BRITISH STANDARD

# Spatial datasets for geographical referencing –

## Part 0: General model for gazetteers and spatial referencing

ICS 07.040;35.240.70

## Publishing and copyright information



ISBN 0 580 48709 1

The following BSI references relate to the work on this standard:
Committee reference IST/36
Draft for comment 05/30127200 DC

## Publishing history

First published, July 2006

## Amendments issued since publication

| Amd. no. | Date | Text affected |
|---|---|---|

# Contents



**Summary of pages**

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 16, an inside back cover and a back cover.

# Foreword

## Publishing information

This part of BS 7666 was published by BSI and came into effect on 28 July 2006. It was prepared by Technical Committee IST/36, Geographic information. A list of organizations represented on this committee can be obtained on request to its secretary.

## Information about this document

BS 7666 was originally published over the period 1994 to 1996 in four parts.

These four parts were revised separately over the period 2000 to 2002. During 2004 to 2005, all the parts were revised together. A new Part 0: *General model for gazetteers and spatial referencing* has been added which provides a common structure for gazetteers of any class of geographic object.

BS 7666 now comprises the following parts:

- *Part 0: General model for gazetters and spatial referencing;*
- *Part 1: Specification for a street gazetteer;*
- *Part 2: Specification for a land and property gazetteer;*
- *Part 5: Specification for a delivery point gazetteer.*

These parts supersede BS 7666-1:2000, BS 7666-2:2000, BS 7666-3:2000 and BS 7666-4:2002. The new Part 0 has subsumed Part 3: Specification for addresses. Part 1 has subsumed Part 4: Specification for recording public rights of way but in other respects is similar in scope to that published previously. The scope of Part 2 is largely unchanged. Part 5 is new in scope.

Parts BS 7666-1:2000, BS 7666-2:2000, BS 7666-3:2000 and BS 7666-4:2002 are now withdrawn. Thus Parts 3 and 4 will not form part of the standard although there will now be a Part 5. Renumbering has not taken place to avoid any confusion with the withdrawn standards.

This part of the standard aims to provide an overview and a more generalized common data model which can then be applied as the basis for any other parts of the standard, both existing and to be developed in the future. It is based upon BS EN ISO 19112, Geographic information — *Spatial referencing by geographic identifiers*, and builds this to define spatial references and general gazetteers of geographic objects in the UK.

BS EN ISO 19112 uses the term “geographic identifiers” for spatial references in the form of a label or code that identifies a location. In BS 7666, the more commonly used term “spatial reference” is used. In order to distinguish between the geographic objects in the gazetteer (termed “locations”) and those used to reference them, the term “spatial unit” is used here for the referencing object. In the attribute tables, some elements in BS EN ISO 19112 are dropped from the spatial referencing part, and additional attributes are included in the gazetteer.

## Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

### Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

# Introduction

Geographic information contains spatial references that relate the features and information represented by the data or text to positions in geographic space. Spatial references fall into two categories:

a) those using coordinates;

b) those using labels or codes.

This British Standard is concerned with the latter. The spatial references here are based upon a relationship with a location defined by a geographic object or objects, such as a street or property. Many different types of spatial reference exist and are used in different applications by different organizations. BS 7666 identifies some types of spatial references, and provides a way of cross-referencing between datasets collected using different types of spatial references.

# 1 Scope

This part of BS 7666 defines the essential components of a gazetteer of geographic locations and provides a general model of spatial references based upon named spatial units in the United Kingdom. It defines the attributes of each geographic location to be recorded in a gazetteer, and the metadata associated with the gazetteer.

This part of BS 7666 may be used for defining gazetteers of locations and systems of spatial references based upon named spatial units, but does not specify any particular ones, nor does it define a database schema. It provides the basis for the other parts of BS 7666 by defining general structures to enable gazetteers of a range of classes of geographic locations to be created in a consistent way. Specific gazetteers of particular classes of locations are defined in the other parts of BS 7666.

# 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the reference cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times.*

BS ISO 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 Code.*

# 3 Terms and definitions

For the purposes of this part of BS 7666, the following terms and definitions apply.

## 3.1 address

means of referencing an object for the purposes of identification and location

*NOTE Examples are "389 Chiswick High Road, London W4 4AL" and "Nelson's Column, Trafalgar Square, London".*

## 3.2 coordinate reference system

set of mathematical rules for assigning coordinates to points, related to the real world by a datum

*NOTE Examples are the National Grid of Great Britain, the Irish Grid and WGS84 (latitude and longitude).*

### 3.3 gazetteer

record of instances of a particular location class or classes, with sufficient information to find and identify each uniquely

*NOTE Examples are a street gazetteer and a local land and property gazetteer.*

### 3.4 location

identifiable geographic place

*NOTE Examples are "High Street" and "St James Park".*

### 3.5 spatial reference

description of position in the real world

*NOTE In the context of BS 7666, this will be based upon descriptive identifiers of spatial units.*

### 3.6 spatial unit

location used in the referencing of another location

*NOTE An example is "street" when used to reference the location of "building".*

# 4 Gazetteer of geographic objects

## 4.1 Properties of a gazetteer

A gazetteer shall contain all instances of an identified class or classes of locations, as defined by its scope, e.g. streets and elementary street units. The content of a gazetteer shall be identified by a scope statement that describes the classes of location and the rules of inclusion or exclusion.

*NOTE An example of a scope statement is "residential property units identified from taxation records, and electoral roll records, but with individual units with shared facilities held at the combined level only".*

## 4.2 Gazetteer metadata

### 4.2.1 Mandatory elements

A gazetteer shall have the following mandatory (M) metadata elements:

a) **name:** name of the gazetteer, e.g. National Land and Property Gazetteer;

b) **scope:** description of the content of the gazetteer, e.g. residential property units;

c) **territory of use:** geographic domain of the gazetteer, e.g. Great Britain;

d) **gazetteer owner:** the organization that has overall responsibility for the gazetteer, e.g. The Local Government Information House;

e) **custodian:** organization or officer responsible for compilation and maintenance, e.g. South Borsetshire District Council Land and Property Gazetteer Custodian;

f) **coordinate system:** coordinate reference system used to describe position, e.g. National Grid of Great Britain;

g) **spatial referencing system(s):** the spatial reference system(s) used in the gazetteer e.g. street address (see **4.2.4**);

h) **current date:** the date at which the gazetteer can be considered to be current;

*NOTE The current date is not necessarily the date of creation or date of last update of the gazetteer.*

### 4.2.2 Optional elements

A gazetteer shall have the following optional (O) metadata elements, where appropriate:

a) **language(s):** the languages used in the gazetteer for names, identified by a three letter code as specified in BS ISO 639-2;

*NOTE This enables multiple-language entries in the gazetteer. When no language is specified, a default of English is assumed.*

b) **character set(s):** any non-English character set(s) used to record entries in the gazetteer, e.g. Gaelic;

c) **coordinate axis units:** unit of measure of coordinates, e.g. metres;

d) **metadata date:** date of the last update of the metadata;

e) **primary classification scheme:** details of the primary classification scheme used in the gazetteer;

f) **secondary classification scheme:** details of any secondary classification scheme used in the gazetteer;

g) **state coding scheme(s):** details of any coding scheme used to define the logical state of a location recorded in the gazetteer;

h) **external cross-referencing scheme(s):** details of external cross-referencing schemes used in the gazetteer.

### 4.2.3 Structure

The record shall be in accordance with Table 1.

*NOTE 1 Tests for checking conformance for location records are given in Annex A.*

*NOTE 2 A UML (Unified Modelling Language) model is shown in Annex B. Examples are given in Annex C.*

*NOTE 3 As appropriate, additional metadata elements can be added by the user in the context of a particular gazetteer.*

Table 1 **Gazetteer metadata]**

| **Name** [a] | **UML name** [b] | **Obligation** [c] | **Maximum occurrences** [d] | **Data type** [e] |
|---|---|---|---|---|
| name | name | M | 1 | CharacterString |
| scope | scope | M | 1 | CharacterString |
| territory of use | terOfUse | M | 1 | CharacterString |
| language | language | O | N | Language [f] |
| character set | charSet | O | N | CharacterString |
| gazetteer owner | gazOwner | M | 1 | CharacterString |
| custodian | cust | M | 1 | CharacterString |
| coordinate system | coordSys | M | 1 | CharacterString |
| coordinate axis units | coordUnit | O | 1 | CharacterString |
| metadata date | metaDat | O | 1 | Date |
| spatial referencing system | spatRefSys | M | N | CharacterString |
| primary classification scheme | pClassScm | O | 1 | CharacterString |
| secondary classification scheme | sClassScm | O | 1 | CharacterString |
| state coding scheme | statCodScm | O | 1 | CharacterString |
| current date | curDat | M | 1 | Date |
| external cross-referencing scheme | extXRefScm | O | N | CharacterString |

[a] The unique name of the attribute.

[b] The name of the attribute used in the UML model.

[c] Whether the attribute is mandatory (M) or optional (O).

[d] Whether the attribute is single-valued (1) or may have multiple values (N).

[e] The form of the attribute.

[f] As defined in BS ISO 639-2.

All dates shall be recorded in accordance with BS ISO 8601, consistently either in the basic format (YYYYMMDD) or in the extended format (YYYY-MM-DD).

### 4.2.4 Spatial referencing system

A spatial referencing system shall comprise a hierarchical set of one or more types of spatial unit and be applicable to the whole of its territory of use. A spatial unit may itself be referenced with respect to a higher level unit.

*NOTE Not all of the spatial units need have instances everywhere in the territory of use, and some types may be missing from the hierarchy in some places. For example, local authority areas may be of different types (e.g. unitary or county and district) in different parts of the country.*

A spatial unit shall have the following mandatory (M) attributes:

a) **identifier:** an identifier for the spatial unit, e.g. street name;
b) **definition:** the definition of the spatial unit, e.g. a named street;
c) **position:** a representative point for the position of the spatial unit, defined by a coordinate pair;
d) **spatial unit owner:** organization or class of organizations able to create and destroy spatial unit instances, e.g. the Street Naming and Numbering Authority.

The record shall be in accordance with Table 2.

*NOTE An example of a spatial referencing system is given in Annex D.*

Table 2 **Attributes of a spatial unit**

| Name [a] | UML name [b] | Obligation [c] | Maximum occurrences [d] | Data type [e] |
|---|---|---|---|---|
| identifier | id | M | 1 | CharacterString |
| definition | definition | M | 1 | CharacterString |
| position | position | M | 1 | Point [f] |
| owner | sUOwner | M | 1 | CharacterString |

[a] The unique name of the attribute.

[b] The name of the attribute used in the UML model.

[c] Whether the attribute is mandatory (M) or optional (O).

[d] Whether the attribute is single-valued (1) or may have multiple values (N).

[e] The form of the attribute.

[f] Defined by a coordinate pair

# 5 Location records in a gazetteer

## 5.1 Locations

Each record in the gazetteer shall identify a single instance of a location. The location instance may be related to other location instances in the same class (e.g. a named street may form part of another named street). The location instance may also be part of a hierarchy of locations of different types (e.g. a street may be part of a locality or town).

## 5.2 Mandatory attributes

A location recorded in the gazetteer shall have the following mandatory (M) attributes:

a) **identifier:** unique identifier of the location, e.g. a Unique Property Reference Number;

b) **entry date:** date when the location was added to the gazetteer;

c) **update date:** date of last update of location record;

d) **start date:** date at which the location came into existence;

*NOTE 1 When the start date is not known, a notional date at which it is known to exist should be used, e.g. 1900.*

e) **position:** a coordinate for a representative point of the location;

f) **spatial reference:** a spatial reference for the location, e.g. a property address;

g) **administrator:** organization responsible for defining the characteristics of the location.

## 5.3 Optional attributes

Where appropriate, a location recorded in the gazetteer shall also have one or more of the following optional (O) attributes:

a) **alternative identifier:** other identifier of the location;

b) **primary classification:** class of the location according to a defined classification scheme, e.g. “residential”;

c) **secondary classification:** sub-class of the location according to a defined classification scheme, e.g. “terraced”;

d) **external cross-reference:** identifier of related object recorded elsewhere, e.g. its Address-Point Reference;

e) **end date:** date at which the location ceased to exist;

f) **state:** code identifying the logical status of the location, e.g. “demolished”;

g) **current state date:** date at which the location achieved its current state;

*NOTE When the current state date is not known, a date when it was known to be in that state should be used, e.g., the date when the location was added to the gazetteer.*

h) **extent:** description of the location, either by a bounding polygon, or reference to one or more geographic elements, e.g. the topographic identifiers (TOIDs) of the set of geometric objects that represent the location in a topographic map base;

i) **related location:** related location in the same class, e.g. a historical predecessor;

j) **parent:** an instance or instances of a different location type of which the location forms part, e.g. for an elementary street unit, the street of which it forms part;

k) **child:** instance of a different location type which forms part of this location, e.g. for a street, the constituent elementary street units.

## 5.4 Structure

The record shall be in accordance with Table 3.

*NOTE 1 A UML (Unified Modelling Language) model is shown in Annex B. Examples are given in Annex D.*

*NOTE 2 As appropriate, additional attributes can be added by the user in the context of a particular application.*

*NOTE 3 Tests for checking conformance for location records are given in Annex A.*

Table 3 **Attributes of a location**

| **Name** [a] | **UML name** [b] | **Obligation** [c] | **Maximum occurrences** [d] | **Data type** [e] |
|---|---|---|---|---|
| identifier | id | M | 1 | CharacterString |
| alternative identifier | altId | O | N | CharacterString |
| primary classification | pClass | O | 1 | CharacterString |
| secondary classification | sClass | O | 1 | CharacterString |
| entry date | entryDat | M | 1 | Date |
| update date | updatDat | M | 1 | Date |
| start date | startDat | M | 1 | Date |
| end date | endDat | O | 1 | Date |
| state | state | O | 1 | CharacterString |
| current state date | curStatDat | O | 1 | Date |
| extent | extent | O | 1 | GeogExtent[f] |
| position | position | M | 1 | Point [g] |
| spatial reference | spatRef | M | N | SpatialReference[h] |
| administrator | admin | M | 1 | CharacterString |
| external cross-reference | extXRef | O | N | CharacterString |
| related location | relLoc | O | N | Location |
| parent | parent | O | N | CharacterString |
| child | child | O | N | CharacterString |

[a] The unique name of the attribute.

[b] The name of the attribute used in the UML model.

[c] Whether the attribute is mandatory (M) or optional (O).

[d] Whether the attribute is single-valued (1) or may have multiple values (N).

[e] The form of the attribute.

[f] See **5.5**.

[g] Defined by a coordinate pair.

[h] See **5.6**.

All dates shall be recorded in accordance with BS ISO 8601, consistently either in the basic format (YYYYMMDD) or in the extended format (YYYY-MM-DD).

## 5.5 Geographic extent

A geographic extent (GeogExtent) shall be defined by either:

a) a collection of smaller geographic objects (GeographicObject), e.g. a town defined by a set of suburbs;

b) by one or more boundary polygons (BoundaryPolygon), including where necessary one or more inner polygons providing “cut-outs”.

## 5.6 Spatial reference

The spatial reference shall take the form of one or more spatial units according to a spatial referencing system as defined in **4.2.4**.

# 6 Data quality

The quality of data in a gazetteer shall be tested and reported. Associated with each gazetteer shall be a data quality report recording a standard set of data quality measures. This report shall contain details of any tests carried out, including details of the test methods, the date of the test, the name of the tester, and details of any source material or other information used. Where tests are performed on samples of the data, these shall be chosen at random, and the method of generation of the sample shall be recorded. The data quality report shall contain sections covering each of the following aspects:

a) **lineage:** a description of the source material from which the gazetteer and updates to it were derived and the methods of derivation;

b) **currency:** the date for which the gazetteer is current;

c) **positional accuracy:** results of tests of the positional accuracy of the coordinates in the gazetteer, in terms of distance on the ground;

d) **attribute accuracy:** the results of tests carried out on the accuracy of the (discrete) attributes in the gazetteer, expressed as the percentage found correct and of the continuous attributes (e.g. dates), expressed as a mean error;

e) **completeness:** the results of tests to verify that all entries have been included in the gazetteer in accordance with its stated scope, expressed as a percentage present, together with the results of tests to verify that there are no duplicate entries, expressed as a percentage of duplicates;

f) **logical consistency:** the result of tests to verify that entries in the gazetteer have been recorded in a consistent manner.

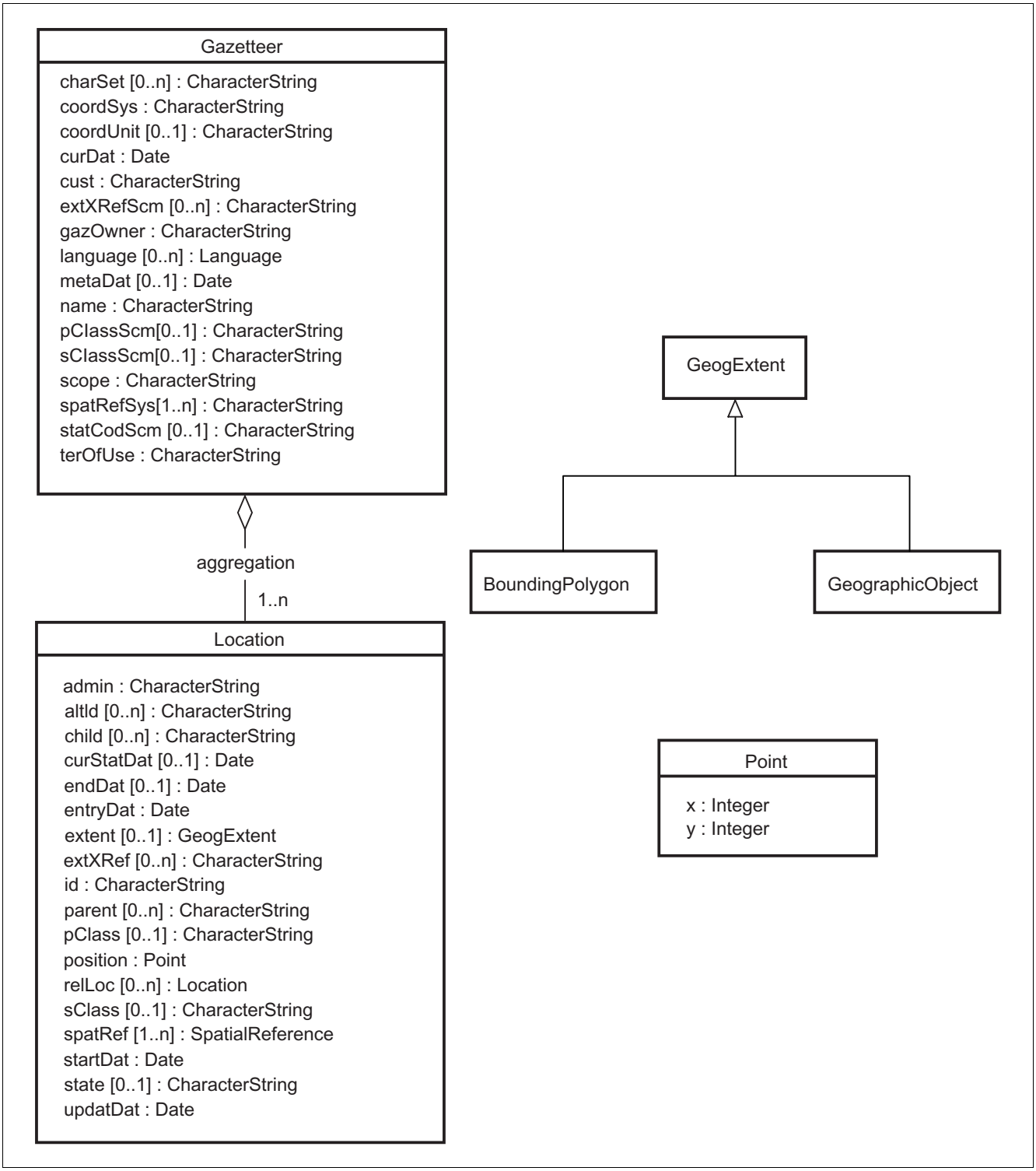
# Annex A (normative) Checklist for verification of conformity

A gazetteer shall conform to this part of BS 7666 if it:

- has metadata as defined in **4.2**;
- contains a record of all instances of the locations defined in its scope;
- contains all mandatory information about each location instances as defined in Clause **5**;
- has a quality report as described in Clause **6**.

# Annex B (normative) UML model

Figure B.1 **UML model for a gazetteer**




*NOTE The classes Language and SpatialReference are defined in the implementation.*

The model diagram is written in UML (Unified Modelling Language). It shows the object classes as boxes and the associations between them. The name of the object class is shown in the top level of the box, and the attributes (where given) are shown in the lower level.

The minimum and maximum allowable number indicated in brackets []. [0..] indicates that the attribute is optional, and [..n] implies multiple values are allowed. Where no range is given, a single attribute value is mandatory. The data type of the attributes is shown. These are:

- CharacterString: a sequence of alphanumeric characters;
- Date: a date, according to BS ISO 8601;
- Integer: a whole number.

Where the data type is another class, the name of that class is given.

Associations are identified by links (lines) between classes, identified by name. These also show the multiplicity of the association from the perspective of the other class (target) to that class (source):

- 0.. 1 implies optionality;
- 1..n implies one or more;
- 0.. n implies zero, one or more.

◊ **represents an aggregation, e.g. the gazetteer is an aggregation of locations.**

Δ **represents subtyping, e.g. Bounding Polygon and Geographic Object are types of Geographic Extent.**

## Annex C (informative) Example gazetteer

This annex gives an example of a gazetteer of localities. It is included for illustrative purposes only. Table C.1 shows the gazetteer metadata. Table C.2 shows an example gazetteer entry.

Table C.1 **Gazetteer metadata**

| Name | Entry |
|---|---|
| Name | National Locality Gazetteer |
| scope | neighbourhoods, suburbs, districts, villages, estates, settlements that may form part of a town, or stand in their own right within the context of one or more administrative areas |
| territory of use | Great Britain |
| language | ENG |
| character set | English |
| gazetteer owner | Office of the Deputy Prime Minister |
| custodian | The National Locality Gazetteer Custodian |
| State coding scheme | 1 = planned |
| | 2 = current |
| | 3 = historic |
| coordinate system | National Grid of Great Britain |
| coordinate axis units | metres |
| spatial referencing system | combination of: |
| | a)related town (optional); and |
| | b)administrative area (County or Unitary Authority) |
| Primary classification scheme | 1 = rural village or settlement; |
| | 2 = suburb of a town; |
| | 3 = industrial or trading estate; |
| | 4 = other |
| secondary classification scheme | none |
| current date | 2005-05-01 |
| external cross-referencing scheme | none |
| location(s) | locality |

Table C.2 **Example gazetteer entry**

| Name | Entry |
|---|---|
| Identifier | Cottenham |
| alternative identifier | 348853812 |
| primary classification | 1 |
| secondary classification | none |
| entry date | 2005-02-15 |
| update date | 2005-02-15 |
| start date | 2000-01-01 |
| end date | — |
| state | current |
| current state date | 2000-01-01 |

*(Continued)*

Table C.2 *(Continued)*

| Name | Entry |
|---|---|
| extent | (548000, 271100), (542000, 267300), (544200, 265500), (549600, 270000), (549300, 270800) |
| position | (545000, 267300) |
| spatial reference | ( , Cambridgeshire) |
| administrator | Cambridgeshire County Council |
| external cross-reference | — |
| parent | Cambridgeshire |
| child | — |

# Annex D (informative) Example spatial reference system

This annex gives an example of a spatial reference system. It is included for illustrative purposes only.

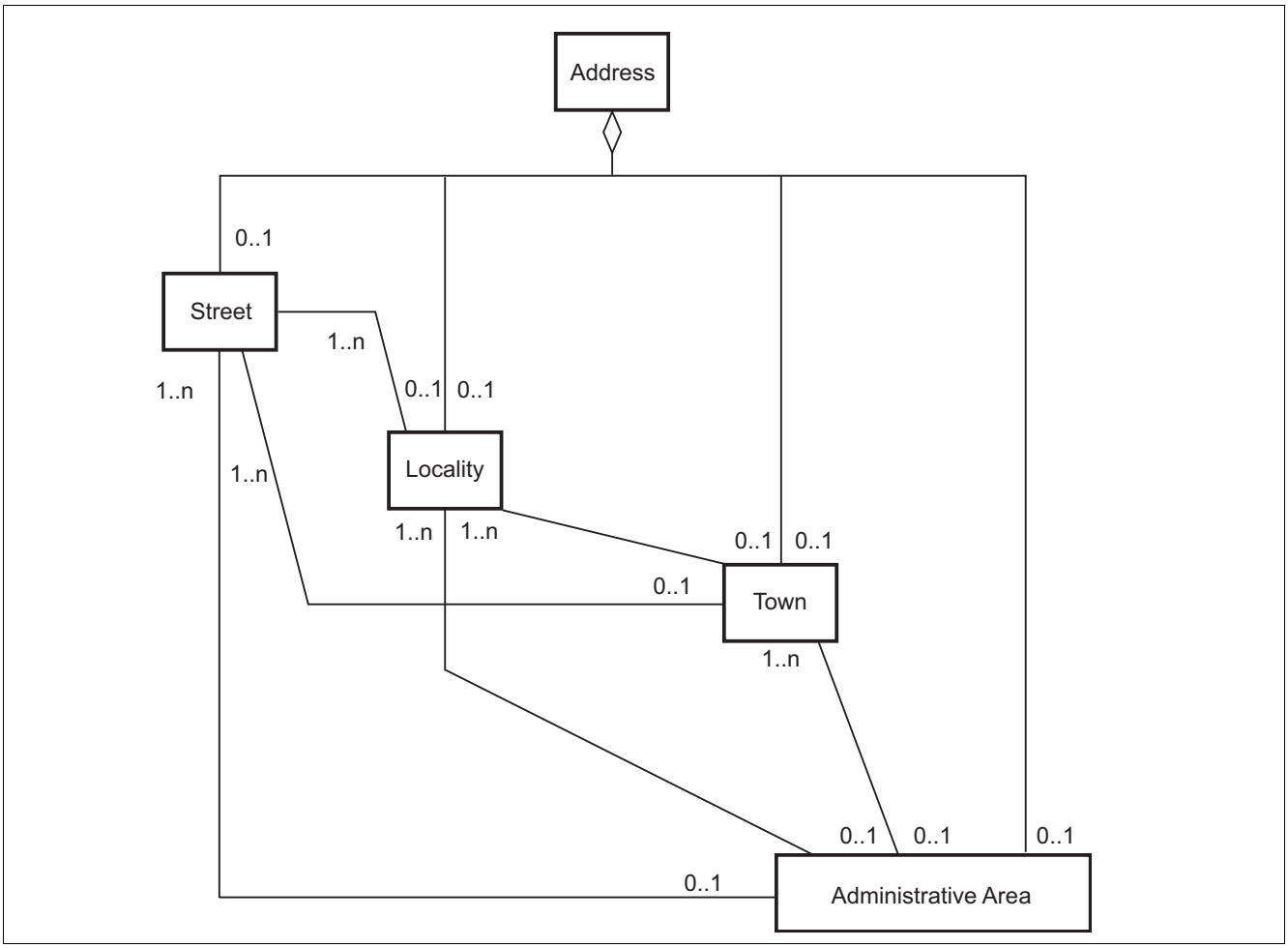
**name:** geographic address

**territory of use:** The United Kingdom

**spatial unit(s):** administrative area, town, locality, street

These spatial units, and the relationship between them are shown in Figure D.1. The spatial units are described in detail in Tables D.1 to D.4.

Figure D.1 **Model of addresses**




*NOTE At least one of the classes Administrative Area, Town, Locality and Street should be present to form a meaningful address.*

Table D.1 **Administrative area**

| **Attribute** | **Value** |
|---|---|
| name | administrative area |
| definition | a) a highest level local administrative area, which may be a county, unitary authority or metropolitan district; or<br>b) Greater London; or<br>c) an island or group of islands |
| identifier | administrative area name, e.g. “Cambridgeshire”, “Isle of Wight”, “Southampton”, “Comhairle nan Eilean Siar”, “London” |
| owner | Office of the Deputy Prime Minister |

Table D.2 **Town**

| **Attribute** | **Value** |
|---|---|
| name | town |
| definition | a) city or town that is not an administrative area; or<br>b) a suburb of an administrative area that does not form part of another town; or<br>c) a London District<br>*NOTE A town may not have well-defined boundaries.* |
| identifier | a) by its town name alone, e.g. “Cirencester”, “Ealing”; or<br>b) by the combination of its town name and the name of the administrative area within which the town is situated, e.g. “Stroud, Gloucestershire” |
| owner | Ordnance Survey |

Table D.3 **Locality**

| **Attribute** | **Value** |
|---|---|
| name | locality |
| definition | local area identified formally or informally by a particular name where people live or where certain activities take place that may form part of a town, or stand in its own right within the context of one or more administrative areas<br>*NOTE A locality may be a neighbourhood, suburb, district, village, estate, settlement, parish or industrial estate. It may not have well-defined boundaries.* |
| identifier | a) the combination of its locality name and the related administrative area name within which the locality is situated, e.g. “Barnsley, Gloucestershire”; or<br>b) the combination of its locality name, the town name of the related town, and if necessary to identify the town, the related administrative area name within which the town is situated, e.g. “Stratton, Cirencester”, “Sevington, Ashford, Kent”; or<br>c) the combination of its town name and, if necessary to identify the town, the related administrative area name within which the town is situated, e.g. “Ashford, Kent” |
| owner | Local Authorities |

Table D.4 **Street**

| **Attribute** | **Value** |
|---|---|
| name | Street |
| definition | whole or part of a highway, road, lane, footpath, square, court, alley or passage |
| identifier | a) the combination of its designated street name and the name of the related town within which the street is situated and, if necessary to identify the town, the name of the related administrative area within which the town is situated, e.g. “Acacia Avenue, St Ives, Cambridgeshire”; or<br>b) the combination of its designated street name, the name of the locality within which the street is situated, the town name of the related town within which the locality is situated and (if necessary to identify the town or in the case of a locality not within a town) the name of the related administrative area within which the town or locality is situated, e.g. All Saints Way, Pen-y-fai, Bridgend”. |
| owner | Street Naming and Numbering Authorities |

# Bibliography

BS EN ISO 19112:2003, *Geographic information — Spatial referencing by geographic identifiers*.

BS EN ISO 19113:2002, *Geographic information — Quality principles.*

BS EN ISO 19115:2003, *Geographic information — Metadata.*

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