

ORDNANCE SURVEY GB

# Code-Point Open - User Guide

## Version History

Version	Date	Description
2.2	28/11/2019	Updated contact details

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# 1. Introduction

Code-Point Open is a dataset that contains [postcode units](#), each having a notional geographical location. There are about 1.7 million postcode units in England, Scotland and Wales. It is a data product that does not include software for analysis but can be used with a variety of programs. Code-Point Open can be loaded onto any desktop PC. Consult your geographical information system (GIS) vendor to establish actual system requirements.

Code-Point Open can be used to display and analyse any data collected at the postcode level. This can enable a variety of applications, including:

- Site location
- Web enabled searches
- Market analysis and profiling
- Health and demographics
- Resource allocation
- End-to-end journey route planning when used with an appropriate road network
- Socio-economic profiling
- Sales targeting

## 1.1 Code-Point Open features

Where appropriate, each Code-Point provides:

- A postcode.
- A positional quality indicator (PQI), which indicates the quality of the data underlying the Code-Point Open location coordinate (CPLC).
- The country indicator (either England, Scotland or Wales).
- The National Health Service (NHS) region and area codes.
- The local government county, district and ward codes.

### Purpose

The purpose of this document is to provide useful information about Code-Point Open as well as instructions for creating single-space postcodes.

### Resources

The following documents are associated with Code-Point Open:

1. Code-Point Open User Guide
2. Code-Point Open Technical Specification

## Target Audience

This document is intended for:

- Users with no technical knowledge relating to Code-Point but are comfortable navigating the internet.
- Users with technical knowledge in GIS.

## Glossary

- A glossary of terms and abbreviations can be found in [Annexe A - Glossary](#).

## Feedback

Ordnance Survey welcomes all feedback. If you have any comments or require further information, please make contact using the [details](#) above or via our [website](#).

## 2. Code-Point Open explained

### 2.1 Postcode

Postcodes are an alphanumeric abbreviated form of an address. Postcode units are unique references and identify an average of 15 addresses. In some cases, where an address receives a substantial amount of mail, a postcode will apply to only one address. The maximum number of addresses in a postcode is 100.

The postcode is held in **Code-Point Open** as a seven-character field. Within Code-Point Open data, there may be 0, 1 or 2 spaces between these elements of the postcode. The following is a list of the valid formats of postcodes (an A indicates an alphabetic character; an N indicates a numeric character).

#### Format

Outcode	Incode	Example postcode	Example as held in Code-Point Open
AN	NAA	M2 5BQ	M2 5BQ
ANN	NAA	M34 3AB	M34 3AB
AAN	NAA	DN5 7XY	DN5 7XY
AANN	NAA	DN16 9AA	DN169AA
ANA	NAA	W1A 4WW	W1A4WW
AANA	NAA	EC1A 1HQ	EC1A1HQ

Postcode example

Area	District	Sector	Unit
KY	12	8	UP

Please refer to the glossary for a further description of [postcode](#).

### 2.2 Position

#### Code-Point location coordinate (CPLC)

Code-Point Open provides a National Grid reference ([NGRef](#)) to a resolution of 1 metre for each postcode unit in Great Britain and is known as the Code-Point Location coordinate (CPLC). A CPLC is normally allocated to a point that falls within the extent of the postcode unit. The point is given the coordinates of the nearest delivery point to the calculated mean position of the delivery points within the postcode unit. This is the notional position of the postcode.

Where several postcode units apply to one surveyed position, for example, a block of flats or offices, there is an identical CPLC for each. However, there may be instances where the CPLC position is imprecise or approximate, due to the manual allocation by Royal Mail of a postcode outside the recognised geographic extent of that postcode.

When discovered or notified to Ordnance Survey by customers, these will be referred to Royal Mail for possible improvement.

### Positional quality indicator (PQI)

The importance of checking the PQI, to establish CPLC positional quality, cannot be overemphasised as it indicates the positional accuracy of the Code-Point Open coordinates.

There are seven PQI values for the positional quality of CPLCs. The order shown indicates the level of quality associated with the PQI; PQ10 is the most accurate and PQ90 the least. A lower positional quality CPLC will be allocated to postcode units awaiting a surveyed position, or that relate to addresses that will not have a surveyed position

The PQI assigned to the CPLC will depend on the coordinates available in PALF to generate the CPLC.

PQI	Description of source PALF data
10	Within the building of the matched address closest to the postcode mean determined automatically by Ordnance Survey.
20	As above, but determined by visual inspection by NRS.
30	Approximate to within 50 m of true position (postcodes relating to developing sites may be within 100 m of true position).
40	The mean of the positions of addresses previously matched in PALF but that have subsequently been deleted or recoded (very rarely used).
50	Estimated position based on surrounding postcode coordinates, usually to 100 m resolution, but 10 m in Scotland.
60	Postcode sector mean (direct copy from PALF). See glossary for additional information.
90	No coordinates available.

## 2.3 Attributes

Attribute	Description
Postcode	Contains elements for postal area, district, sector and unit. See postcode in this chapter.
Positional quality	Indicates the source of the data indicator used and, hence, the quality of the coordinates provided for each record. It is determined by the best available data in PALF.
Easting	Distance in metres east of National Grid origin.
Northing	Distance in metres north of National Grid origin.
Country code	Code used by ONS to identify the country in which the Code-Point Open georeference lies. See <a href="#">Annexe A</a> .
NHS regional health authority code	English Pan Strategic Health Authority in which CPLC falls.
NHS health authority code	English Strategic Health Authority or Scottish Health Board in which CPLC falls.
Administrative county code	County in which CPLC falls.

Attribute	Description
Administrative district code	Unitary Authority, Metropolitan and Non- Metropolitan District, London Borough or Scottish Council Area in which CPLC falls.
Administrative ward code	Electoral Ward or Division in which CPLC falls.

Comparison of Code-Point Open and Code-Point attributes

Data element	Code-Point Open	Code-Point
Postcode unit	●	●
Eastings	●	●
Northings	●	●
Positional quality indicator	●	●
PO Box indicator		●
Total number of delivery points		●
Delivery points		●
Domestic delivery points		●
Non-domestic delivery points		●
PO Box delivery points		●
Matched address premises		●
Unmatched delivery points		●
Country code	●	●
NHS regional health authority code	●	●
NHS health authority code	●	●
Administrative county code	●	●
Administrative district code	●	●
Administrative ward code	●	●
Postcode type		●

### Administrative and health authority codes

Administrative and health authority codes allocation to postcode is by point in polygon comparison against Boundary-Line data.

Postcodes with a PQI of 90 or 60 are not allocated codes.

### Lineage

Code-Point Open is derived from georeferenced Royal Mail Postcode Address File (PAF), OS MasterMap Topography Layer and the ROADS database datasets from Ordnance Survey and administrative and national health area codes created by ONS and NRS, but allocated using Ordnance Survey Boundary-Line data, and positioned with an Ordnance Survey NGref.



### **Positional accuracy**

Each CPLC is coordinated on the National Grid, with notional eastings and northings quoted to a resolution of 1 metre. The accuracy of each postcode unit coordinate pair is defined by the PQI, which provides a quality statement of that Code-Point Open record.

### **Attribute accuracy**

The representation of postcode attributes is checked as part of Royal Mail maintenance of PAF and by Ordnance Survey in the coordination and quality assurance of PALF.

### **Logical consistency**

Logical consistency is a measure of the degree to which Code-Point Open data agrees with its specified structure. Data is monitored to ensure that attributes are present in the correct format and in valid combinations.

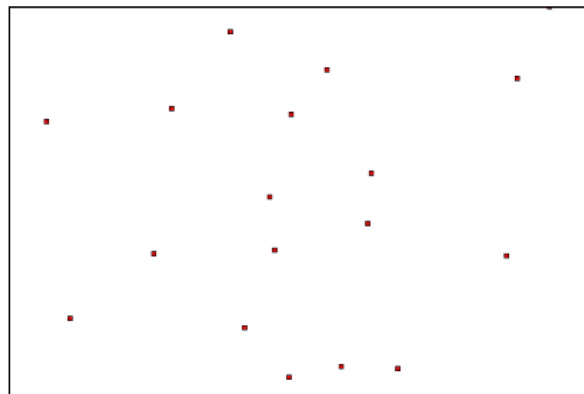
### **Completeness**

Code-Point Open contains coordinates for all available postcode units supplied to Ordnance Survey from the Royal Mail PAF within Great Britain. Resources are directed towards continually improving attribute and positional accuracy. Deleted postcodes are not included. Errors and omissions that are identified by customers can be referred to Ordnance Survey for investigation and, where appropriate, onward notification to Royal Mail.

### 3. Overview of Code-Point Open

#### 3.1 Data

Example of Code-Point Open data when viewed through a geographical information system (GIS) package.

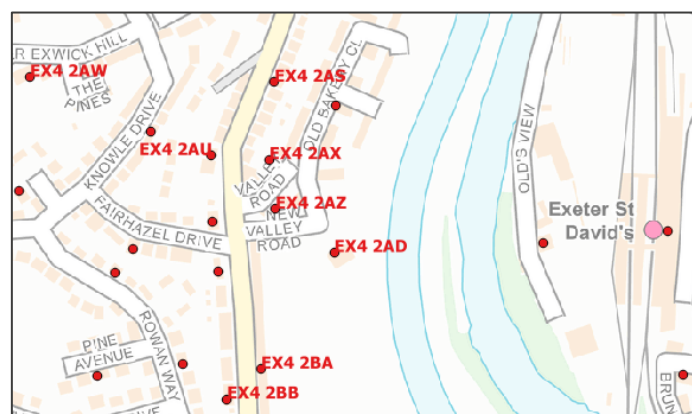


*NOTE: the attribution is loaded from a CSV file. If loaded from the GeoPackage, attribute names will be slightly different and will not display the Eastings and Northings attributes.*

Postcode	Positional_Quality_Indicator	Eastings	Northings	Country_Code	NHS_regional_health_authority_code	NHS_health_authority_code	Administrative_county_code	Administrative_district_code	Administrative_ward_code
EX1 1AE	10	291960	92581	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1AT	10	291778	92355	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BA	10	291725	92265	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BB	10	291786	92251	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BD	10	291763	92290	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BE	10	291802	92302	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BG	10	291778	92355	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BH	10	291832	92347	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BJ	10	291815	92319	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BL	10	291812	92372	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BN	10	291822	92357	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BP	10	291981	92334	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498
EX1 1BQ	10	291832	92347	E92000001	E19000002	E18000010	E10000008	E07000041	E05003498

Example of Code-Point Open overlaid on to OS Open.

*NOTE: to use Code-Point Open in this way requires a separate GIS package with the relevant licences.*



## 3.2 Basic principles

- Each postcode unit will be allocated a British NGref of a point that falls within the notional extent of the postcode unit – there may be a small number of instances where coordinates cannot be allocated.
- Multiple postcodes in a single block of flats or offices will share one NGref.
- Administrative area codes are allocated using the Boundary-Line™ polygon that the CPLC falls within; currency is that of the latest available Boundary-Line data. Where addresses in a postcode fall in two or more administrative areas, only the codes for the area in which the CPLC falls are given.
- NHS codes are allocated based on NHS areas usually being a superset of administrative areas.

### Government Statistical Service (GSS) codes

GSS codes are a unique system of referencing for administrative units. The codes are allocated by ONS for England and Wales and by NRS for Scottish areas.

More information on GSS codes can be found here

<https://webarchive.nationalarchives.gov.uk/20160108161055/http://www.ons.gov.uk/ons/guide-method/geography/geographic-policy/coding-and-naming-for-statistical-geographies/index.html>

## 3.3 Application overview

### 3.3.1 Uses of Code-Point Open

Code-Point Open forms a nationally-consistent postcode reference and is a standard link between databases and GIS. Identified below are some of the applications for Code-Point Open:

<b>Citizen services</b> Website searches Location finding Tourism Accessing public facilities Find my nearest	<b>Retail</b> Sales analysis by store Competitor analysis Customer buying profiles Store location
<b>Government</b> Statistical demographic analysis Crime analysis Flood warnings Pollution monitoring	<b>Transport</b> Satellite navigation – end-to-end journey planning using the postcodes and appropriate road network data
<b>Health</b> Targeting of services to population needs Resource allocation Epidemiology	<b>Utilities</b> Market profiling Consumption analysis Pressure-zone analysis

Analysis of 'What if...?' scenarios	Location finding
<b>Insurance</b> Market analysis and profiling Geological and flood-risk analysis Personal and household risk assessment Incident area management	

For more information on applications of Code-Point Open please visit  
<https://www.ordnancesurvey.co.uk/business-and-government/case-studies/index.html>

## 4. Creating single-space postcodes

### 4.1 Centroids only

#### 4.1.1 Outward and inward bound representation

The current specification represents the postcodes in a set format, which defines the postcodes as having an inward and outward postcode 'code'. Code-Point Open postcodes have 0, 1 or 2 spaces between the in and out code.

The table below identifies how postcodes are currently shown in the data.

Postcode structure	Number of spaces
AANNNA	0 spaces (represented as AANNNA) for example: PO143RW
ANN NAA	1 space (represented as ANN<>NAA) for example: CB1 1DG
AN NAA	2 spaces (represented as AN<><>NAA) for example: B1 5AP

#### 4.1.2 Single-space postcodes

The Code-Point Open postcodes are currently represented as above; however, there may be a user requirement to represent each postcode in a uniformed single-space format.

The aim of this section is to offer some guidance on how to process the Code-Point Open data to generate postcodes with a single space.

The single-space instructions are applicable to both the postcode point and unit polygon products. Microsoft Excel, Microsoft Access, MapInfo and ESRI GIS formats have been included to provide guidance when using CSV and other formats.

The underlying theory for all of the methods is principally the same, in that all current spaces are removed and then a single space added before the third character from the right.

#### 4.1.3 CSV single-space postcodes using Microsoft Excel and Access

1. Open the CSV file with Excel so the data is displayed in columns.  
In a new blank column, click in the first cell of the new column (excluding the row column names).
2. In the function line, enter the following function command, where A1 is the column containing the postcode:  
`=TRIM(LEFT(A1,LEN(A1)-3))&"<s>"&RIGHT(A1,3)`

Where <s> indicates a single space.

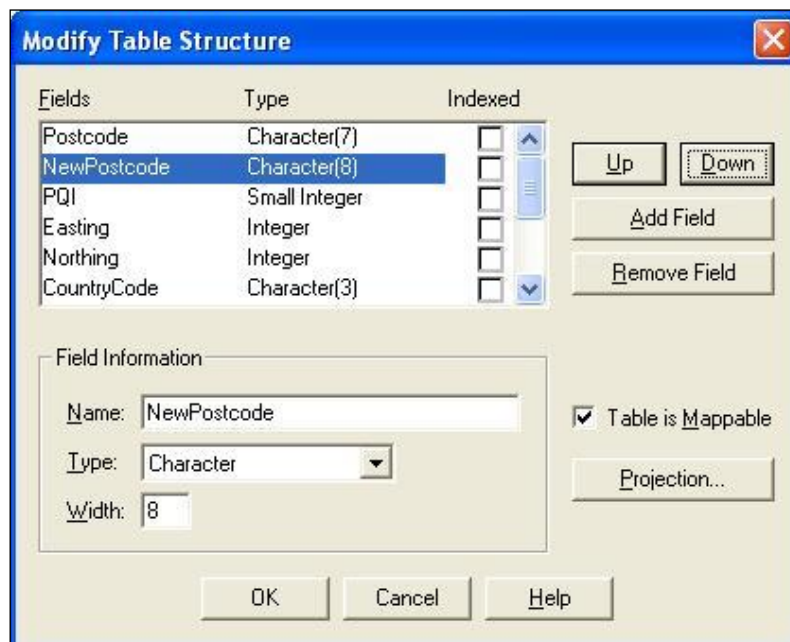
This should now produce a column containing postcodes with a single space.

The same method can be employed in Access, using an update query rather than the function line. The functions listed above are the same for Access and Excel.

#### 4.1.4 MID/MIF and TAB single-space postcodes using MapInfo

The process within MapInfo is the same, regardless of whether the original supply is in TAB or MID/MIF, as both are imported to MapInfo and opened as a .TAB file.

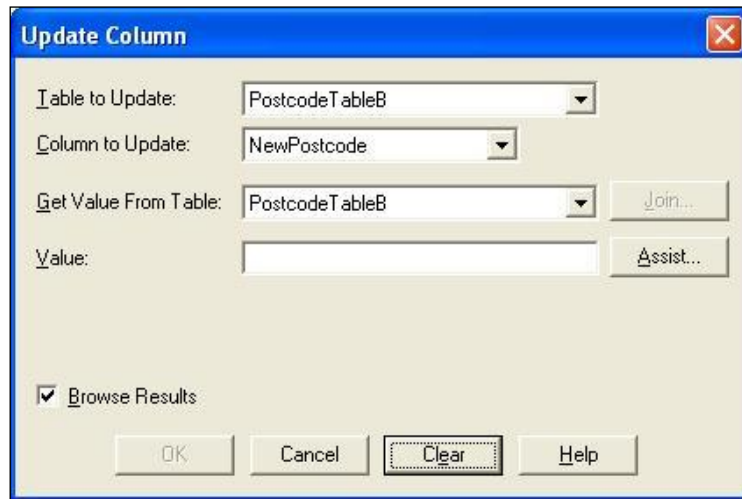
1. First, open the Code-Point Open data in MapInfo and add a new column to hold the formatted postcode. To add a column to the TAB file.
2. Click on Table, Maintenance, Table Structure.  
This opens the following Modify Table Structure dialogue box:



*NOTE: if the Add Field/Remove Field buttons are missing, then it may be necessary to save a copy of the table and alter the copy.*

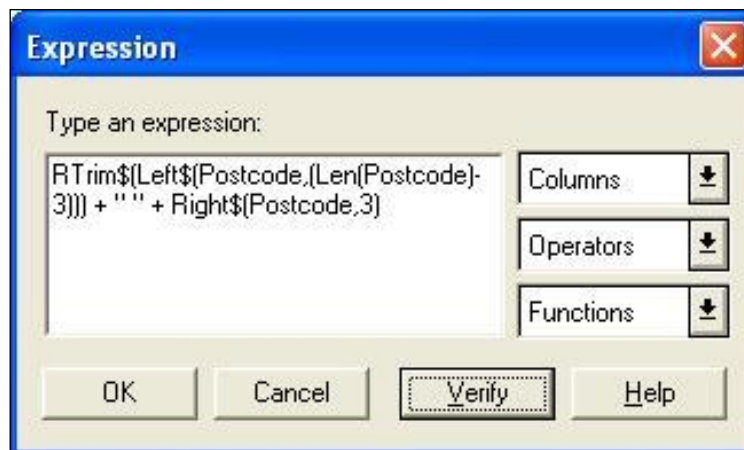
3. Click on Add Field.  
This adds a field to the end of the table.
4. Name the new column *NewPostcode* and give it a Type of *Character* and a Width of *8*.
5. Click the OK button to apply the changes.  
The final stage is to update the new column.

6. Click Table and then the Update column tab.  
This opens the following dialogue box:



7. Ensure that the *Table to Update* field has the name of the table you wish to update as its value.
8. From the *Column to Update* drop down menu select the previously added column *NewPostcode* making sure the *Get Value from Table* is the same table as in the *Table to Update* field.
9. Click the *Assist* button.

This opens the following Expression dialogue box:



10. In the Type an expression box, key in the following function command:  
`RTrim$(Left$(Postcode,(Len(Postcode)-3))) + " " + Right$(Postcode,3)`
11. Click the *OK* button to apply the update. This will update your new column with a single-space postcode.

### 4.1.5 Shapefile single-space postcodes using ESRI ArcGIS

These steps assume that the data has already been imported into ArcGIS and that the user has the correct permissions to edit the Shapefile. It is advised to try this method on a copy of the original data, and not the only copy of the data, in case of error.

Once the Shapefile is open, the required new fields can be added.

1. Right-click on the layer in the *Table of Contents* (down the left-hand side of the *map* window) and open the *Open Attribute Table*.

The first step is to add a new column to hold the newly formatted postcode.

2. Click on the *Options* button then click on *Add Field*.

This opens the following dialogue box:

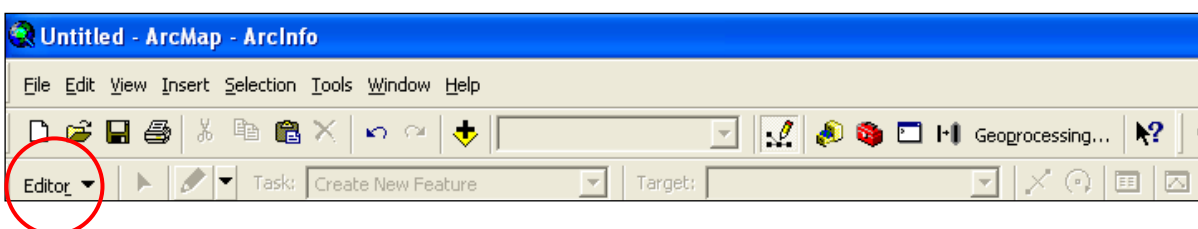


3. Key in an appropriate name, for example, 'NewPC' in the *Name* box and change the *Type* box on the drop-down menu to 'text'; also change the *Field Properties Precision/Length* to '8'.

4. Click *OK* and the field is added.

The final stage is to update the new column. In order to populate the fields, the table has to be made editable.

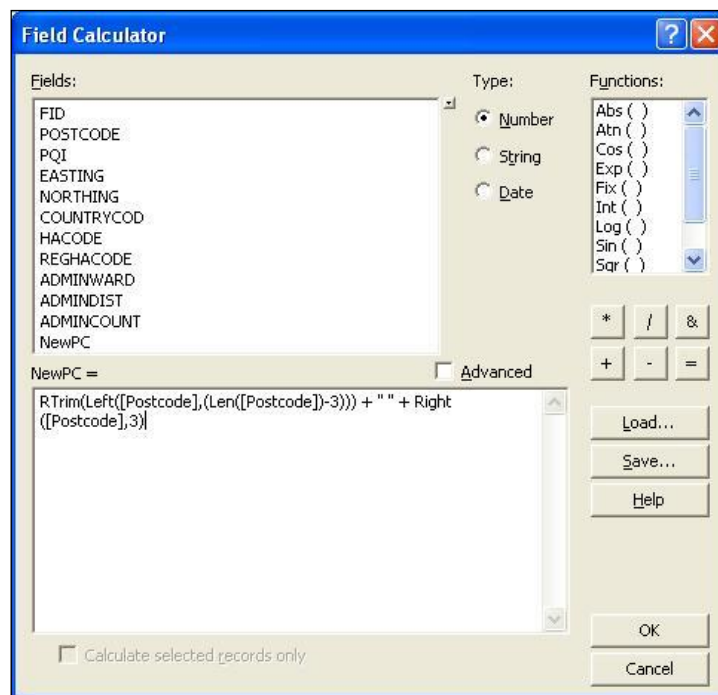
5. Return to the map window. Do not close the attribute table as it will be required later. Click on the *Editor* drop down selection.





If this toolbar is not already loaded, then right-click on an empty part of the grey area on the map window and all the available toolbars will be listed. Simply click on the *Editor* tool bar and it will be loaded to the toolbar.

6. Click the *Editor* drop down and select the first option, *Start Editing*.
7. Once *Start Editing* has been selected, return to the attribute table.
8. Right-click on the column name of the column added previously, for example, 'NewPC' and select *Field Calculator*. This opens the following Field Calculator dialogue box:



In the bottom dialog box, enter in the following function command:  
`RTrim(Left([Postcode],(Len([Postcode])-3))) + "<s>" + Right([Postcode],3)`

Where <s> indicates a single space.

9. Click *OK* to update the column. This will update your new column with a single-space postcode.
10. Finally, go back to the map window, click on the *Editor* tool bar and select *Stop editing*. It will prompt to save the edits. Click *Yes*.

## Data measures

Ordnance Survey measures the data in its products in one or more of the ways set out in table 1 below.

**Table 1:** definitions of data measures

Data measure	Definition	Sub-measure	Definition
Completeness	Presence and absence of features against the specified data content*	Omission	Features representing objects that conform to the specified data content but are not present in the data.
		Commission	Features representing objects that do not conform to the specified data content but are present in the data.
Logical consistency	Degree of adherence to logical rules of data structure, attribution and relationships	Conceptual consistency	How closely the data follows the conceptual rules (or model).
		Domain consistency	How closely the data values in the dataset match the range of values in the dataset specification.
		Format consistency	The physical structure (syntax): how closely the data stored and delivered fits the database schema and agreed supply formats.
		Topological consistency	The explicit topological references between features (connectivity) – according to specification.
Positional accuracy	Accuracy of the position of features	Absolute accuracy	How closely the coordinates of a point in the dataset agree with the coordinates of the same point on the ground (in the British National Grid reference system).
		Relative accuracy	Positional consistency of a data point or feature in relation to other local data points or features within the same or another reference dataset.
		Geometric fidelity	The ‘trueness’ of features to the shapes and alignments of the objects they represent*.
Temporal accuracy	Accuracy of temporal attributes and temporal relationships of features	Temporal consistency	How well-ordered events are recorded in the dataset (life cycles).
		Temporal validity (currency)	Validity of data with respect to time: the amount of real-world change that has been incorporated in the dataset that is scheduled for capture under current specifications.
Thematic accuracy (attribute accuracy)	Classification of features and their attributes	Classification correctness	How accurately the attributes within the dataset record the information about objects*.

\* When testing the data according to the dataset specification against the ‘real-world’ or reference dataset.

## Annexe A: Glossary

### addressed premise

A permanent or non-permanent building structure with an address being a potential delivery point for Royal Mail.

Examples of an addressed premise would be a house, a flat within a block of flats, a caravan site, a bollard to which several houseboats may be moored, or an organisation occupying the whole building.

### building

A physical, walled structure connected to foundations that has, or will have, a roof. This definition includes buildings surveyed at foundation stage.

### CPLC (Code-Point location coordinate)

A [National Grid reference](#) for each [postcode unit](#). It is a two-dimensional coordinated point to a resolution of 1 metre. Coordinates are attributed from Gridlink using an accuracy hierarchy.

### Country code

The code used by the Office of National Statistics to indicate the country in which the Code-Point georeference lies. This has replaced the PAF update date field.

### CountryCode

England	E92000001
Scotland	S92000003
Wales	W92000004
N Ireland	N92000002

### Comma-separated values (CSV)

The CSV file format is commonly used to exchange data between different applications, for example, Microsoft Excel and Access. Being text files, CSV files can also be viewed in *Notepad*.

### delivery point

A Royal Mail-defined point to which mail is delivered. This may be a property (private address), organisation, mailbox or even, very rarely, the name of an individual. These categories are derived from the *Programmers' Guide* from Royal Mail. This is distinct from the addressed premise because there may be more than one organisation at an address.

### Gridlink

Gridlink is the name given to a joined-up Government initiative involving Royal Mail, the Office for National Statistics, National Records of Scotland (NRS), Land & Property Services and Ordnance Survey. All these organisations are involved in the georeferencing of postcodes and the relating of postcodes to administrative and National Health Service areas and so on.

## **inward code or incode**

See [postcode](#).

## **matched address**

An address, resulting from a match between the OS MasterMap Topography Layer data and PAF, which has been allocated a coordinate position. The match may be a result of either manual or automatic matching, the latter encompassing both full and 'fuzzy logic' matching.

## **National Grid reference (NGref)**

The National Grid provides a unique reference system that can be applied to all Ordnance Survey maps of Great Britain. The map of Great Britain is covered by 100 km by 100 km grid squares, with the origin lying to the west of the Isles of Scilly. When a National Grid reference is quoted, the easting (left to right direction) is always given before the northing (upwards direction).

A National Grid reference (to 1 metre) will identify the spatial position of the [CPLC](#).

## **non-geographic postcodes**

Special non-geographic postcodes are allocated to single organisations who receive an exceptionally large amount of mail. These are included in Code-Point Open.

## **outward code or outcode**

See [postcode](#).

## **Postcode Address File (PAF)**

PAF now contains the postal addresses and postcodes of approximately 28 million delivery points in Great Britain.

## **Postal Address Location Feed (PALF)**

The PAL Feed is provided to Ordnance Survey from GeoPlace, who have geocoded the PAF feed from Royal Mail, using source coordinates from Local Authorities in England, Wales & Scotland and Ordnance Survey.

## **positional quality indicator (PQI)**

The positional quality indicator is a flag used to indicate the positional accuracy of the coordinates allocated to each postcode record. There are seven PQI values for the positional quality of CPLCs.

## **postal address**

A postal address is a delivery point that is currently receiving mail. There may be many delivery points within an individual building structure as shown in OS MasterMap Topography Layer data.

## postcode

An abbreviated form of address made up of combinations of between five and seven alphanumeric characters. A postcode may cover between 1 and 100 addresses. The average number of addresses per postcode is 15.

There are two main components of a postcode:

- The outward code (also called outcode). The first two to four characters of the postcode, constituting the postcode area and the postcode district. It is the part of the postcode that enables mail to be sent from the accepting office to the correct area for delivery.
- The inward code (also called incode). The last three characters of the postcode, constituting the postcode sector and the postcode unit. It is used to sort mail at the local delivery office.

For example:

Outward		Inward	
NW	6	4	DP
			Unit
		Sector	
	District		
Area			

## postcode area

An area given a unique alphabetic coding by Royal Mail to facilitate the delivering of mail. The area is identified by one or two alpha characters at the start of the full postcode, the letters being derived from a town, city or district falling within the postcode area. There are, at present, 120 postcode areas in Great Britain, for example, SO for Southampton, MK for Milton Keynes, B for Birmingham or W for London West. The postcode area code constitutes the first part of the outward code.

## postcode district

A sub-area of the postcode area, specified by the character sub-string within the first half of a full postcode, which may be numeric, alphabetic or alphanumeric; for example, 42 from MK42 6GH or 1A from W1A 4WW. There are approximately 2 986 postcode districts in Great Britain.

*NOTE: there are certain non-geographic districts. In these instances, a district code is allocated to cover all large users in the postcode area.*

## postcode sector

A sub-area of a postcode district, whose area is identified by the number third from the end of a full postcode. There are approximately 11 200 postcode sectors in Great Britain. An example of a postcode sector code is 3, from GU12 3DH.

## postcode unit

A sub-area of a **postcode sector**, indicated by the two letters of the **inward postcode**, which identifies one or more **small-user postcode** delivery points or an individual **large-user postcode**. There are approximately 1.7 million postcode units in the UK.