

NZTopo Data Dictionary  
DATA DOCUMENTATION GUIDE  
TOPOGRAPHIC DATA FOR GIS  
PRIMARY SOURCE SCALE 1:50 000

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## 1. NZTOPO data dictionary

NZTopo is a term used to encompass the digital data used to produce 1:50 000 topographic maps for New Zealand.

The components of the NZTopo Data Dictionary are:

- Data Documentation Guide (this document)
- And a Database (Data Dictionary) describing NZTopo objects, their attributes, and associated information in HTML format.

The Data Dictionary html library precisely describes each object. This includes its object class, entity source, object inheritance, classification, related objects and valid attributes.

The classification field holds a value that indicates the scale of the map from which the data has been captured and it's whereabouts.

- 50k topo = New Zealand/Antarctica/Pacific/Auckland Island
- 50k ant = Antarctica
- 50k auck = Auckland Island
- 25k Pacific = Pacific

Note: some objects in the database are unique to a particular map series and some objects may appear under more than one classification.

## 2. INTRODUCTION

NZTopo uses an object orientated (OO) data model. Real world entities are abstracted and held as objects where each object belongs to only one class. The OO database more closely resembles the real world. The "information model" it uses is necessarily more complex than the collection of tables in a relational system. The advantage of the OO model is in the direct correspondence between the way in which real entities are perceived, and the data model designed to represent them.

There are over two hundred object classes in NZTopo, with some object classes having up to seven attributes.

NZTopo has been primarily sourced from the 1:50 000 scale National Topographic Map Series. Other map series to be added are the Antarctica 1:50,000 series and Topographic Map 272 series (Pacific Island mapping).

The spatial component of the data is composed of points, lines or polygons.

## 3. NZTopo DATA CONCEPTS

### 3.1 Object

A geographic entity that has one or more coordinate points is referred to as an object. These spatial objects are the most basic data unit within the database.

Each object has related attributes that describe its geographic location and other information (geographic or non-geographic).

The size of the object in the real world objects dictates how it is represented within NZTopo. It may be represented as either a point or a polygon object. E.g. swamp\_pnt, swamp polygon objects.

There are three types of objects: points, lines and polygons.

### 3.1.1 Point (\_pnt)

A point object has one coordinate point to locate it on the surface of the earth. A point object may be used to locate single objects or area objects that are represented by a point because of the scale.

### 3.1.2 Line (\_cl, \_edge)

A line object must have a start point and an endpoint, and can contain an unlimited number of other points to trace its route. Linear objects have topology formed between themselves and other associated objects.

### 3.1.3 Polygon (\_poly)

A polygon is a object that encloses an area. To define the area, a polygon's boundary lines must be topologically connected end-to-end to form a closed loop.

## 3.2 Attribute Data

Attributes further identify an object class. They may hold spatial and non-spatial properties of the object.

E.g. road\_cl object:

<b>Attribute</b>	<b>Attribute Value</b>
Name	DARTMORE ROAD
Road name id	1030000123456
Road surface	Sealed
Road number of lanes	2
Road highway number	1

## 4. LINEAGE

The NZTopo database contains the digital data used to produce 1:50 000 topographic maps of New Zealand. It is held in terms of the New Zealand Transverse Mercator projection.

Photogrammetric acquisition of the base data for the series commenced in the Department of Lands and Survey in 1973, was continued by the Department of Survey and Land Information between 1987 and 1996 and was completed in 1997 under the administration of Land Information New Zealand (LINZ). The process of digital capture took place between 1989 and 1998. Since 1996 LINZ has been carrying out a progressive programme of maintenance of the NZTopo database.

In 2003 the database was transformed from the New Zealand Map Grid projection to the New Zealand Transverse Mercator (NZTM2000) projection.

### 4.1 Accuracy

The positional accuracy of existing spatial data is defined as a statistical estimate of the degree to which the planimetric co-ordinates and elevations of digital spatial objects agree with the position of the corresponding object in the real world.

NZTopo data complies with the following specification:

- planimetric (x,y) accuracy - "90% of well-defined points<sup>1</sup> are within  $\pm 22\text{m}$ ".
- vertical (z) accuracy - "90% of well-defined points are within  $\pm 5\text{metres}$ "; contour lines are within  $\pm 10\text{metres}$ .

Inaccuracies in the position of the data have resulted from:

- inaccuracies inherent in the source map data resulting from the map production processes. This includes the Cartographic principles of generalisation and displacement.
- and/or the inaccuracies in the digitising processes used to convert the analog data to a digital format.

### 4.2 Impact of Cartographic Generalisation and Displacement principles

NZTopo was designed as, and still remains a database whose main role is the production of 1:50 000 Topographic Mapping Series.

Built into NZTopo are the cartographic principles of displacement and generalisation. Displacement of data is most commonly found in objects on either side of road centrelines. The cartographic representation of a 2-3 lane road measures 40 metres on the ground. To allow for clear cartographic presentation objects that are alongside roads may have to be offset from their real world position

### 4.3 Coordinate Standard

Northing and Easting coordinates are stored in terms of New Zealand Transverse Mercator (NZTM2000). Heights are in metres above Mean Sea Level (MSL) and, where captured, are held as an attribute against the object.

### 4.4 Resolution of Coordinates

The positional data in NZTopo is expressed in NZTM co-ordinates to 6 decimal places eg 0.000001. This is an indication of the level of storage resolution of the data within NZTopo and not an expression of the absolute accuracy of the data.

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<sup>1</sup> A well-defined point can be accurately identified both in the real world and in the digital data.

## 5. ESSENTIAL CHARACTERISTICS OF NZTopo

There are a number of properties common to the majority of data. Handling of name attributes and areas sharing coincident boundaries are the same regardless of the object.

### 5.1 Object Class Naming Conventions

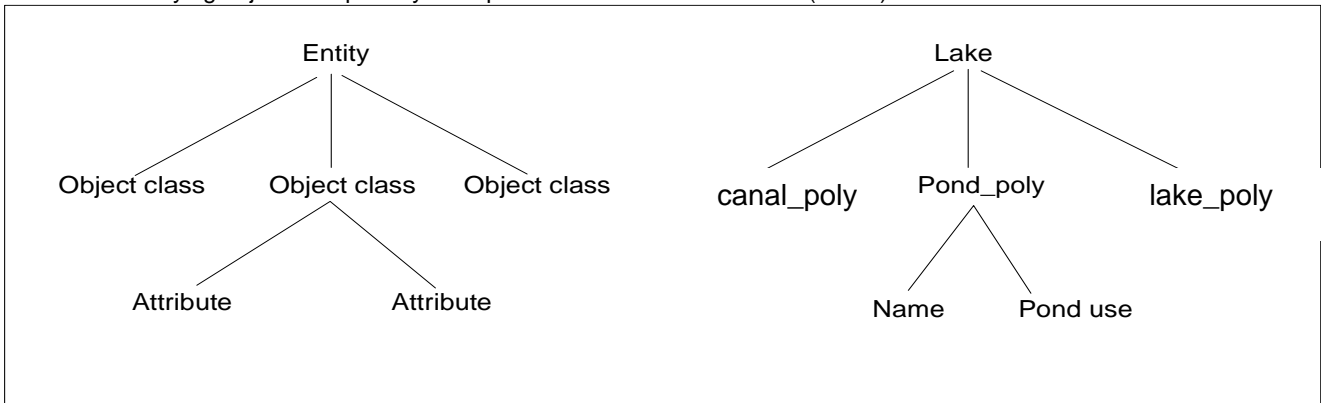
The following are the standard extensions used in NZTopo:

Extension	Meaning	Explanation
_cl	Centre line	Represented by a single line through the centre of the object
_pnt	Point	Represented by a single point
_poly	Polygon	A polygon object depicting the shape of an area
_edge (edg)	Edge	Used where the object is represented as a single line due to it's vertical or near vertical characteristics, e.g. a waterfall, slip etc.

The only topographic objects whose codes do not fall into one of these categories are coastline and contour.

### 5.2 Entities

An entity is a real world phenomenon, which cannot be divided into phenomena of the same class. It is the method of classifying objects adopted by the Spatial Data Transfer Standard (SDTS) FIPSPUB 173.



Objects in NZTopo are classified according to their entity. The source of the entity classification comes from either the SDTS model, ICSM (Intergovernmental Committee on Surveying and Mapping) or a NZ listing (entities either typical to New Zealand).

## 6. NZTopo RELATED OBJECTS

### 6.1 Hydrography Objects

The hydrography theme depicts objects related to drainage and flow of water across the earth's surface. This section gives an overview of the content and structure of the hydrography theme.

#### 6.1.1 Structure and Content of the Hydrography Theme

The hydrography theme consists of points, linear and polygon objects forming drainage patterns.

Note: The coastline object is the line defining Mean High Water Mark (MHWM).

<b>Object inheritance</b>	<i>point</i>			
<b>Object class</b>	soakhole_pnt	spring_pnt	swamp_pnt	waterfal_pnt
<b>Object inheritance</b>	<i>linear</i>			
<b>Object class</b>	canal_cl water_r_cl	drain_cl waterfal_cl	rapid_cl waterfal_edg	river_cl
<b>Object inheritance</b>	<i>polygon</i>			
<b>Object class</b>	canal_poly ice_shelf_poly reservr_poly shoal_poly sea_poly	ice_poly mangrove_poly lake_poly snow_poly	island_poly lagoon_poly rapid_poly swamp_poly	coastline pond_poly river_poly waterfal_poly

### 6.2 Relief Objects

The relief theme contains elevation height points and contours (20m interval) which depict the shape of the earth's surface. It also has other relief-related objects such as cliffs, embankments etc.

#### 6.2.1 Structure and Content of the Relief Theme

The relief theme consists of point and linear objects depicting relief patterns. The contour and height\_pnt objects both hold elevation as an attribute.

<b>Object inheritance</b>	<i>point</i>			
<b>Object class</b>	blowhole_pnt sinkhole_pnt	cave_pnt	height_pnt	saddle_pnt
<b>Object inheritance</b>	<i>linear</i>			
<b>Object class</b>	cliff_edge slip_edge	contour	cutting_edge	embankmnt_cl

### 6.3 Utility Objects

The utilities theme depicts objects that form part of the public service utility infrastructure that can clearly be shown at a scale of 1:50000.

### 6.3.1 Structure and Content of the Utilities Theme

The utilities theme consists of points and linear objects depicting public service utilities.

<b>Object inheritance</b>	<i>point</i>		
<b>Object class</b>	gas_val_pnt	pylon_pnt	
<b>Object inheritance</b>	<i>linear</i>		
<b>Object class</b>	pipeline_cl	powerline_cl	telephone_cl

## 6.4 Transport Objects

The transport theme depicts objects that are related to air, water, rail and road transportation.

### 6.4.1 Structure and Content of the Transport Theme

The transport theme consists of points, linear and polygon objects that form road/rail networks and other related transportation systems.

<b>Object inheritance</b>	<i>point</i>			
<b>Object class</b>	ford_pnt	helipad_pnt	rail_stn_pnt	
<b>Object inheritance</b>	<i>linear</i>			
<b>Object class</b>	ferry_cr_cl	railway_cl	road_cl	track_cl
<b>Object inheritance</b>	<i>polygon</i>			
<b>Object class</b>	airport_poly	runway_poly		

## 6.5 Non-Vegetative Landcover Objects

The non-vegetation theme depicts landcover objects excluding those of vegetation.

### 6.5.1 Structure and Content of the Non-Vegetative Landcover Theme

The non-vegetation theme consists of point, linear and polygon objects showing landcover phenomena.

<b>Object inheritance</b>	<i>point</i>			
<b>Object class</b>	cemetery_pnt	fumarole_pnt	geo_bore_pnt	grave_pnt
	hist_ste_pnt	mine_pnt	rock_out_pnt	rock_pnt
<b>Object inheritance</b>	<i>linear</i>			
<b>Object class</b>	dredg_tl_cl	racetrk_cl		
<b>Object inheritance</b>	<i>polygon</i>			
<b>Object class</b>	cemetery_poly	golf_crs_poly	grav_pit_poly	landfill_poly
	mine_poly	moraine_poly	moran_wl_poly	mud_poly
	pumce_pt_poly	quarry_poly	race_trk_poly	reef_poly
	res_area_poly	rifle_rg_poly	rock_poly	sand_poly
	scree_poly	shingle_poly	showgrd_poly	sprtfld_poly

## 6.6 Structure Objects

The structures theme depicts objects of a man-made nature e.g. fences, monuments, bridges, buildings etc.

### 6.6.1 Structure and Content of the Structures Theme

The structures theme consists of point, linear and polygon objects.

<b>Object inheritance</b>	<i>point</i>			
<b>Object class</b>	beacon_pnt cattlstop_pnt floodgte_pnt ladder_pnt radar_dm_pnt siphon_pnt windmill_pnt	bivouac_pnt chimney_pnt flume_pnt mast_pnt redoubt_pnt tank_pnt wreck_pnt	building_pnt dredge_pnt gate_pnt monument_pnt sat_stn_pnt tower_pnt stockyard_pnt	buoy_pnt flare_pnt kiln_pnt pa_pnt shaft_pnt well_pnt
<b>Object inheritance</b>	<i>linear</i>			
<b>Object class</b>	boatramp_cl cblwy_ind_cl flume_cl ski_tow_cl walkwire_cl	boom_cl cblwy_peo_cl ladder_cl slipway_cl weir_cl	breakwtr_cl dam_cl marne_fm_cl spillwy_edge wharf_cl	bridge_cl fence_cl ski_lift_cl tunnel_cl wharf_edge
<b>Object inheritance</b>	<i>polygon</i>			
<b>Object class</b>	building_poly siphon_poly	dry_dock_poly tank_poly	fish_fm_poly	marne_fm_poly

## 6.7 Vegetative Landcover Objects

The vegetation theme depicts objects related to plant life.

### 6.7.1 Structure and Content of the Vegetative Theme

The vegetation theme consists of point, linear and polygon objects showing a representative tree pattern, shelter belts and forested areas.

<b>Object inheritance</b>	<i>point</i>			
<b>Object class</b>	tree_pnt			
<b>Object inheritance</b>	<i>linear</i>			
<b>Object class</b>	shelt_blt_cl			
<b>Object inheritance</b>	<i>polygon</i>			
<b>Object class</b>	auck_veg_poly plantatn_poly mari_complex_poly vineyard_poly	bog_poly native_poly mixed_scrub_poly	exotic_poly scatscrb_poly tundra_poly	orchard_poly scrub_poly tussock_poly

## 6.8 Names and Descriptive Text

### 6.8.1 Structure and Content of the Name and Descriptive Text Theme

This theme holds 2 objects. Geo\_name and descrip\_text.

Geo\_name is the cartographic representation of the names in the Geographic Names Database.

Descrip\_text is the descriptive text associated to NZTopo objects or general notes or points of information.

## 7. GLOSSARY

### **Attribute**

A descriptive characteristic of a object. An attribute has a may have a defined set of values.

### **Class**

See object class.

### **Coordinate System**

A spatial referencing system that records the location of geographic objects.

### **Database resolution**

See resolution.

### **Digital terrain modeling**

The representation and analysis, by a computer, of a land surface, area of ocean, or other structure with respect to elevation or a primary attribute such as population distribution.

### **Entity**

A real world phenomenon which cannot be divided into phenomena of the same type.

### **Generalisation**

A process by which objects which cannot be separated at a given map scale are displaced from their true positions for the sake of cartographic clarity.

### **GIS**

Geographic Information System. A spatial database which is manipulated via a set of spatial operators or commands.

### **Graphic\_point**

A spaghetti point.

### **Graphic\_line**

A spaghetti line.

### **ICSM**

Intergovernmental Committee on Surveying and Mapping.

### **Image**

A digital representation of a map, drawing, or picture. It can be scanned in, remotely sensed, or obtained through other means. It is made up of horizontal lines of pixels.

### **Inheritance**

The value resources inherited from other classes.

### **Line**

A object that has a start point, and endpoint, and any number of intermediate points.

### **MSL**

Mean Sea Level.

### **MHWM**

Mean high water mark.

### **NZMG**

New Zealand Map Grid.

### **NZTM(2000)**

New Zealand Transverse Mercator 2000.

**NZTopo50**

The national, topographic vector database sourced from the 1:50,000 Topographic Map 260 series.

**Object**

An identifiable package of data in an object-orientated database.

**Object Class**

A named description of a logical data structure that can be held in a database..

**Object Orientated**

A database model which maps directly into the real world.

**Object Type**

A classification of objects according to their geographical extent and graphic representation. See also *point, line and polygon*

**Orthophoto**

Photograph or digital image which has the properties of an orthographic projection. It is derived from a perspective aerial photograph by differential rectification so that the image displacements caused by camera tilt and terrain relief are removed.

**Pixel**

An abbreviation for picture element. An individual cell in a raster data set.

**Point**

A object that has a single coordinate point to locate it on the earth's surface.

**Polygon**

An area object whose perimeter forms a closed polygon. There is only one external polygon. There may be one or more internal nested inner boundaries.

**Positional accuracy**

Statistical estimate of the degree to which planimetric co-ordinates and elevations of objects agree with their real world values.

**Projection**

A systematic representation of the earth on a flat surface (plane). Each projection has special properties that make it useful for specific types of mapping.

**Raster**

A cellular data structure composed of rows and columns. Each cell has a value which represents an attribute value for the object represented by that group of cells.

**Representation**

A collection of specifications for how each object appears. An objects representation can combine lines, symbols, text and shading.

**Repromat**

Colour-separated reproduction material on a stable base used for the printing of maps.

**Resolution**

The precision to which the data is stored and reported. For example, a resolution of 0.001 metres means that the data is stored and reported to an accuracy of 1mm. Note that this is not the same as the accuracy of the data itself.

**Simple\_point**

A topologically structure point.

**Simple\_line**

A topologically structured line.

**Simple\_area**

A topologically structured area.

**Spaghetti**

Unstructured data. No topology associated with objects.

**Spatial Data**

Data that locates an object geographically and determines the way it is represented on screen.

**Spheroid**

An ellipsoidal model of the earth's surface, derived from a standard formula for the Earth's gravity potential and a formula expressing the polar flattening due to the earth's rotation.

**SDTS**

Spatial Data Transfer Standard.

**Symbol**

A user-defined graphic that represents a point object.

**Terrain analysis**

The representation and analysis, by a computer, of a land surface, area of ocean, or other structure with respect to elevation.

**Topographic Map**

A published map. LINZ is responsible for publishing the following map series: 1:4,000,000 1:3,000,000 1:2,000,000 1:1,000,000 1:500,000 1:250,000 and 1:50,000.

**Topographic Map 260 Series**

The published topographic map series at 1:50,000 scale.

**Topology**

The geometric and connective relationships that exist among objects.

**Vertical Integration**

Vertical integration is defined as the process of realigning objects that at map scale share a common boundary in such a manner that the common boundary is entirely coincident.

**Vector data**

Spatial data in which the location of a real world phenomenon is defined by points and straight lines (vectors) between these points.