

Proposal to require the use of NZVD2016 for cadastral surveys

Consultation Document

Office of the Surveyor-General

August 2023



Acceptance

Role	Name	Date
Surveyor-General	Anselm Haanen	28 August 2023

Reference documents & useful links

Location	Description
Cadastral Survey Rules 2021 (LI 2021/95) – New Zealand Legislation (https://www.legislation.govt.nz/regulation/public/2021/0095/latest/whole.html)	Cadastral Survey Rules 2021
https://www.linz.govt.nz/guidance/survey	Cadastral survey standards, rules, and technical guidance
https://www.linz.govt.nz/guidance/geodetic-system/coordinate-systems-used-new-zealand/vertical-datums	LINZ web page - Vertical Datums

LINZ objective ID: A5512774

Have your say - Changes to the official vertical datums for cadastral surveys.

The Surveyor-General is seeking feedback on proposed changes to Schedule 5 of the Cadastral Survey Rules 2021 (Official vertical datums).

Your feedback

1. Feedback can be provided by:
 - Submitting an individual or collective written submission.
 - Contributing to a submission from an organisation or professional body.
2. It would be helpful if feedback:
 - refers to the section number in this document where possible.
 - includes the reason behind your comments, possibly through citing an example.
3. Email written feedback to: sgrulesreview@linz.govt.nz

Feedback is due by Monday 9 October 2023.

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Enquiries

Email: sgrulesreview@linz.govt.nz

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Foreword

It is now seven years since the New Zealand Vertical Datum 2016 was introduced as the official vertical positioning framework for the nation. Many councils have adopted it for their datasets and LINZ uses it for all new elevation datasets.

Most surveyors are now utilising it for their surveys. This is due to the improved availability, reliability and quality of NZVD2016 control marks, and because it enables the use of GNSS technology for reliably transferring heights.

Although NZVD2016 was made available for use on cadastral surveys over four years ago, most surveyors are still converting back to the old local vertical datums for their cadastral survey datasets.

Surveyors are telling us that the mix of old and new datums when preparing surveys is creating additional risks, such as confusion about which datum applies, or errors in transformation.

This proposal to make the use of NZVD2016 mandatory for cadastral surveys is intended to mitigate some of these risks, drive cost-efficiencies into surveys, and make it very clear that NZVD2016 is the datum to be used for all spatial elevation data going forward.



Anselm Haanen

Surveyor-General / Kairūri Matua

1 Overview

1.1 What's the purpose of this consultation document?

The Surveyor-General is seeking your views on proposed changes to the official vertical datums listed in Schedule 5 of the Cadastral Survey Rules 2021.

Currently 14 vertical datums are included in schedule 5 of the Cadastral Survey Rules 2021, these being the nationwide New Zealand Vertical Datum 2016 (NZVD2016) and 13 local vertical datums (LVDs).

We are proposing to remove the 13 LVDs from schedule 5 leaving NZVD2016 as the only official vertical datum available for use.

1.2 Timeframe

Our indicative timing to implement the proposed changes are described in figure 1, below: -

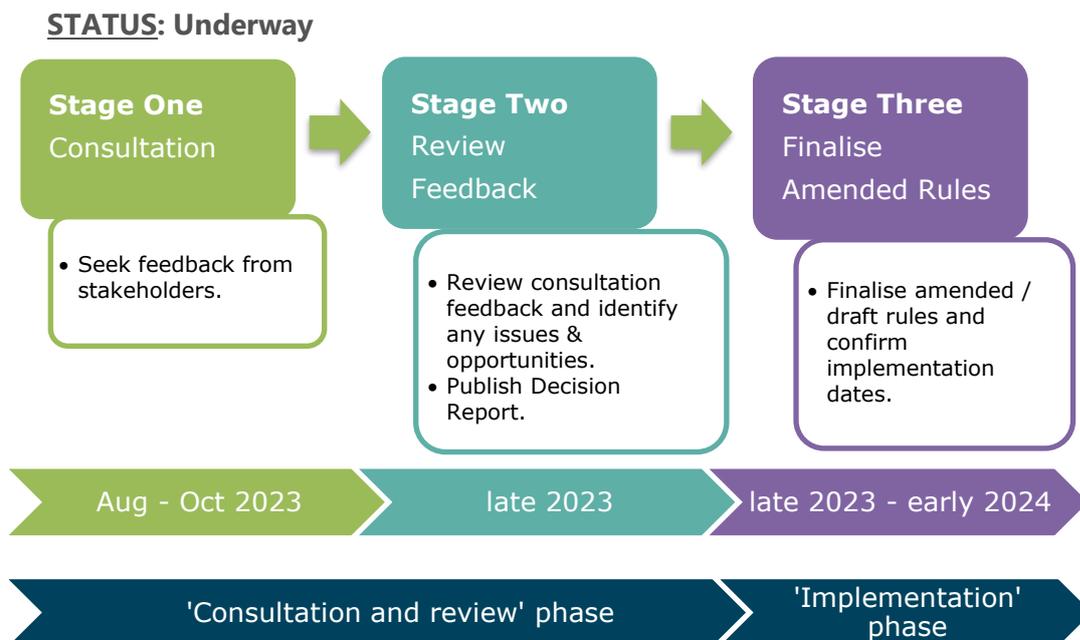


Figure 1: Consultation Process

1.3 Matters to consider

You may wish to consider the following questions when thinking about the proposal: -

1. What are the compliance costs in implementing the proposal and will they be reasonable?
2. Will the proposal achieve a balance between managing risk and flexibility, to achieve efficient and effective outcomes?
3. Is the proposal looking to the future adequately, particularly when considering future technological developments and the expectations of users of cadastral information?
4. How does the proposal contribute to the cadastre and if implemented how would it benefit surveyors using the cadastre, or others who have an interest in the cadastre?

1.4 Further matters to consider for territorial authorities

LINZ supports and encourages territorial authorities to adopt NZVD2016 as a vertical datum. While some territorial authorities have transitioned and adopted NZVD2016, not all territorial authorities have, while some are in the process of transitioning.

LINZ encourages territorial authorities to consider how the proposed changes may have an impact on their work. In almost all cases¹ surveyors will present cadastral survey datasets to the council in terms of NZVD2016, even though existing information may reference LVDs.

The ["NZVD2016 information for councils"](#) LINZ web page provides further information and can be navigated to from the "vertical datums" page referenced at the start of this document (Reference documents & useful links).

¹ Except, for example, plans of existing unit developments that must express levels in terms of the previously deposited plan.

2 The proposal

The following section outlines the proposed changes to Schedule 5 of the Cadastral Survey Rules 2021, with a brief background to the changes.

The intention of this proposal is to clearly outline the need to move to one official vertical datum for cadastral surveys, and to provide a future date when the requirement will be in place.

2.1 Summary of proposal

The proposal sets out to amend Schedule 5 of the Cadastral Survey Rules 2021 by removing the 13 LVDs from the list of available datums, leaving NZVD2016 as the only option as an official vertical datum.

Any of the 14 current official vertical datums would continue to be able to be used until 30 June 2024. From 1 July 2024, the NZVD2016 datum would be only option as an official vertical datum.

Only Schedule 5 is proposed to be amended. All other parts of the Cadastral Survey Rules 2021 would remain unchanged.

2.2 Background

On 27 June 2016 LINZ published NZVD2016 in LINZ standard [LINZS25009](#) - a single datum that covers all of New Zealand and replaced NZVD2009. Information was also published that enables the ready transformation of heights between the 13 LVDs and NZVD2016.

NZVD2016 is New Zealand's official height system and allows for the consistent collection and seamless exchange of heights across New Zealand.

The Surveyor-General enabled the use of NZVD 2016 for cadastral surveys from 1 January 2019 by publishing the list of 13 LVDs and NZVD 2016 in Ruling [LINZR65301](#) (Ruling on official vertical datums).

The combined 14 official vertical datums were then carried through and incorporated within the current [Cadastral Survey Rules 2021](#).

NZVD2016 is currently used on around 30% of cadastral survey datasets that are required to reference a height datum.

The Surveyor-General now considers that enough time has elapsed since NZVD2016 was introduced and enabled, and sufficient physical NZVD2016 heighted marks are now in place, for a single official vertical datum to be mandatory.

3 Discussion - proposed implementation

It is proposed that on 1 July 2024 the only datum available for use as an official vertical datum will be the New Zealand Vertical Datum 2016 (NZVD2016). This section outlines the proposal in further detail.

3.1 The changes

Currently, where a cadastral survey requires the use of an official vertical datum, that datum may be in terms of either NZVD2016 or one of the 13 LVDs, as listed in Schedule 5 of the Cadastral Survey Rules 2021.

Under rule 18(1) of the Cadastral Survey Rules 2021, all reduced levels in a survey must be expressed in terms of a single official vertical datum and Schedule 5 is referred to for the available official vertical datums.

While we are proposing to make changes to Schedule 5 only, this affects any rule that references Schedule 5, either directly or indirectly.

Affected rules should be considered in light of the proposed changes, especially if a survey is underway and a LVD has been selected. The following generalised examples describe rules that may be affected: -

- Where a new height-limited boundary point is defined by a reduced level, rules 18 (2) & (3) provide distance and connection criteria to “vertical control marks” (see schedule 6). Schedule 5 is referenced in Schedule 6 by requiring a height in terms of an “official vertical datum”.
- Where a new height-limited primary parcel boundary point is required to be referenced by a permanent reference mark (PRM) under rule 31 (c), distance criteria is specified in rule 32 and rule 34 requires at least 2 of the PRMs required by rule 32 to have a reduced level.
- Rules 60 – 62 outline requirements for non-primary height-limited boundaries where rule 60 refers to rule 18 (noting rule 62 as an exception), rule 61 provides certain referencing criteria, and rule 62 specifies the requirements for height-limited boundary points on existing unit developments.

Although NZVD2016 heighted marks generally have an increased density and spread compared to LVDs the surveyor will need to carefully consider the proposed changes to ensure compliance from 1 July 2024.

3.2 Why Change?

NZVD2016 has been in place for some time now. Continuing to allow cadastral survey datasets to be in terms of an LVD has become increasingly problematic over time, especially over large areas and at the boundaries between LVD areas.

With many councils having adopted NZVD2016 and many organisations now producing data in terms of NZVD2016, we propose that cadastral surveys should now also be in terms of NZVD2016 if an official vertical datum is required to be referenced. This change will support the ever-increasing use of 3D cadastral data across an increasing user base and responds to the increasing demands of a 3D cadastre.

Over time LINZ has promoted the use of NZVD2016 and encouraged various organisations to adopt it. NZVD2016 is now well established and has significant advantages over the use of LVDs. These include: -

- GNSS derived NZGD2000 ellipsoidal heights can be consistently converted to NZVD2016. NZVD2016 is consistent with NZGD2000. This means that normal-orthometric NZVD2016 heights can be transformed to ellipsoidal NZGD2000 heights and vice versa.
- Coverage is throughout New Zealand, and across boundaries between historical LVDs.
- NZVD2016 is formally defined in the LINZ standard [LINZS25009](#), which provides for a consistent and standardised approach to any work relying on the datum.
- NZVD2016 heights are more consistent, current, and accurate as they are calculated using all available data (GNSS vectors and precise levelling) in a single network.

If we retain multiple official vertical datums, the need to convert between datums will likely increase and a future 3D digital cadastre will be unnecessarily complex.

3.3 NZVD2016 / LVDs – density & spread

LINZ has supported the use of NZVD2016 by investing in and maintaining an increasing number of NZVD2016 heighted marks. This new network is of higher quality (reliability, and accuracy) than the networks of local benchmarks that used to be maintained in terms of an LVD.

The density and spread of NZVD2016 marks make it much easier for surveyors to connect their surveys to the NZVD2016 datum when compared to LVD marks. The availability of these marks, with their consistent accuracy, across large rural and infrastructure projects is particularly valuable for survey work. The examples in Figures 2 & 3 (next page) show coverage for both LVDs and NZVD2016 heighted marks with an order of 3V or better: -

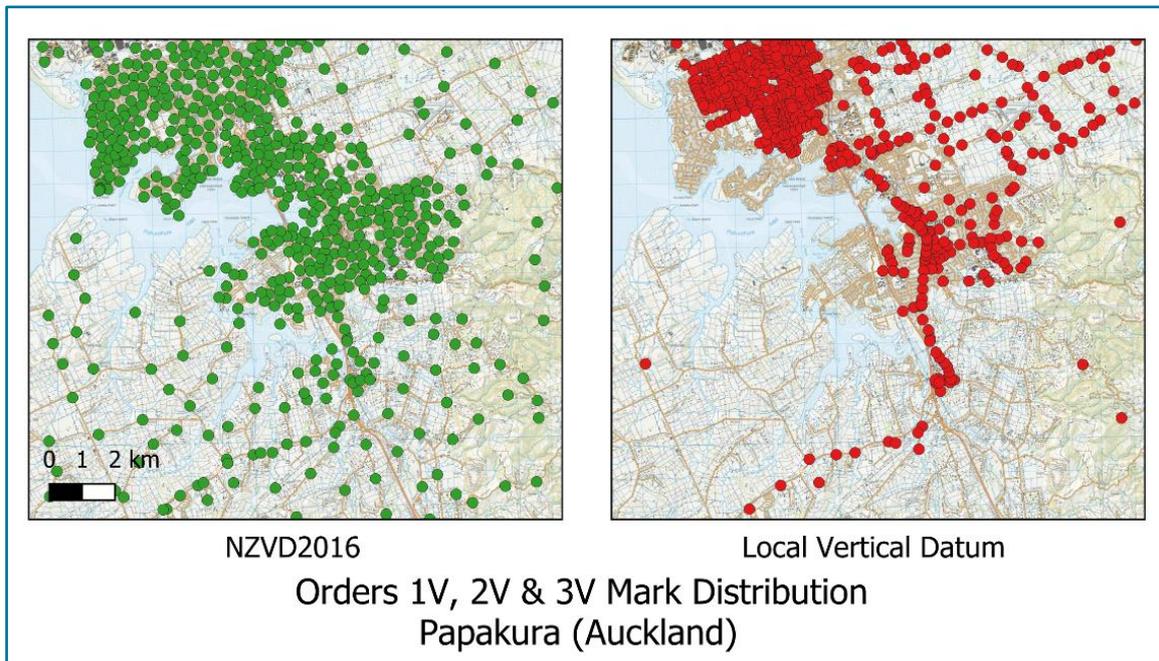


Figure 2

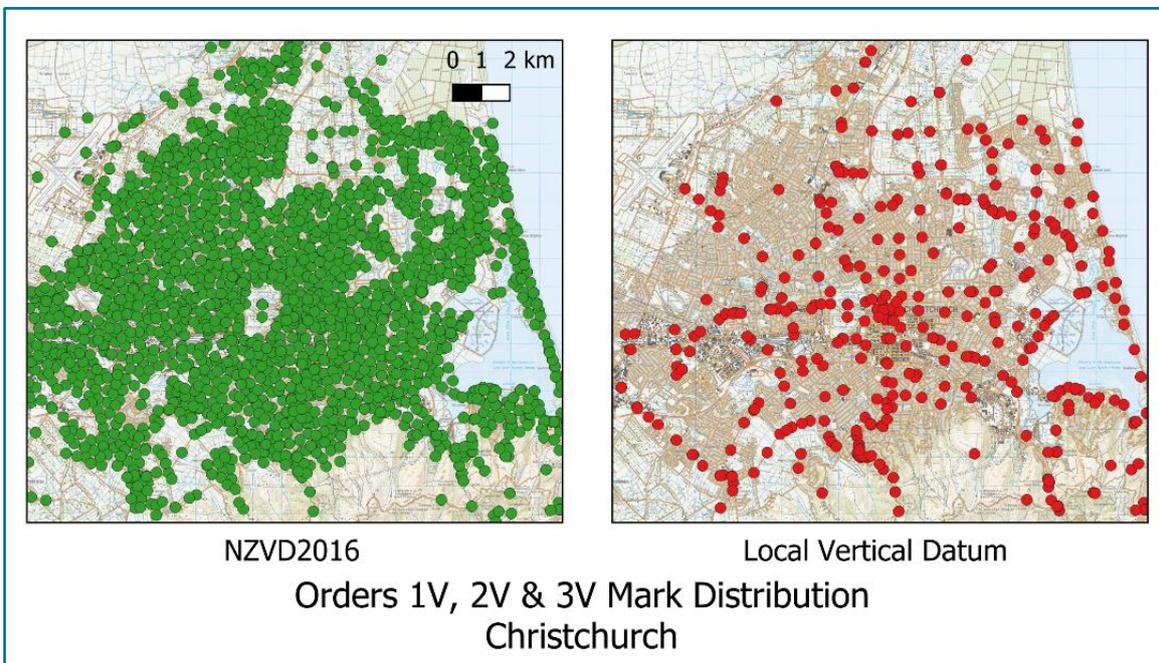


Figure 3

4 Proposal summary and timing

With the shape and form of a future 3D digital cadastre currently being considered by LINZ, there is now a need to utilise a common vertical datum. This next step in the evolution of our cadastre will better support surveys that increasingly provide information about the vertical extent of parcels.

Where an official vertical datum is required for a survey, we are strongly encouraging surveyors to immediately start using the NZVD2016 datum for all new surveys.

From 1 July 2024, we propose that only NZVD2016 will be an official vertical datum. LVDs will be available for use to 30 June 2024. See Figure 4 below: -

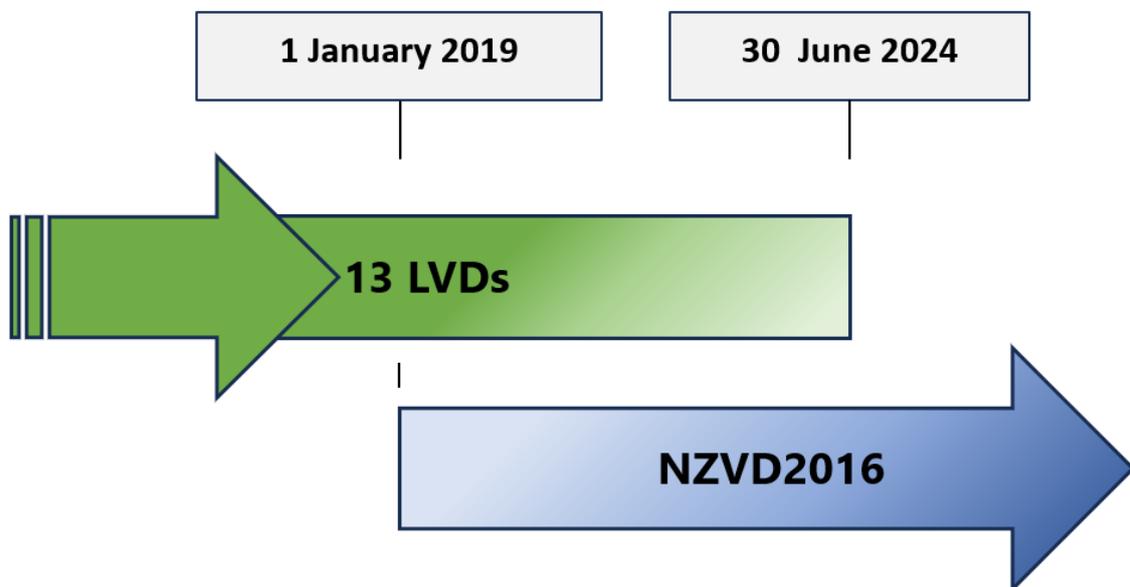


Figure 4: Proposed timeline – Official vertical datums

If a surveyor considers the new requirement to be in terms of NZVD2016 unreasonable or impractical in a specific instance, a request for dispensation pursuant to s47(5) of the Cadastral Survey Act 2002 may be submitted.

Given the clear intention outlined in this proposal, surveys commenced after the rule change are unlikely to be considered favourably.

4.1 What's next

Following the closing date for submissions, we will review the feedback, work through any issues and opportunities, and produce a Decision Report before promulgating the actual changes to the Rules.