OS Open Roads

User Guide

Contents

Preface

This user guide (hereafter referred to as the guide) is designed to provide an overview of OS Open Roads (hereafter referred to as the product) and it gives guidelines and advice on how a customer might derive the maximum benefit from the product. It assumes a general knowledge of geographic information. If you find an error or omission in this guide, or otherwise wish to make a comment or suggestion as to how we can improve the guide, please contact us at the address shown below under contact details or complete the product and service performance report form at annexe A and return it to us.

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Ordnance Survey
Adanac Drive
SOUTHAMPTON
SO16 0AS

General enquiries (calls charged at local rate): +44 (0)3456 050505

Dedicated Welsh Language HelpLine: 03456 050504

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The documentation is supplied in portable document format (PDF) only. Free Adobe® Reader® software, which displays the guide, incorporates search and zoom facilities and allows you to navigate within. Hyperlinks are used to navigate between associated parts of the guide and to relevant Internet resources by clicking on the blue hyperlinks and the table of contents.
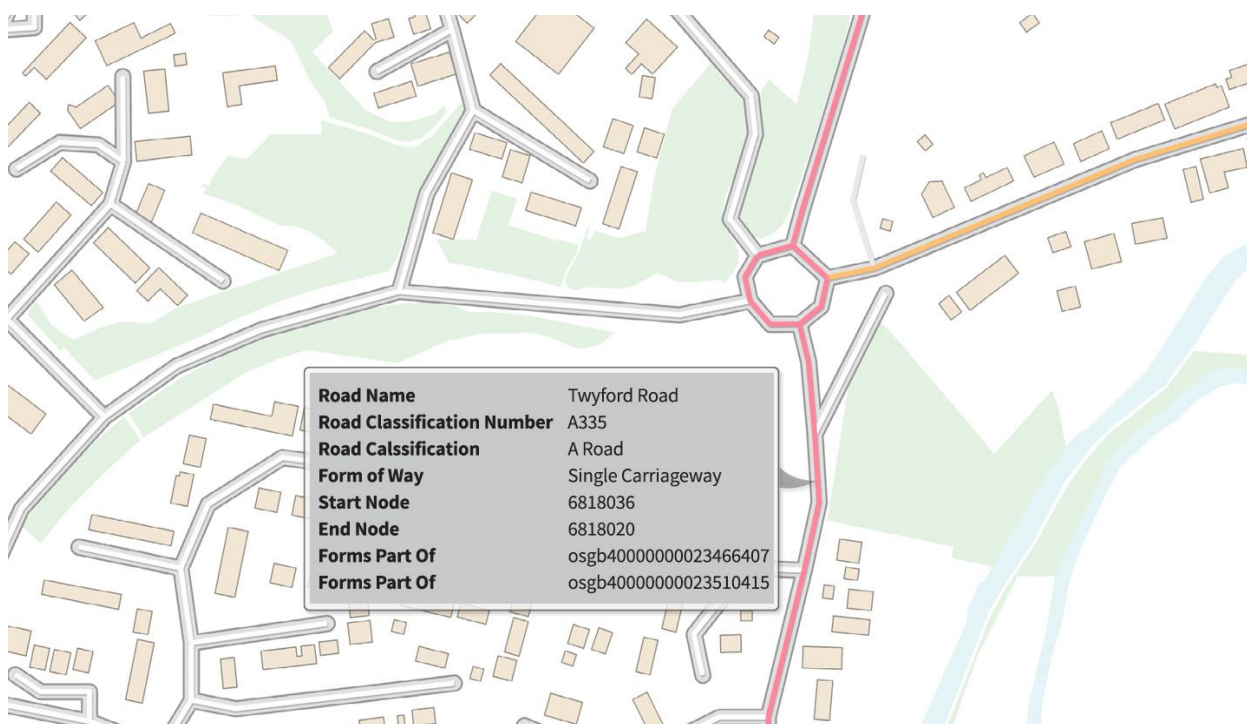
Chapter 1   Introduction

Overview

OS Open Roads is a digital representation of Great Britain's Roads. The links represent an approximate central alignment of the road carriageway and will include roads classified by the National or Local Highway authority (for example, A Roads) and unclassified roads which make up Great Britain's road network. Attributes identify the roads that make up the Primary Route Network (PRN) and the Strategic Route Network (SRN). The SRN is made up of nationally significant roads used for the distribution of goods and services, and a network for the travelling public. They are known as Trunk Roads. Whilst the PRN is made up of roads used for transport on a regional or county level and include all roads which make up the SRN.

OS Open Roads is a generalised product which has been automatically simplified from Ordnance Survey large scale data. Generalisation is the process of reducing the scale and complexity of the data whilst maintaining the important elements and characteristics of the features. The appropriate product scale is 1:25 000, with a recommended viewing scale range of 1:15 000 to 1:30 000.

Key Features

The key features of the OS Open Roads products are:

- Comprehensive coverage of the road network for Great Britain

- A topologically connected link and node network.

- The identification of roads that form a part of the Strategic Road Network

- The ability to reference between the OS Open Roads Product and OS MasterMap Highways Network.

Road Name	Twyford Road
Road Classification Number	A335
Road Calssification	A Road
Form of Way	Single Carriageway
Start Node	6818036
End Node	6818020
Forms Part Of	osgb40000000023466407
Forms Part Of	osgb40000000023510415

Applications

OS Open Roads supports a wide range of customer applications that use geographic information. The product can be used alone or combined with other Ordnance Survey products such as Terrain® 50 or VectorMap® District. The OS Open Roads product may be used for applications such as but not limited to the examples below:

- Assign information to the road network for both personal and business use.

- High level analytical queries, for example, how many kilometres (kms) of road are there in Great Britain, an individual country or

- Simple drive time analysis, for example, what is within a 25 minute drive of any given location?

- Identifying community problems and reporting back to a relevant authority.

Detailed turn by turn routing is not supported in OS Open Roads, this requires the additional detail and complexity available in the OS MasterMap Highways Network.

Definitive details of road maintenance responsibility is not supported in OS Open Roads, this requires the additional detail held in the OS MasterMap Highways Network.

Chapter 2   OS Open Roads

Generalisation

The detail within OS Open Roads has been automatically generalised from Ordnance Survey large scale data. Generalisation is the process of reducing the scale and complexity of data whilst maintaining the important elements and characteristics of the location.

OS Open Roads generalisation comprises the following processes:

- **Selection/omission**

Some features that appear at higher resolutions are removed at the lower resolutions For example, cul-de-sacs less than specified length are not supplied.

- **Simplification**

Simplification can take a number of forms in OS Open Roads. Examples include reducing the number of vertices that represent a curve, and representing a roundabout below a certain size with a RoadNode that is specifically attributed as a roundabout.

Feature types

OS Open Roads features are classified into three feature types. Each feature type has associated attribution and further detail of this can be found in the Technical Specification.

The following section gives a description of each feature type.

RoadLink

A RoadLink feature represents the generalised alignment of the road carriageway. It can represent part or all of a road. Links end where there is a change in attribution or at a junction. Where a RoadLink crosses over another RoadLink, at a bridge for example, neither link will be split. Each end of a RoadLink's geometry is coincident with a RoadNode.

RoadNode

A RoadNode feature represents a junction, roundabout, change in attribution, or the end of a road. The geometry of a RoadNode is coincident with the end of related links.

MotorwayJunction

The MotorwayJunction feature is a point feature representing the generalised location of a motorway junction. It provides information on the motorway number and the junction number, for example M42 J2. Where two motorway junctions meet, for example M3 J2 and M25 J12, there will be two MotorwayJunction features, one to represent each junction.

Co-ordinate reference system

The vector product formats (GeoPackage and Shapefile) enable the use of the coordinate reference system British National Grid (BNG).

The 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 GML data, this is represented by reference to its entry in the EPSG registry, as
http://www.opengis.net/def/crs/EPSG/0/27700

Currency

OS Open Roads has been derived from Ordnance Survey large-scale data. The product will be refreshed from Ordnance Survey large scale data every six months.

Completeness

Quality control procedures are undertaken at all stages of production to ensure that the data are accurate, complete and conform to the specification.

These quality control checks include automated data testing against the product specification and visual checks by operators.

Precision

OS Open Roads features are published with geometry given to a precision of 2 decimal places.

Chapter 3   Product Supply

Supply Format

OS Open Roads is available in the following formats:

- Data: GML v3.2. zipped as a single file using gzip.
- Vector: ESRI® Shapefile dataset zipped using gzip
- Vector: GeoPackage file zipped using gzip.

Supply Media

OS Open Roads is supplied as an online download and can be ordered from the Ordnance Survey OS OpenData™ website. This allows you to order the data in the format and media of your choice.

Data can be ordered and downloaded from the following link:

https://www.ordnancesurvey.co.uk/opendatadownload/products.html

Coverage and File Sizes

GML

A zipped file comprising a national set.

The zipped file will contain 52 GML files which will contain up to three feature types.

File size will range from 19KB– 650MB.

The data is not encrypted.

ESRI Shapefile

A zipped file comprising of a national set.

The product has been split into 100km^2 (figure 1).

The file will contain up to 156 Shapefiles.

Each Shapefile holds a single feature type per 100km^2

File size will be approximately 2.4 GB.

The data is not encrypted.

GeoPackage

A zipped file comprising of a single national GeoPackage file.

The single GeoPackage file will contain three individual layers for each feature type, all with national coverage.

File size will be approximately 830 MB.

The data is not encrypted.

Product Chunking

To ensure the file sizes are manageable, each file has been supplied as a 100 by 100km tiles (figure 1). These files have not been cut at tile edge of the zones. Consequently, features will extend across the edge of the tile edges and therefore will be supplied in more than one file. Users will need to remove the duplicate features once the data has been translated. Each feature has a unique identifier, id, for this purpose.

Ordnance Survey divides Great Britain into squares 100 km by 100 km. Each of these squares has a unique two-letter reference, for example, TG in the diagram below.

Figure 1: Illustrates the 100km by 100km tiles which has been used to chunk up OS Open Roads GML

Annexe A   Product and service performance report form

Ordnance Survey welcomes feedback from its customers about OS Open Roads.

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

Your name: ....

Organisation: ....

Address: ....

....

....

Postcode: ....

Phone: ....

Fax: ....

Email: ....

Quotation or order reference: ....

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

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

OS Open Roads.Product Manager, Ordnance Survey, Adanac Drive, SOUTHAMPTON, SO16 0AS.

If you wish to return it by fax, please dial 023 8005 6159. Alternatively, if you wish to get in touch by email, please contact Customer Services: 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.

OS Open Roads

Technical specification

Contents

Preface

Purpose of this specification and disclaimer

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Chapter 1   Introduction

OS Open Roads is a topologically connected link and node road network of Great Britain. The links represent an approximate central alignment of the road carriageway and will include all classified roads and unclassified roads which make up Great Britain's road network.

OS Open Roads is a generalised product which has been automatically generalised from Ordnance Survey large scale data. Generalisation is the process of reducing the scale and complexity of the data whilst maintaining the important elements and characteristics of the features. The appropriate product scale is 1:25 000, with a recommended viewing scale range of 1:15 000 to 1:30 000.

Available Formats

OS Open Roads will be supplied in the following open source formats:

- Vector data in Geography Markup Language (GML) 3.2 Simple Features Profile level 1.

- A national vector dataset in ESRI® Shapefile(.shp)

- A national vector GeoPackage file(.gpkg).

Identifiers

Each feature will be given a unique identifier. The GML product will have the property *gml:identifier* which will hold the features unique identifier. The ESRI Shapefile will have the property *identifier* which will hold each features unique identifier. The GeoPackage file will have the property *id* which will hold each features unique identifier. The identifier will not be persistent between product versions and therefore there will be no change history information for a feature.

Adherence to Standards

OS Open Roads is based on the INSPIRE Transport Networks Road application schema, which itself is based on the ISO TC211 family of open standards.

Extending INSPIRE Specification

OS Open Roads extends the INSPIRE specification with an additional feature type MotorwayJunction. The RoadLink feature type extends the INSPIRE RoadLink feature type with a number of additional properties.

UML Diagram and Table Conventions

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

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

In the UML diagram classes from the INSPIRE Data Specifications are coloured grey, whereas classes in the Ordnance Survey product specification are orange. All code lists are coloured blue and enumerations are green, which can be seen in figure 1. The tables which follow in this Technical Specification use orange for a feature type, blue for a code list and green for enumerations.
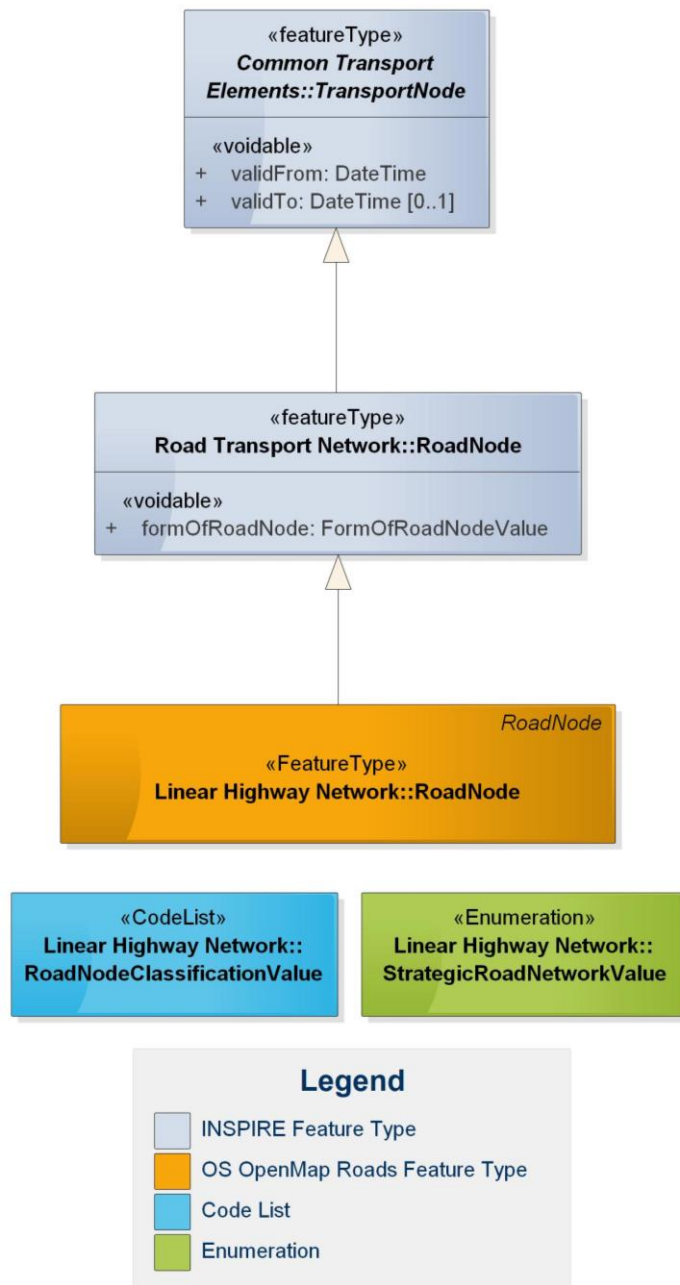
Figure 1: A UML diagram using the colour conventions specified in this Technical Specification.

Lexical Conventions

•   Class names are conceptually meaningful names (singular noun) in UpperCamelCase

•   Class names end in "Value" where the class is assigned the stereotype <<CodeList>> or <<Enumeration>>

•   Property names (attributes and associations) are in lowerCamelCase

Stereotypes

The following stereotypes are used on UML elements:

Stereotype	UML Element	Description
Application Schema	Package	Parent package containing sub-packages and elements that comprise part of the modular specification
FeatureType	Class	A spatial object type. [ISO 19136].

Stereotype	UML Element	Description
No stereotype	Class	A non-spatial object type. Examples include: document or organisation.
Type	Class	A structured data type with identity
Enumeration	Class	A fixed controlled set of values for a free text data type.
CodeList	Class	A controlled set of values for a free text data type that may be extended.
Voidable	Property	A property that is required but is either not currently captured (unknown) or is partially populated (unpopulated).
LifecycleInfo	Property	Property considered part of the life cycle information.

Relationships and Associations

There are 4 key types of relationship that can be defined between classes; only the following two exist in OS Open Roads (figure 2):

- **Generalisation/Specialisation:** this is used to denote either:
  - o An extension relationship. The target class represents the same real world phenomenon so it shall have the same name as the class it is extending. It simply includes additional properties.
  - o A sub typing relationship. The target class defined a specialised sub-type of parent feature. For example, a TransportNetwork is a sub-type of a generic Network class.
- **Directed Association:** used to denote relationships between features. These relationships are by reference only (they are implemented by a property whose value is the identifier of the related feature or object). The directed end shall always be assigned name which describes the relationship and a multiplicity.
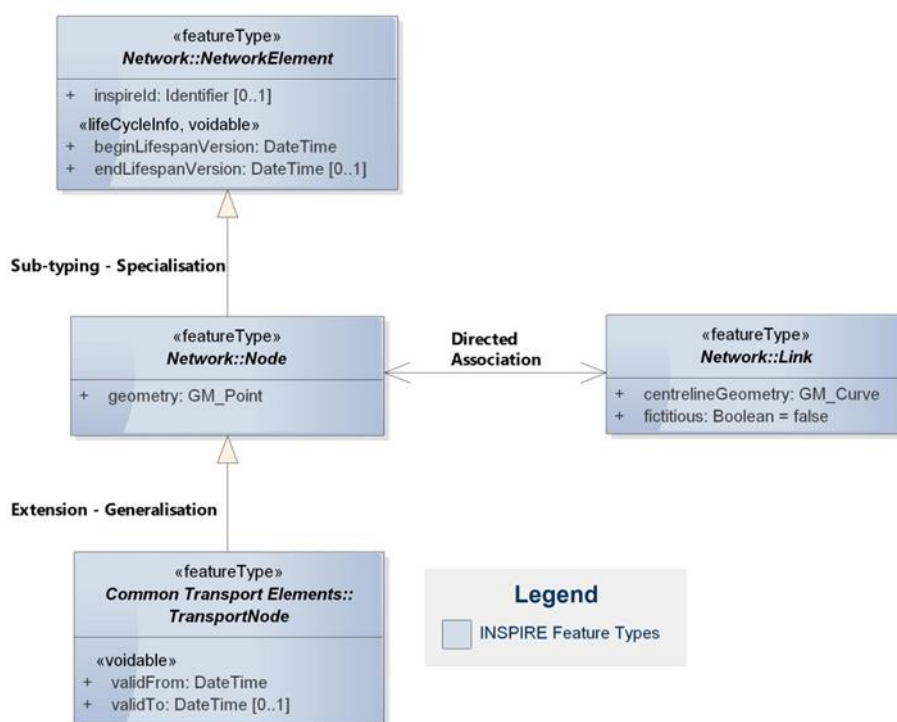

Figure 2: A UML diagram illustrating the key relationships in OS Open Roads

Chapter 2　OS Open Roads Structure

Product Structure

OS Open Roads consists of three core features which are:

1. **RoadLink** – A feature which represents all or part of a road.

2. **RoadNode** – A feature which represents the end of the network, a change in attribution or a junction.

3. **MotorwayJunction** – A feature which provides junction information along roads classified as a Motorway.

Features are provided as a FeatureCollection.

This product has been built with the INSPIRE Transport Networks Data Specification as a basis which results in the product inheriting attribution from INSPIRE. The overview of the product structure can be found in figure 3 which highlights the inherited INSPIRE feature types and attribution. Properties of the INSPIRE specification, which are voidable, have not been included in figure 3 or the following tables. For information on the INSPIRE properties which are not included in this product, please see the INSPIRE Transport Networks Road specification.

The GML naming of attributes is used in the main text of this guide; the naming of the attributes in shape files will be different due to the limitations of the Shapefile format, whereas the naming of attributes in GeoPackage files will be very similar to GML as there are no length character limitations of the GeoPackage format.

A mapping between the GML attributes and Shapefile attributes can be found in chapter 4.1. . A mapping between the GML attributes and GeoPackage attributes can be found in chapter 5.1.
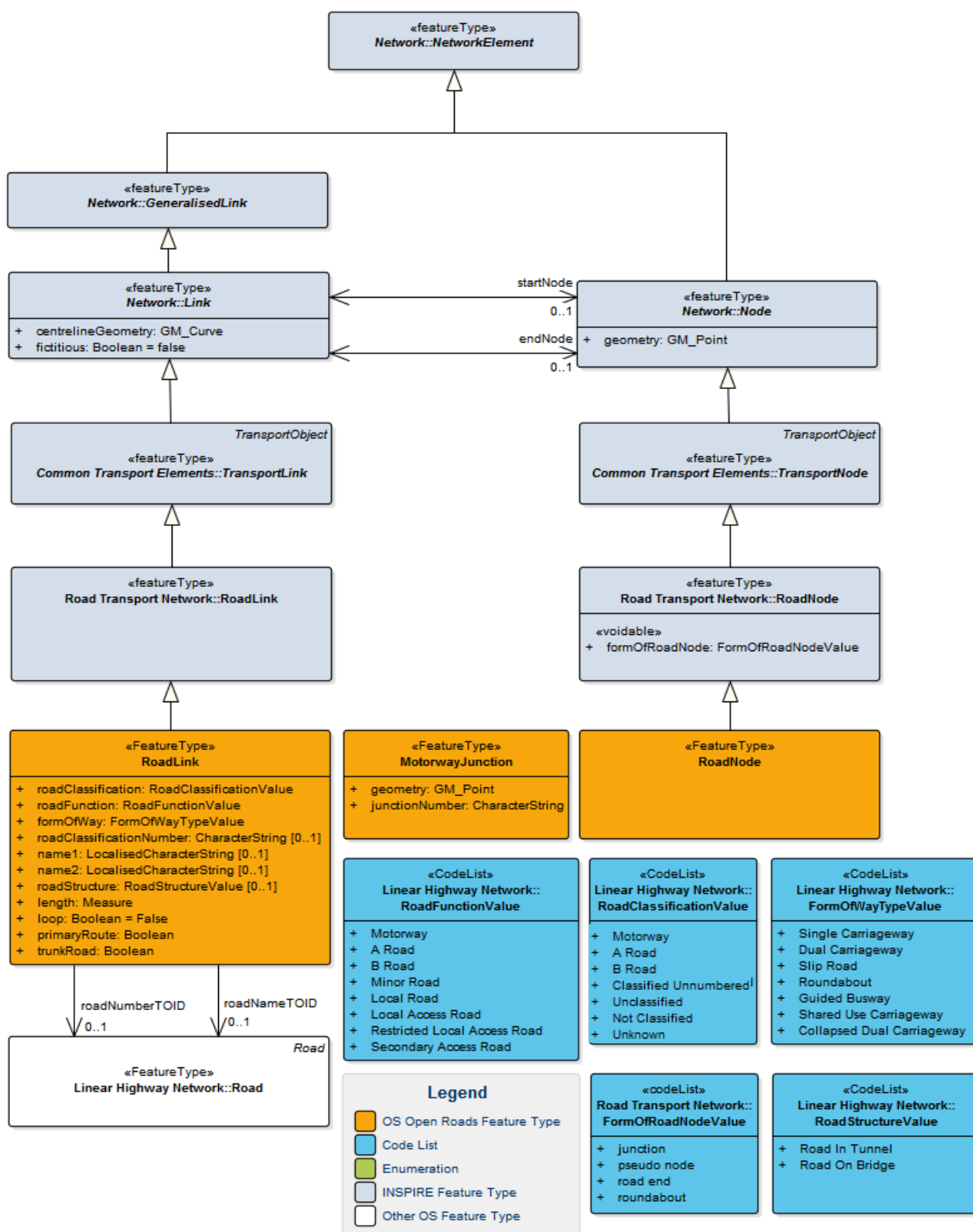
Figure 3: A UML diagram illustrating the data structure of OS Open Roads and how it has been extended from INSPIRE

Features

This section describes the three features available in the OS Open Roads product, giving the following information about each attribute and association:

- **Name and Definition**

The name of the attribute and what it is describing

- **Attribute Type**

The nature of the attribute, for example a numeric value or a logical indicator.

- **Multiplicity**

Describes how many times this element is expected to be populated in the data. An attribute may be optional, mandatory and may have multiple occurrences. For example

- o '1' there must be a value
- o '2' there must be two values
- o 'n' there may be one or more values
- o '0' population is optional.

These values may be used in combination.

- **Association**

An association identifies the relationship between features. These relationships are by reference only and the value will be the identifier of the referenced feature.

RoadLink

The RoadLink feature is a generalised representation of the road network alignment.

These features are split in the following circumstances:

- where the classification or a name changes
- where the name changes (or ceases to apply)
- where there is a junction or roundabout at the same physical level

«FeatureType» RoadLink		
Definition: A feature which represents a part or all of a named or numbered road.		
Attribute: id		
Definition: Unique identifier, for RoadLink, this is a GUID which is not persistent.		
Type: CharacterString	**Length**: 38	**Multiplicity**: [1]
Attribute: centrelineGeometry		
Definition: The geometry that represents the centreline of the link.		
Type: GM_Curve	**Multiplicity**: [1]	
Attribute: fictitious		
Definition: Indicator that the centreline geometry of the link is a straight line with no intermediate control points – unless the straight line represents the geography in the resolution of the data set appropriately.		
Type: Boolean	**Length**: 5	**Multiplicity**: [1]
Attribute: roadClassification		
Definition: Road classification uses a common system of route numbering, which is centrally administered for		

England and Wales by the Department for Transport. In all other respects roads classification is a devolved matter outside of England.

Type: RoadClassificationValue	**Length**: 22	**Multiplicity**: [1]
Attribute: roadFunction		
Definition: A alternative classification of the Road based on its usage.		
Type: RoadFunctionValue	**Length**:30	**Multiplicity**: [1]
Attribute: formOfWay		
Definition: A description of the RoadLink based on its form or function.		
Type: FormOfWayValue	**Length**: 50	**Multiplicity**: [1]
Attribute: roadClassificationNumber		
Definition: The official road number assigned by the appropriate authority. *Note*: This includes at least one letter. For example 'A329(M)'		
Type: CharacterString	**Length**: 10	**Multiplicity**: [0..1]
Attribute: name1		
Definition: The name of the RoadLink. *Note 1: Where a road has a name in more than one language, this attribute will be the Welsh or Gaelic version.* *Note 2: Where a feature has more than one name, the language of each name is provided as a 3 digit ISO 639-2 code ('eng', 'cym', 'gla').*		
Type: LocalisedCharacterString	**Length**: 150	**Multiplicity**: [0..1]
Attribute: name2		
Definition: An alternative name of the RoadLink. *Note 1: Where a road has a name in more than one language, this attribute will be the English version.* *Note 2: where a feature has more than one name, the language of each name is provided as a 3 digit ISO 639-2 code ('eng', 'cym', 'gla').*		
Type: LocalisedCharacterString	**Length**: 150	**Multiplicity**: [0..1]
Attribute: roadStructure		
Definition: Identifies if this section of road passes through or over a physical structure such as a tunnel or bridge.		
Type: RoadStructureValue	**Length**: 14	**Multiplicity**: [0..1]
Attribute: length		
Definition: The calculated length of the RoadLink in metres.		
Type: Measure	**Length**: 10	**Multiplicity**: [1]
Attribute: loop		
Definition: Indicates if the RoadLink feature connects back on itself by having the same start and end roadNode.		
Type: Boolean	**Length**: 5	**Multiplicity**: [1]
Attribute: primaryRoute		
Definition: States if the RoadLink forms part of the Primary Route network		
Type: Boolean	**Length**: 5	**Multiplicity**: [1]
Attribute: trunkRoad		
Definition: States if the RoadLink forms part of the Trunk Road network		

Type: Boolean	Length: 5	Multiplicity: [1]
Association: startNode		
Definition: The node coincident with the first vertex of the geometry attribute.		
Multiplicity: 1	**Length**: 38	
Association: endNode		
Definition: The node coincident with the last vertex of the geometry attribute.		
Multiplicity: 1	**Length**: 38	
Association: roadNumberTOID		
Definition: Identifier of the Road feature which holds the information about the road classification number the RoadLink forms part of in the OS MasterMap Highways Network product.		
Multiplicity: 0..1	**Length**: 20	
Association: roadNameTOID		
Definition: Identifier of the Road feature which holds the information about the road name the RoadLink forms part of in the OS MasterMap Highways Network product.		
Multiplicity: 0..1	**Length**: 20	

RoadNode

RoadNode features are added at the start and end of every RoadLink feature. Where roads connect at the same level a single RoadNode feature is captured.

The following table identifies the attribution the RoadNode feature can carry and their descriptions, including the data type and multiplicity.

«FeatureType» RoadNode		
Definition: A point representing either the start/end of a highway or connectivity between two or more RoadLink features.		
Attribute: id		
Definition: Unique identifier, for RoadNode, this is a GUID which is not persistent.		
Type: CharacterString	**Length**: 38	**Multiplicity**: [1]
Attribute: formOfRoadNode **«voidable»**		
Definition: Description of the function of a road node in the road transport network.		
Type:FormOfRoadNodeValue	**Length**: 20	**Multiplicity**: [1]
Attribute: geometry		
Definition: The location of the node.		
Type: GM_Point	**Multiplicity**: [1]	

MotorwayJunction

Motorway junctions are represented by a MotorwayJunction feature.

The following table identifies the attribution the MotorwayJunction feature can carry and their descriptions, including the data type and multiplicity

«FeatureType» MotorwayJunction		
Definition: A feature that represents the numbered motorway junction.		
Attribute: id		
Definition: Unique identifier, for MotorwayJunction, this is a GUID which is not persistent.		
Type: CharacterString	**Length**: 38	**Multiplicity**: [1]
Attribute: geometry		
Definition: The location of the node.		
Type: GM_Point	**Multiplicity**: [1]	
Attribute: junctionNumber		
Definition: The Motorway junction number designated by the National Authority (DfT) *Note: For Example M3 J9* *Note 2: Where two Motorway Junctions meet there will be two features, for example M3 J2 and M25 J12*		
Type: CharacterString	**Length**: 12	**Multiplicity**: [1]

Code lists and Enumerations

A code list is a controlled set of values for a free text data type which can be extended. This section identifies the code lists used within *OS Open Roads* and describes their values.

RoadClassificationValue

Roads classification exists to ensure that there is a feasible, logical road network throughout the country. Road classifications should be set to take into account the traffic management goals and road categorisation approach of the Local Highway Authority (LHA).

The RoadLink feature is attributed with a "RoadClassification" with a data type of "RoadClassificationValue". The table below describes the codes which will be used to populate this field and the description for each code.

Code List: RoadClassificationValue	
Code	**Description**
Motorway	A multi-carriageway public road connecting important cities, classified by the DfT A Motorway does not form part of the official Road Classification scheme as it is a Special Road. However, it has been included to allow them to be classified.
A Road	A major road intended to provide large-scale transport links within or between areas.
B Road	A road intended to connect different areas, and to feed traffic between A roads and smaller roads on the network.
Classified Unnumbered	Smaller roads intended to connect together unclassified roads with A and B roads, and often linking a housing estate or a village to the rest of the network. NOTE 1: these were 'minor roads' in ITN and sometimes known unofficially as C roads. NOTE 2: A Street may be assigned a local classification number by the Local Highways Authority.

Unclassified	Roads intended for local traffic. NOTE: The vast majority (60%) of roads in the UK fall within this category. NOTE 2: These may be designed Unofficial local road classifications. For example: D, E, F and G roads.
Not Classified	Roads that have not been assigned a road classification at national or local level by a designation authority.
Unknown	The classification of the road is unknown because the RoadLink is not a Motorway, A or B road and the RoadLink has not been matched to any other road classification at national or local level.

RoadFunctionValue

The RoadLink feature is attributed with a "roadFunction" with a data type of "RoadFunctionValue". The table below describes the codes which will be used to populate this field and the description for each code.

Code List: RoadFunctionValue	
Code	**Description**
Motorway	A multi-carriageway public road connecting important cities.
A Road	A major road intended to provide large-scale transport links within or between areas.
B Road	A road intended to connect different areas, and to feed traffic between A roads and smaller roads on the network.
Minor Road	A public road that provides interconnectivity to higher classified roads or leads to a point of interest.
Local Road	A public road that provides access to land and/or houses, usually named with addresses. Generally, not intended for through traffic.
Local Access Road	A road intended for the start or end of a journey, not intended for through traffic but will be openly accessible.
Restricted Local Access Road	A road intended for the start or end of a journey, not intended for through traffic and will have a restriction on who can use it.
Secondary Access Road	A road that provides alternate/secondary access to property or land not intended for through traffic.

FormOfWayValue

The RoadLink feature is attributed with a "FormOfWay" with a data type of "FormOfWayValue". The table below describes the codes which will be used to populate this field and the description for each code.

Code List: FormOfWayValue	
Code	**Description**
Single Carriageway	A road consisting of one carriageway with traffic in one or both directions. There may be more than one lane in any particular direction
Dual Carriageway	A road consisting of two separate carriageways with separate flow directions. The carriageways are partitioned by physical features, such as a barrier and/or verge.
Slip Road	A link that provides exit from or entry to another link.

Roundabout	A method of controlling traffic flow by allowing vehicles from a particular direction priority.
Collapsed Dual Carriageway	The geometry of the dual carriageway has been collapsed where they are running parallel and is less than a defined distance apart, resulting in a single line representing both carriageways of a dual carriageway.
Guided Busway	A specially constructed or modified route for passenger road vehicles that have been built or adapted to be steered by external means. Typically, along guided busways, a raised kerb acts upon small wheels protruding from the sides of the modified vehicle. This classification is only for the specific cases where buses run along specifically designed tracks or channels that remove the need for steering.
Shared Use Carriageway	Roads that have been altered for use principally by pedestrians but may provide some access for certain types of vehicle.

RoadStructureValue

The RoadLink feature is attributed with a "structure" with a data type of "RoadStructureValue". The table below describes the codes which will be used to populate this field and the description for each code.

Code List: RoadStructureValue	
Values for structure	
Code	**Description**
Road In Tunnel	A road which passes underground or water
Road On Bridge	A road that passes over a river, railway, road or ravine on a structure *Note: For the first release this value will not be populated.*

FormOfRoadNodeValues

The RoadNode feature is attributed with a "RoadNodeCategory" with a data type of "TransportNodeTypeValue". The below table describes the codes which will be used to populate this field and the description for each code.

This code list has been inherited from INSPIRE and is not extendable.

Code List: FormOfRoadNodeValue	
Functions of road nodes within Euroroads.	
http://inspire.ec.europa.eu/codelist/FormOfRoadNodeValue	
Code	**Description**
junction	Three or more road links intersect at the road node.
pseudo node	Exactly two road links connect to the road node.
road end	Only one road link connects to the road node. It signifies the end of a road.
roundabout	The road node represents or is a part of a roundabout.

Chapter 3   GML Overview

GML Overview

This chapter describes the GML format for *OS Open Roads*. It is recommended that you read this in conjunction with the Open Geospatial Consortium (OGC) document, *Geography Markup Language v3.2.1.*

The XML specifications that GML is based on are available from the World Wide Web Consortium (W3C®) website: http://www.w3.org.

Information about Unicode and UTF-8, the character encoding we have chosen, is available on the Unicode Consortium website: http://www.unicode.org/.

Schema overview and location

XML schemas are used to define and validate the format and content of the GML. The GML v3.2 specification provides a set of schemas that define the GML feature constructs and geometric types. These are designed to be used as a basis for building application-specific schemas, which define the data content.

The Ordnance Survey application schema **OSOpenRoads.xsd**, which is referenced by the data, is available on our website. It imports the INSPIRE transport network road application schema, which in turn imports the GML 3.2 schemas. These in turn import schemas produced by the W3C, which are available from the W3C website at http://www.w3.org/XML/1998/namespace.html.

All these schemas are defined in XML Schema Definition language (XSD), as defined by the W3C.

The 'OS Open Roads' schema document defines the http://namespaces.os.uk/Open/Roads/1.0 Namespace; this is defined in the XSD at https://www.ordnancesurvey.co.uk/xml/open/roads/1.0/OSOpenRoads.xsd.

The application schema uses the following XML namespaces, for which definitions are available as given here:

Prefix	Namespace identifier	Definition available at
gml	http://www.opengis.net/gml	http://schemas.opengis.net/gml/3.2.1/gml.xsd
xsi	http://www.w3.org/2001/XMLSchema–instance	Built in to XML http://www.w3.org/TR/xmlschema-1/
xlink	http://www.w3.org/1999/xlink	http://www.w3.org/1999/xlink.xsd
xml	http://www.w3.org/XML/1998/namespace	http://www.w3.org/2001/xml.xsd
net	urn:x-inspire:specification:gmlas:Network:3.2	http://inspire.ec.europa.eu/schemas/net/4.0/Network.xsd
tn	http://inspire.ec.europa.eu/schemas/net/3.0	http://inspire.ec.europa.eu/schemas/net/3.0/Network.xsd
tn-ro	urn:x-inspire:specification:gmlas:RoadTransportNetwork:3.0	http://inspire.ec.europa.eu/schemas/tn-ro/3.0/RoadTransportNetwork.xsd
os	http://namespaces.os.uk/product/1.0	https://www.ordnancesurvey.co.uk/xml/schema/product/1.0/OSProduct.xsd
highway	http://namespaces.os.uk/mastermap/highwayNetwork/1.0	https://www.ordnancesurvey.co.uk/xml/schema/highwaysnetwork/v1/LinearHighwayNetwork.xsd
road	http://namespaces.os.uk/Open/Roads/1.0	https://www.ordnancesurvey.co.uk/xml/open/roads/1.0/OSOpenRoads.xsd.

Simple Features Profile – Level 1

GML is designed to support a wide variety of capabilities, ranging from simple contextual mapping, to products that include complex geometric property types or even spatial and temporal topology. The Simple Features Profile of GML 3.2 defines a restricted subset of GML, allowing scope for greater interoperability.

This product conforms to Simple Features Profile – Level 1.

Chapter 4   ESRI Shapefile

OS Open Roads is supplied as an ESRI Shape file. An ESRI Shape file is an open file format to store geometry and attribute information about spatial features.

Attribute Mapping

The naming of attributes between GML and ESRI Shape file will be different as shape files are limited to 11 characters for an attribute name. Therefore, the following tables map the GML attribute name to the attribute name in the shape files.

The GML contains an attribute which describes the geometry of the feature; this is not applicable for a shape file as they are separated by their geometry.

RoadLink

GML Attribute	ESRI Shape Attribute
id	identifier
fictitious	fictitious
roadClassification	class
roadFunction	function
roadClassificationNumber	roadNumber
name1	name1
Specified in the GML tag for "*name1*" as **"xml:lang"**	name1_lang
name2	name2
Specified in the GML tag for "name2" as **"xml:lang"**	name2_lang
formOfWay	formOfWay
length	length
primaryRoute	primary
trunkRoad	trunkRoad
roadStructure	structure
loop	loop
startNode	startNode
endNode	endNode
numberTOID	numberTOID
nameTOID	nameTOID

RoadNode

GML Attribute	ESRI Shape Attribute
id	identifier
formOfRoadNode	formOfNode

MotorwayJunction

GML Attribute	ESRI Shape Attribute
id	identifier
junctionNumber	number

Chapter 5 GeoPackage Overview

OS Open Roads is supplied as a national GeoPackage file. Geopackage (*.gpkg) is an open, standards based, data format as is defined by the Open Geospatial Consortium (OGC). It is designed to be a lightweight format that can contain large amounts of varied and complex data in a single, easy to distribute and ready to use file.

GeoPackage can be used in most GIS software in its native format without translation. GeoPackage attribute names are not limited in length. A GeoPackage file has no size limit and it supports raster, vector and database formats making it a highly versatile solution.

GeoPackage was released in 2014 and so is a relatively new format. As a result, some older software packages may have trouble loading it or may need a plugin in order to do so. If this is the case, your version of GIS may need updating. For example, QGIS software, as of version 2.18 (October 2016), is able to interact with GeoPackage files without needing additional plugins or settings. Earlier versions will either require a plugin or will not be able to interact with this format.

Attribute Mapping

The naming of attributes between GeoPackage and GML file is very similar as GeoPackage files are not limited in the number of characters for an attribute name. Therefore, the following tables map the GML attribute name to the attribute name in the GeoPackage files.

The GML contains an attribute which describes the geometry of the feature; this is not applicable for a GeoPackage file as they are separated by their geometry.

RoadLink

GML Attribute	GeoPackage Attribute
id	id
fictitious	fictitious
roadClassification	roadClassification
roadFunction	roadFunction
roadClassificationNumber	roadClassificationNumber
name1	name1
Specified in the GML tag for "*name1*" as **xml:lang**	name1_lang
name2	name2
Specified in the GML tag for "name2" as **xml:lang**	name2_lang
formOfWay	formOfWay
length	length (has two fields: "length" and "length_uom")
primaryRoute	primaryRoute
trunkRoad	trunkRoad
roadStructure	roadStructure
loop	loop
startNode	startNode
endNode	endNode
numberTOID	numberTOID
nameTOID	nameTOID

RoadNode

GML Attribute	GeoPackage Attribute
id	id
formOfRoadNode	formOfRoadNode

MotorwayJunction

GML Attribute	GeoPackage Attribute
id	id
junctionNumber	junctionNumber