

NZTopo Data Dictionary

Data Documentation Guide

Topographic Data for Geographic
Information Systems.

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 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 map series for which the object is designed for.

- 50k topo = New Zealand/Antarctica/Pacific/Auckland Island
- 50k ant = Antarctica
- 250K topo = New Zealand

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 around one hundred and fifty object classes in NZTopo.

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_poly 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:

Attribute	Attribute Value
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 1:50,000 data complies with the following specification:

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

NZTopo 1:250,000 data complies with the following specification:

- planimetric (x,y) accuracy - "90% of well-defined points are within $\pm 150\text{m}$ ".
- vertical (z) accuracy - "90% of well-defined points are within $\pm 5\text{metres}$ "; contour lines are within $\pm 50\text{metres}$.

Position differences between the data and the real-world can be attributed to:

- 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 at 1:50,000 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.

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

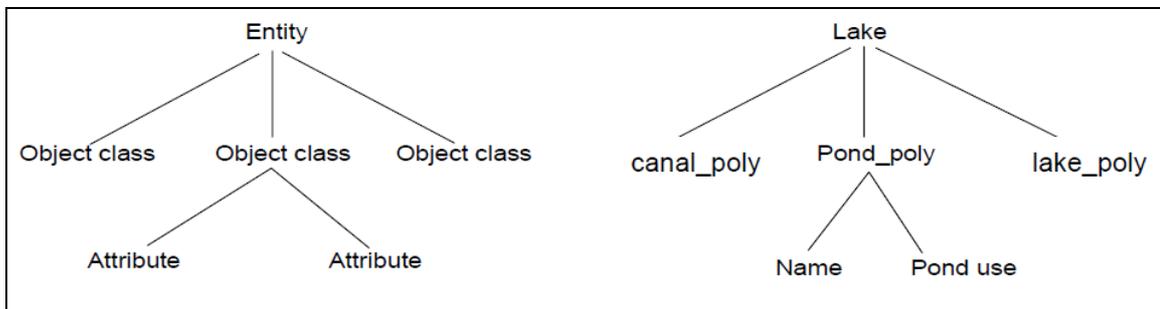
The following are the standard extensions used in NZTopo:

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	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. And the text objects geographic_name and descriptive_text.

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).

Object inheritance	<i>point</i>			
Object class	soakhole_pnt	spring_pnt	swamp_pnt	waterfal_pnt
Object inheritance	<i>linear</i>			
Object class	canal_cl	drain_cl	rapid_cl	river_cl
	water_race_cl	waterfall_cl	waterfall_edge	
Object inheritance	<i>Polygon</i>			
Object class	canal_poly	ice_poly	island_poly	coastline
	ice_shelf_poly	mangrove_poly	lagoon_poly	pond_poly
	reservr_poly	lake_poly	rapid_poly	river_poly
	shoal_poly	snow_poly	swamp_poly	waterfall_poly

6.2 Relief Objects

The relief theme contains elevation height points and contours (20m interval at 1:50,000 and 100m at 1:250,000) 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

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

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.

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

Please note: Not all utilities are included in the NZTOPO data. For the latest information please contact the utility and infrastructure agencies.

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.

Object inheritance	<i>point</i>			
Object class	ford_pnt	helipad_pnt	rail_station_pnt	
Object inheritance	<i>linear</i>			
Object class	ferry_cr_cl	railway_cl	road_cl	track_cl
Object inheritance	<i>Polygon</i>			
Object class	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.

Object inheritance	<i>point</i>			
Object class	cemetery_pnt	fumarole_pnt	geo_bore_pnt	grave_pnt
	historic_site_pnt	mine_pnt	rock_outcrop_pnt	rock_pnt
Object inheritance	<i>linear</i>			
Object class	dredge_tail_cl	racetrack_cl		
Object inheritance	<i>Polygon</i>			
Object class	cemetery_poly	golf_crs_poly	gravel_pit_poly	landfill_poly
	mine_poly	moraine_poly	moran_wall_poly	mud_pol
	pumce_pit_poly	quarry_poly	race_track_poly	reef_poly
	res_area_poly	rifle_range_poly	rock_poly	sand_poly
	scree_poly	shingle_poly	showground_poly	sportsfield_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.

Object inheritance	<i>point</i>			
Object class	beacon_pnt	bivouac_pnt	building_pnt	buoy_pnt
	cattlestop_pnt	chimney_pnt	dredge_pnt	flare_pnt
	floodgate_pnt	flume_pnt	gate_pnt	kiln_pnt
	ladder_pnt	mast_pnt	monument_pnt	pa_pnt
	radar_dome_pnt	redoubt_pnt	sat_stn_pnt	shaft_pnt
	siphon_pnt	tank_pnt	tower_pnt	well_pnt
	windmill_pnt	wreck_pnt	stockyard_pnt	
Object inheritance	<i>linear</i>			
Object class	boatramp_cl	boom_cl	breakwtr_cl	bridge_cl
	cableway_ind_cl	cableway_peo_cl	dam_cl	fence_cl
	fume_cl	ladder_cl	ski_lift_cl	ski_tow_cl
	slipway_cl	spillway_edge	tunnel_cl	walkwire_cl
	weir_cl	wharf_cl	wharf_edge	

Object inheritance	<i>Polygon</i>			
Object class	building_poly	dry_dock_poly	fish_farm_poly	marine_farm_poly
	siphon_poly	tank_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.

Object inheritance	<i>point</i>
Object class	tree_pnt

Object inheritance	<i>linear</i>
Object class	shelt_blt_cl

Object inheritance	<i>Polygon</i>			
Object class	exotic_poly	orchard_poly	plantation_poly	native_poly
	scattered_scrub_poly	scrub_poly	vineyard_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: geographic_name and descriptive_text.

7. GLOSSARY

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.

Geographic Information System.

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

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.

NZTopo

The national, topographic vector database.

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*

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.

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.

Spatial Data

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

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: 250,000 and 1: 50,000.

Topology

The geometric and connective relationships that exist among objects.

Vector data

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