatement (present in RAMI, Paths, and RAMI and Speed products)

Reinstatement defines the standard to which the highway must be restored to, following opening due to works in the highway, as defined in the New Roads and Street Works Act Specification for the Reinstatement of Openings in Highways in England and Wales (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/782183/reinstating-road-after-street-works-statutory-code.pdf) and the New Roads and Street Works Act 1991 Specification for the Reinstatement of Openings in Roads in Scotland (https://roadworks.scot/sites/default/files/publications/249/specification-for-the-reinstament-of-openings-in-roads-4th-edition-2019.pdf).

3.22 Highways Dedication (present in RAMI, Paths, and RAMI and Speed products)

Highway Dedications provide an indication of the type of user who has access to that particular section of the Highway. Highway Dedications may reference public rights of way but are not a definitive record of such.

Every section of geometry supplied by a local highway authority will have a type of dedication associated, in line with the Highways Act 1980 (https://www.legislation.gov.uk/ukpga/1980/66/contents) and the Countryside and Rights of Way Act 2000 (https://www.legislation.gov.uk/ukpga/2000/37/contents), which determine the highway user access.

3.23 Special Designations (present in RAMI, Paths, and RAMI and Speed products)

Special Designations are statutory and advisory designations that can be applied to protect a highway when street works are to be undertaken. Special Designations exist to reduce the bureaucracy involved in managing street works, with an emphasis on minimising delay and inconvenience to road users, whilst protecting the integrity of the street and any apparatus on it.

3.24   Average Speed (present in RAMI and Speed products)

Average Speed is the detailed historical speed information collected by in-vehicle telematics devices that collect data for all major roads. The Average Speed information is based on a year's worth of collected data and is given for six distinct times of each day and for both directions of a road link. The Average Speed is provided in kilometres per hour (km/h) for each road link.

3.25   Speed Limits (present in RAMI and Speed products)

The Speed Limits feature identifies the speed limit for each stretch of road in Great Britain and is based on road traffic signs. The speed limit is provided in miles per hour (mph).

4. Product supply

4.1 Supply format

4.1.1 OS MasterMap Highways Network core products

OS MasterMap Highways Network– Roads and OS MasterMap Highways Network– Paths are supplied in three formats: Geography Markup Language (GML 3.2.1), Geopackage and Vector Tiles. All formats are compressed into a regular zip file (.ZIP).

OS MasterMap Highways Network – RAMI is supplied in two formats: Geography Markup Language (GML 3.2.1) and Geopackage. All formats are compressed into a regular zip file (.ZIP).

4.1.2 OS MasterMap Highways Network speed products

OS MasterMap Highways Network with Routing and Asset Management Information and Average Speed is available in comma separated value (CSV) file format only. The CSV file will be supplied with headers. The data is provided zipped as single file (.zip). Data is provided as full supply only and is refreshed annually (in May).

OS MasterMap Highways Network with Routing and Asset Management Information and Speed Limits is available in shapefile format only. The data is provided zipped as single file (.zip). Data is provided as full supply only and is refreshed quarterly (in April, July, October and January).

4.2 Supply media

4.2.1 OS MasterMap Highways Network core products

OS MasterMap Highways Network core products (Roads, Routing and Asset Management Information, and Paths) are available to PSGA, commercial customers and partners through the OS Data Hub (https://osdatahub.os.uk/). The products are available as both full supply and change-only update (COU) and customers can order an area of interest (AOI) or a Managed GB Set. The products are available as a download for all customers, and DVD for customers ordering a Managed GB Set.

4.2.2 OS MasterMap Highways Network speed products

OS MasterMap Highways Network with Routing and Asset Management Information and Average Speed data is supplied as download only. OS MasterMap Highways Network with Routing and Asset Management Information and Speed Limits data is also supplied as download only. Both speed products are available for partners only and can be ordered from the OS Data Hub (https://osdatahub.os.uk/). New OS MasterMap Highways Network with Speed contracts cannot be entered into after 29th March 2023. Supply of product updates to customers with existing contracts continues until March 2024.

4.3   Coverage

All products will cover Great Britain.

4.4   Non-geographic chunks

OS MasterMap Highways Network core products will only be supplied as non-geographic chunks. Non-geographic chunking is a way of dividing up data into chunks that are supplied in separate volumes that have a feature count, as opposed to a given geographic National Grid area. For this reason, it is possible for features from various geographic locations to appear in one volume and for adjacent features to appear in different volumes. Non-geographic chunk volumes are designed to be loaded into spatial databases but can be used in a file format if all chunks are translated or imported into the system at the same time. For information on the volume feature counts for each feature type in OS MasterMap Highways Network, please see Annex A: Volume feature count.

4.5   Product packaging

4.5.1   OS MasterMap Highways Network core products (Roads, Routing and Asset Management Information, and Paths)

When a customer receives an order from the OS Data Hub, the product will be packaged as follows:

Data folder
The data folder will contain the GML, Geopackage or Vector tiles files which make up the ordered product. The data folder will have been compressed to *data.zip* to enable a single download of the product. Once this has been downloaded, the data.zip file will contain all the data files which make up the ordered product and these files will have been compressed using gzip.

Doc folder
For GML, the doc folder will contain a summary.gml file which will contain specific information about the customer order, including:

• The order number
• Query extent polygon(s) of the order
• The order type: Full supply or COU
• For COU orders, the change-since date

The doc folder will have been compressed to *doc.zip* to enable a single download of the associated documents.

The Geopackage and Vector Tiles formats will have the same folder structure but will be available for GB coverage only so will not contain COU files.

Resources folder
The resources folder will contain the product's Feature Validation Data Set (FVDS), and a lookup table to the OS Open Roads product. For further information on these resources, please refer to the Feature validation data set, and OS Open Roads lookup table sections within this document. The folder will have been compressed to *resource.zip* to enable a single download of the resources; within the zipped folder, the contents will have been compressed.

4.5.2 OS MasterMap Highways Network speed products

When a partner receives an order from the OS Data Hub, the product will be packaged as follows:

Data folder
The data folder will contain the CSV (for Average Speed product) or shapefile (for Speed Limits product) which make up the ordered product. The data folder will have been compressed to either *hnavsp_csv_gb.zip* (for Average Speed) or *hnsplm_shp_gb.zip* (for Speed Limits) to enable a single download of the product. Once this has been downloaded, the zip file will contain the corresponding CSV (*Highways_AverageSpeed_GB.csv*) or shapefiles (*Highways_SpeedLimits_GB.shp*) which make up the ordered product, and these files will have been compressed using zip.

Text file
A text file named *Readme.txt* will contain notes on the product supply and release information.

4.6 File naming

4.6.1 OS MasterMap Highways Network core products (Roads, Routing and Asset Management Information, and Paths)

The file naming for the OS MasterMap Highways Network GML will be constructed as *Highways_ProductName_FeatureType_SupplyType_NullorDelete_volumenumber.gml.gz*, where:

- *Highways* identifies that the GML is from the OS MasterMap Highways Network product family.

- *ProductName* is the name of the product that is being supplied, for example, Roads.

- *FeatureType* is the name of the feature type that is being supplied in the GML file, for example, RoadLink.

- *SupplyType* is the type of supply the GML is, for example, Full or COU.

- *NullorDelete* will not be present in any GML file names if the GML forms part of a full supply. If the GML forms part of a COU supply, then *Delete* will identify if the file contains all the features which need removing from the customer holding as a part of the COU application.

- *volumenumber* will be the volume number for the file, which will be three digits, and the first volume will be 001.

Examples of the GML file names
- Highways_Roads_RoadLink_Full_001.gml.gz
- Highways_RoadsAndRAM_AccessRestriction_Full_001.gml.gz
- Highways_Paths_Maintenance_Full_001.gml.gz
- Highways_Roads_RoadNode_COU_001.gml.gz
- Highways_Roads_RoadNode_COU_Delete_001.gml.gz
- Highways_RoadsAndRAM_RoadLink_COU_001.gml.gz
- Highways_RoadsAndRAM_RoadLink_COU_Delete_001.gml.gz
- Highways_Paths_PathLink_COU_001.gml.gz
- Highways_Paths_PathLink_COU_Delete_001.gml.gz

The file naming for the OS MasterMap Highways Network Geopackage will be constructed as OSMasterMapHighwaysNetworkProductName_gb.gpkg

Examples of Geopackage file names:
- OSMasterMapHighwaysNetworkRoad_gb.gpkg
- OSMasterMapHighwaysNetworkPath_gb.gpkg
- OSMasterMapHighwaysNetworkRAMI_gb.gpkg

The file naming for the OS MasterMap Highways Network Vector Tiles will be constructed as OSMasterMapHighwaysNetworkProductName_gb.mbtiles

Examples of the Vector Tiles file names:
- OSMasterMapHighwaysNetworkRoad_gb.mbtiles
- OSMasterMapHighwaysNetworkPath_gb.mbtiles
-

4.6.2   OS MasterMap Highways Network speed products

OS MasterMap Highways Network with Routing and Asset Management Information and Average Speed is supplied within a zip file with the following name: *hnavsp_csv_gb.zip*. Within the zip file, you will find the CSV file which will contain all records and will have the following name: *Highways_AverageSpeed_GB.csv*.

OS MasterMap Highways Network with Routing and Asset Management Information and Speed Limits is supplied within a zip file with the following name: *hnsplm_shp_gb.zip*. Within the zip file, you will find the shapefile which will contain all records and will have the following named file extensions:

- Highways_SpeedLimits_GB.shp
- Highways_SpeedLimits_GB.prj
- Highways_SpeedLimits_GB.qpj
- Highways_SpeedLimits_GB.dbf
- Highways_SpeedLimits_GB.shx

4.7   Feature validation data set

A feature validation data set (FVDS) reports on all the data it expects to find in the customer's holding after the application of the supply. It does not identify what is contained in the supply if the order is not full supply. This enables a customer to validate that the data holding contains the correct set of features after loading the data with which it was supplied. All orders of the OS MasterMap Highways Network products will be supplied with a FVDS.

A FVDS is divided into files on a non-geographic basis, and each FVDS will contain up to 4 million rows in a single volume. Where a file will exceed 4 million rows, a new FVDS volume will be created. The FVDS is a comma separated value (.csv) file that provides the ID, version date and feature type of every feature that should exist in the current data holding; the fields are separated by a comma. Each row will be terminated by Carriage Return / Line Feed, and where a field has no value in a record, two commas will be placed together in the record (one for the end of the previous field and one for the end of the null field). The FVDS will not contain any header information, but the following table identifies the different columns within the file. Each file is compressed using gzip.

Feature validation data set
ID
Definition: The ID (gml:id) of the OS MasterMap Highways Network feature.
Version Date
Definition: The 'beginLifespanVersion' attribute of the feature. This is the date when this feature came into existence, and it will be formatted as follows: YYYY-MM-DD. For example, 2016-06-12.
Feature Type
Definition: A textual description of the feature type that the record refers to.

4.8 OS Open Roads lookup table

OS Open Roads is part of Ordnance Survey's open data portfolio and is a structured road network which has been generalised to 1:15 000 scale. The OS Open Roads lookup table provides the ID of the OS MasterMap Highways Network RoadLink feature and the ID of the feature which represents the same feature in the OS Open Roads product which could be either a RoadLink or a RoadNode. The lookup table will enable a customer to share information they have calculated and pinned to the OS MasterMap Highways Network easily through the OS Open Roads product. Not all RoadLink IDs from OS MasterMap Highways Network are included in the lookup table, particularly where the RoadLinks are shorter than 20m.

The lookup table has been provided as a comma separated value (.csv) file so the attributes are separated by a comma. Each row will be terminated by Carriage Return / Line Feed, and where an attribute has no value in a record, two commas will be placed together in the record (one for the end of the previous attribute and one for the end of the null attribute). The file will be supplied with headers, and the information is detailed in the following table.

The file will be supplied with all orders of OS MasterMap Highways Network – Roads or OS MasterMap Highways Network – Routing and Asset Management Information and will be a national set, including with area of interest (AOI) orders. The lookup table is updated every six months, which is aligned to when OS Open Roads is released. During this period, some of the OS MasterMap Highways Network RoadLink IDs could change, be removed from the product or have new IDs inserted which will not be represented in the lookup table because the OS Open Roads product has not been updated to reflect this change. The version of OS MasterMap Highways Network with which the OS Open Roads lookup table is aligned can be identified in the file name.

The file is named *OSOpenRoadLookUpTable_YYYY_MM.csv*, where YYYY is the four-digit year and MM is the two-digit month (for example, *OSOpenRoadLookUpTable_2017_09.csv*).

OS Open Roads lookup table
Constraint: • When OSOpenRoads_RoadLinkIdentifier is null, OSOpenRoads_RoadNodeIdentifier cannot be null. • When OSOpenRoads_RoadNodeIdentifier is null, OSOpenRoads_RoadLinkIdentifier cannot be null.
Attribute: RoadLink_ID

OS Open Roads lookup table	
Definition: The ID of the OS MasterMap Highways Network RoadLink feature being represented in OS Open Roads.	
Multiplicity: [1]	Size: 20
Attribute: OSOpenRoads_RoadLinkIdentifier	
Definition: The RoadLink identifier in OS Open Roads that the Highways feature has been generalised to.	
Multiplicity: [0..1]	Size: 38
Attribute: OSOpenRoads_RoadNodeIdentifier	
Definition: The RoadNode identifier in OS Open Roads which the Highways feature has been generalised to (for example, a collapsed roundabout).	
Multiplicity: [0..1]	Size: 38

Annex A: Volume feature count

The OS MasterMap Highways Network products are only being supplied as non-geographic chunks, so the data will be supplied in volumes based on a feature count. The following table identifies the volume feature count used for each volume per feature type (maximum number of features per GML file):

Feature type	Volume feature count
Access Restrictions	66 000
Connecting Link	118 000
Connecting Node	138 000
Ferry Link	108 000
Ferry Node	126 000
Ferry Terminal	136 000
Hazards	94 000
Maintenance	82 000
Path	138 000
Path Link	72 000
Path Node	126 000
Reinstatement	120 000
Restrictions For Vehicles	74 000
Road	88 000
Road Link	46 000
Road Node	120 000
Special Designations	60 000
Street	36 000
Structures	104 000
Turn Restrictions	114 000