Statistics New Zealand
TATAURANGA AOTEAROA

Statistical standard for meshblock

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1 Rationale

Statistical standard for meshblock replaces the 1992 standard, which was published in the New Zealand Standard Areas Classification manual.

The update of the meshblock standard was carried out to reconfirm user needs for a geographic area that optimises data collection and aggregation. The new standard documents a clear purpose for meshblocks and the technical requirements to meet statistical and wider government requirements. It is largely consistent with the 1992 standard, with two main areas of change. First, technical requirements formerly documented by Land Information New Zealand (LINZ) are now included so that the standard reflects all of government practice. Second, minor changes were made to reflect how meshblocks will be managed with modern technology. The conceptual and fundamental basis of the meshblock remains the same as in 1992.

Meshblocks are the smallest geographic units defined by Statistics NZ. The New Zealand-wide system of meshblocks was established in 1976, although the term ‘meshblock’ was used in the 1916 Census of Population and Dwellings.

Meshblocks were designed as an input geography to allow flexibility when aggregated for collection and output purposes. Meshblocks were not designed to be an output area. However, there is high demand from statistical users for small-area statistics and census results were published for meshblocks from 1981–2013.

The physical landscape is constantly changing and cadastral adjustments are made to ensure the correct location of New Zealand's physical features. The placement and maintenance of meshblock boundaries is important to ensure that statistical data is coded to the correct meshblock and that eligible voters are assigned to their correct polling areas to ensure fair voting rights.

The meshblock pattern was first digitised in 1991 by the Department of Survey and Land Information. The coordinate system used from 1991 to 2001 was New Zealand Map Grid (NZMG). In 2001, LINZ adopted New Zealand Transverse Mercator (NZTM or NZTM2000) as the new standard projection for general mapping in New Zealand. This uses a Transverse Mercator projection and is based on the NZGD2000 datum using the GRS80 reference ellipsoid. From 2010, all digital patterns of the New Zealand meshblock, including Chatham Islands meshblocks, are projected NZTM only.

Statistics NZ took over the role of custodian of the digital meshblock pattern from LINZ on 1 February 2016.

This meshblock standard defines meshblocks and describes their primary purposes. The standard sets out requirements and guidelines for the creation and maintenance of the meshblock classification to maximise its usefulness as an input geography. It also identifies Statistics NZ’s responsibilities for maintaining the standard.

2 Definition

A meshblock is both a geographic unit and a classification. It is the smallest geographic unit for which statistical data is reported by Statistics NZ. A meshblock is a defined geographic area, varying in size from part of a city block to large areas of rural land. Meshblocks are contiguous: each meshblock borders on another to form a network covering all of New Zealand, including coasts and inlets. The meshblock classification extends out to New Zealand's 200 mile exclusive economic zone (EEZ).

Primary purposes of a meshblock classification are:

- to provide a small, relevant and flexible building block geography for aggregation into statistical geographies such as sampling, collection, and output areas
- to ensure geographic boundaries can be physically identified and located on the ground by alignment with geographic or physical features, or with the cadastre (New Zealand's land information and survey system for the accurate identification of boundaries for land tenure purposes)
- to form the basis of the New Zealand electoral system as the lowest level building block, by which it defines electorates and polling areas for both parliamentary and local government elections.

3 Meshblock requirements

When developing meshblock requirements, consideration is given to the purposes of meshblocks, the users of our data, wider government needs, existing practices, and international research.

All our geographic classifications should meet the following basic criteria. They should:

- be mutually exclusive
- have complete coverage
- wherever possible, contain only geographically contiguous areas.

For the meshblock classification to meet the above criteria:

- no meshblock should overlap another
- meshblocks must cover all of New Zealand, including coasts and inlets, extending out to the 200 mile EEZ. Note: while the meshblock classification extends to the 200 mile EEZ, the meshblock geographic units are only digitised to the 12 mile limit.

As a flexible building block geography, suitable for grouping up to both collection and output geographies, meshblocks must be small.

- The optimal size for a meshblock is 30–60 dwellings.
- When meshblocks exceed 80 dwellings, they are reviewed for splitting.
- Meshblocks should be no larger than 120 dwellings (unless they contain a large apartment block or other multi-dwelling building).
- Some meshblocks will be zero population, for example water or high country meshblocks.

The boundaries of meshblocks:

- should align to the cadastre, road centrelines, or railway centrelines
- should, where appropriate, align to topographical features, for example river centrelines, ridgelines (see Appendix 1: Spatial alignment)
- must not dissect or divide institutional populations, for example hospitals, business establishments, hotels
- should not, where possible, cut through a land parcel
- should, where possible, incorporate adjacent land parcels that have the same owner
- should be physically identifiable and locatable on the ground
- should keep communities of interest together
- should, where possible, be easily traversable on foot by survey enumerators
- that align with electoral boundaries must not be adjusted, unless requested as part of a representation review. (Electoral boundaries must align with meshblocks, as set out in the Local Electoral Act 2001, Sections 19T, 19U and 19W.)

If no meaningful features exist near the proposed meshblock boundary, point-to-point boundaries are allowed. These are boundaries that have been digitally defined by drawing a line across the ground without reference to any meaningful features.

Meshblocks are maintained by splitting, amalgamating, and nudging their boundaries to ensure they are relevant for their purpose and continue to meet the standard.

See Operational issues – meshblock maintenance for information about meshblock maintenance.

4 The meshblock classification and coding process

Meshblock is a flat classification with the number of meshblocks increasing annually as meshblocks are split.

A meshblock is identified by a unique seven-digit number called a standard meshblock code. When meshblocks are split or amalgamated, each new meshblock is given a new code. The original meshblock codes no longer exist within that version and future versions of the meshblock classification. Each meshblock code is unique and is never reused. Meshblock codes do not change when a meshblock boundary is nudged.

In 2015, new meshblock numbering was introduced. This numbering system is approximately sequential. The first meshblock number in this new sequential numbering pattern is 4000000. A master concordance is held by Statistics NZ to link all versions of the meshblock classification.

See Splitting, nudging, and amalgamating meshblocks for further information about making meshblock changes.

See the Geographic boundary files webpage for more information about the meshblock numbering, in the metadata files for ANZLIC digital boundaries metadata files.

5 The land/water demarcation classification

There is a separate classification to identify land and water meshblocks. Every meshblock must be classified as either land or water. Note that some historic meshblocks had a classification of 'other', where the meshblock consisted of both land and water.

Land/water demarcation classification:

- 1 – Land
  - 11 – Island
  - 12 – Mainland
- 2 – Water
  - 21 – Inland water
  - 22 – Inlet
  - 23 – Oceanic

1 – Land meshblocks

Land meshblocks are meshblocks that have been classified as island or mainland meshblocks.

11 – Island meshblocks

Island meshblocks are meshblocks containing islands that are near to the shore but not linked to a mainland meshblock.

In an effort to separate land from water, the majority of islands, or groups of islands, have now been digitised and assigned a meshblock, regardless of whether they are named or populated.

12 – Mainland meshblocks

Mainland meshblocks are meshblocks containing either land-only areas, or land/water areas where the water area:

- has not been defined as an inland water meshblock
- is not generally used for shipping activity, and/or
- cannot be easily separated from the land-based meshblock (eg small lakes or rivers where the meshblock boundary runs down the centre of the river).

The mainland meshblocks exclude islands (unless they are close to the coast, in which case they may be hooked to a mainland meshblock), but may include some inlet and oceanic areas.

2 – Water meshblocks

Water meshblocks are the aggregation of meshblocks that have been classified as inland water, inlet, or oceanic meshblocks.

21 – Inland water meshblocks

Inland water meshblocks are meshblocks containing lakes and rivers where the meshblock is water only. When separating lakes from land the following guidelines apply:

- All lakes greater than or equal to 9km^2 must be separated from land.
- If the lake is less than 9km^2 and it is used for business or recreational purposes, or people are living on the lake, then the land and water must be separated into separate meshblocks.

- If the lake is less than 9km^2 in size and is not used for business or recreational purposes, or there are no people living on the lake, then the lake can be incorporated into the mainland meshblock.

22 – Inlet meshblocks

Inlet meshblocks are meshblocks containing inlets, bays, coastal harbours, ports, lagoons, or estuaries where the meshblock is water only.

23 – Oceanic meshblocks

Oceanic meshblocks are meshblocks including the area from the mean high water mark or the mean low water springs (depending on the territorial authority) to the extent of the 200 mile EEZ, excluding inlet meshblocks and island meshblocks. Note that meshblock geographic units are only digitised to the 12 mile limit.

6 Operational issues – meshblock maintenance

This chapter explains the process, and outlines the rules and guidelines, for making changes to meshblocks.

- Splitting, nudging, and amalgamating meshblocks
- Summary of nudge and amalgamation rules and guidelines

The real world is constantly changing: the Earth's features are constantly moving, population and mobility increases, buildings are constructed and demolished, and land use changes. Statistics NZ maintains meshblocks to reflect the changes on the ground. However, since changes cannot be implemented immediately, there will always be a discrepancy between the real world and the most recent version of the classification.

A number of electoral and administrative geographies are legally required to align with meshblocks. This can result in high priority meshblock boundary adjustment requests from sources outside Statistics NZ. These requests can sometimes conflict with requirements of the standard, such as when a meshblock population change breaches the range defined in this standard. A balance between competing needs can be negotiated.

Users of meshblock and other geographic boundaries require access to up-to-date digital boundaries. The boundaries are required before any statistics are made available. In particular, local government requires new digital boundaries to reflect changes that have been made during local government boundary representation reviews.

Changes to the meshblock digital boundary and classification are made throughout the year. A major release is made at 1 January each year with ad hoc releases available to users at other times.

Versioning of meshblocks enables 'major releases' for statistical output requirements and 'minor releases' for internal administrative purposes, or to meet external non-statistical requirements. All versions are released with accompanying metadata.

Splitting, nudging, and amalgamating meshblocks

Meshblocks are maintained by splitting, nudging, and amalgamating their boundaries to ensure they are relevant for their purpose and continue to meet the standard.

The following is the process to be followed when a need for change has been identified or requested.

A need for change is identified or a change request is received

A need for a meshblock change is identified internally or a meshblock change request is received from an external source.

Reasons for meshblock changes can include:

- real world changes resulting in one or more meshblock criteria being violated
- Statistics NZ requests for boundary changes so that statistical geographic boundaries can be moved
- external requests for boundary changes so that legal or administrative boundaries can be moved
- to improve meshblock categorisation within the land/water demarcation classification
- to improve the population size balance of meshblocks in areas of population change
- to maintain alignment to cadastre and other geographic features.

To accommodate requests, Statistics NZ considers how the proposed change will affect the meshblock criteria listed in Meshblock requirements including legally defined boundaries and the impact on statistical requirements. Unless there is a significant reason for doing so, a meshblock will not be changed if the change will create one or more meshblocks that violate the requirements of a meshblock.

The type of meshblock change is determined (split, nudge, or amalgamation)

A **split** is where an existing meshblock is divided into two or more meshblocks. This occurs when a meshblock significantly exceeds the optimal size (see Meshblock requirements). Splitting of meshblocks can occur at any time.

A **nudge** of a meshblock boundary involves the shifting of a boundary common to two or more meshblocks. Nudging can occur at any time, however nudging of meshblock boundaries that are coterminous (that is, have the same border or cover the same area) with administrative or electoral boundaries can only be undertaken when these boundaries are under review.

(See Determine whether proposed changes will violate any meshblock requirements or alignment to other boundaries and Implement change in system.)

Nudging is undertaken where the splitting of a meshblock would create a small irrational meshblock or where the outcome of the nudge has little or no statistical significance. It is preferable that the area being nudged does not contain people, dwellings, or businesses.

The impact on the meshblocks affected by the nudge should generally not result in a variation of the population or employee count in businesses of more than 10 percent, or more than five dwellings. Cases where such variation is exceeded may be further considered due to circumstances such as very low population meshblocks.

The estimated area of land in the meshblock being nudged will vary according to the nature (urban or rural) of the land. Preferably nudges should not exceed the following maximum areas:

- urban – five hectares
- rural (excluding high country) – 20 hectares
- rural (high country)/water areas – 50 hectares.

However, in some instances it may be more practical to implement a larger nudge than it is to create a meshblock of nil or small residential or business population.

Amalgamation of meshblocks is permitted only once every five years (prior to a census), where small, statistically insignificant meshblocks exist. The following general rules apply.

- The meshblock must be stable with no or minimal population or economic activity change over the past two census periods.
- Meshblocks must contain zero or near-zero ‘usually resident’ population.
- Meshblocks should contain no major economic activity.
- The boundary to be removed through the amalgamation of meshblocks must not be a statistical or administrative boundary. See Summary of nudge and amalgamation rules and guidelines for exceptions to this rule.
- Meshblocks to be amalgamated should have the same urban rural classification.

Determine whether proposed changes will violate any meshblock requirements or alignment to other boundaries

Under sections 19T(b), 19U(b), and 19W(c) of the Local Electoral Act 2001, all ward, constituency, community board, local board, and territorial authority subdivision boundaries

(including those of Māori wards or constituencies) must coincide with the boundaries of meshblocks determined by Statistics NZ and used for parliamentary electoral purposes.

Nudges to boundaries cannot be made where a boundary is coterminous with an electoral (general electoral district and Māori electoral district), regional council (including constituency and Māori constituency), or territorial authority (including community board, local board, ward, and territorial authority subdivision) boundary. Exceptions to this rule only occur when representation reviews for local government and parliamentary elections are being undertaken at the same time and it is known that both boundaries will change. At this time boundary changes are negotiated to ensure they meet all needs (statistical and electoral/administrative) as much as possible.

Nudges to boundaries that are coterminous with statistical geographies or urban rural areas, or are coterminous with administrative boundaries, may only proceed after consultation and agreement has been obtained from the appropriate parties when dwellings, or residential or business populations are affected. The reverse process is also possible. After consultation, changes to electoral/territorial authority boundaries may result in meshblock boundaries being nudged.

If a local authority wishes to develop community board, local board, territorial authority subdivision, ward, Māori ward, constituency, or Māori constituency boundaries that do not align with meshblock boundaries, they will need to consult Statistics NZ to determine whether specific meshblock boundary alterations are possible.

Implement change in system

Meshblock changes that meet the criteria outlined above are carried out using the meshblock edit tool in the Geospatial Management System within ArcGIS.

Summary of nudge and amalgamation rules and guidelines

Boundaries that can be nudged to align non-cadastral to cadastral boundaries where no dwelling or population is affected:

- area unit
- urban/rural area.

Boundaries that can only be nudged during representation reviews:

- territorial authority
- ward
- Māori ward
- community board
- local board
- territorial authority subdivision
- regional council
- constituency
- Māori constituency
- district health board.

Boundaries that can only be nudged when requested by the Representation Commission:

- general electoral district
- Māori electoral district.

7 Responsibilities

Statistics NZ is both the steward and the custodian of the meshblock and is responsible for facilitating reviews and updates of this statistical standard. Statistics NZ's Geospatial team is responsible for ongoing maintenance, versioning, and release of the meshblock classification.

As required by the New Zealand Geospatial Strategy 2007, Statistics NZ will adhere to government standards and guidelines for fundamental (spatial) datasets including:

- Steward Roles and Responsibility for Fundamental Datasets
- Custodian Roles and Responsibility for Fundamental Datasets
- Appointment Process for Stewardship of Fundamental Spatial Datasets
- using Spatial Data Infrastructure (SDI) standards for accessibility and interoperability published in the New Zealand Geospatial Office's SDI Cookbook (available as PDF from LINZ website)
- ANZLIC Metadata Profile v 1.1 on LINZ website.

Glossary

ArcGIS	Geographic information systems (GIS) for working with maps and geographic information
cadastral (cadastre)	Legally defined parcel boundary
concordance	A concordance provides a linking between versions or between classifications. Concordance can also be called correlation, correspondence, or mapping.
coterminous	Having the same boundary
custodian	Person responsible for implementing appropriate data management and the continued existence, availability, and integrity of the dataset for as long as is required as specified by the Steward
Geospatial Management System (GMS)	Statistics NZ corporate tool and repository for the management and maintenance of geographic spatial data
meshblock	Smallest geographic unit for which statistical data is collected and processed
meshblock edit tool	Tool used within the GMS for editing meshblock boundaries
non-cadastral	Boundaries that do not align to a cadastral boundary
steward	Owner and manager of the data and information on behalf of the Crown

Appendix 1: Spatial alignment

To ensure alignment with the cadastre, meshblocks should, where possible, adhere to:

- cadastral boundaries, for example parcel boundaries, easement boundaries, meridional circuit boundaries, road corridors, surveyed definitions of topographic and hydrographic boundaries
  (Note: The meridional circuit was established in the late 1870s. Covering all of New Zealand, each circuit was a block of land with a primary station, whose location was carefully established by astronomical observations. The station formed the basis of the triangulation networks which followed.)
- connective or projected boundaries (eg bearings and coordinates expressed in Lat Long, NZMG, NZTM), feature to feature (eg trig to trig, peak to peak, parcel corner to road intersection), feature to intersect (eg projection from parcel boundary to intersection with road centreline), lines across river mouths, harbours, or bays (where well defined, eg cadastral intersection to intersection)
- offset boundaries, for example outer boundary of Territorial Sea and EEZ, centrelines of surveyed road and railway corridors, streams, parcels, centrelines of physical road and railway formations, streams, parcels, road frontages
- inclusive boundaries (where the general shape and location is graphically defined but no absolute precision exists), for example boxes or lassos drawn around rocks or island groups, lines fencing off areas of water between the coastline and the outer limit of the Territorial Sea, lines across river mouths, harbours, bays (where approximated)
- topographic and hydrographic boundaries, for example streams, rivers, lakes, coastline definitions (such as mean high water mark, mean low water mark), ridgelines, river banks, islands, bush lines, real time definitions (moves with feature), historic definitions (as it existed at a certain point in time, latest definition always applies), surveyed definitions (as defined by survey at a certain point in time)
- constructed features, for example road centrelines, railway centrelines, dams, groynes, building complexes, fence lines
- current and historic boundaries – at times boundaries are maintained in relative alignment, in accordance with the historic location of features such as former streambeds, former cadastral boundaries, and the former location of a road
- jurisdictional boundaries (based on a combination of the above, but with an additional status in that the intent of the meshblock line is to follow the boundary, rather than the features that the boundary follows), for example wards, territorial authorities, regions, electoral boundaries, jury districts.