Implementing NZVD2016

A National Height System

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Introduction - Height

Heights are important

Coastal Monitoring

Engineering

Ownership Rights

Infrastructure

Conservation

Water Management

Flood Management

The future of data

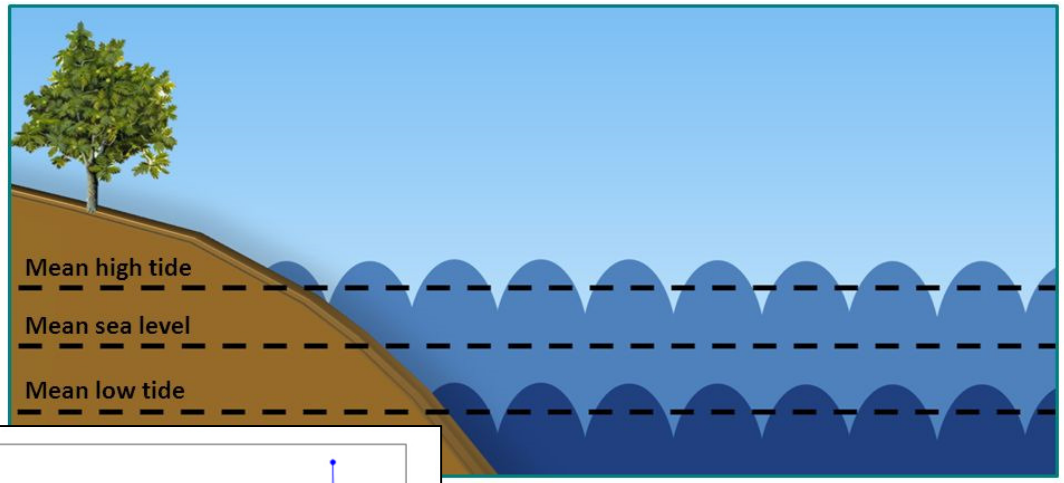
Height, in reference to what?

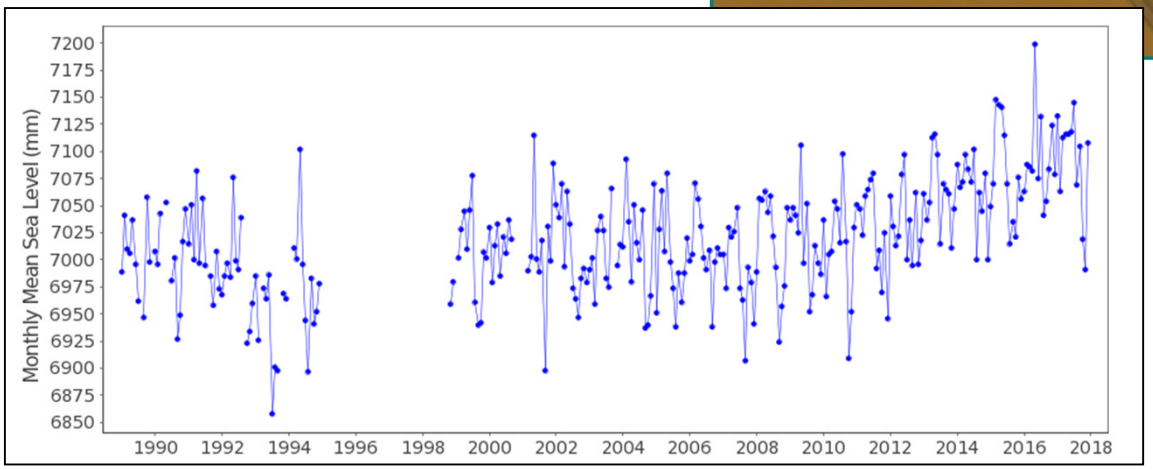
Desirable height reference attributes:

- Predicts the direction of fluid flow
- Able to be determined anywhere
- Easy to use
- Compatible with current technology
  - GPS and levelling
- Standardised and exchangeable
- Resilient to destruction
- Maintainable and assessable
- Unchanging/static

What height systems are we using?

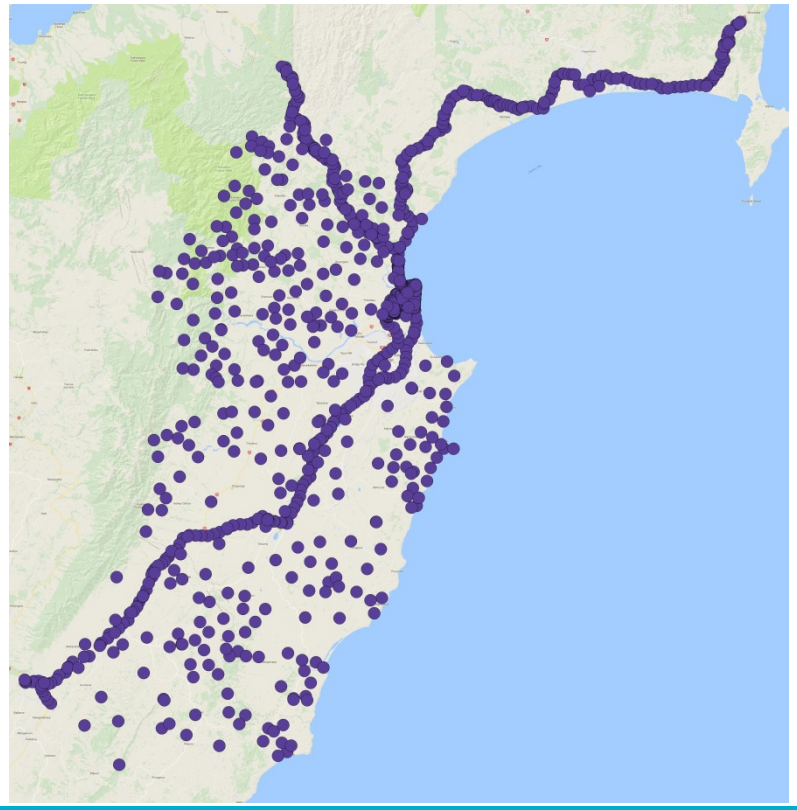
Mean Sea Level

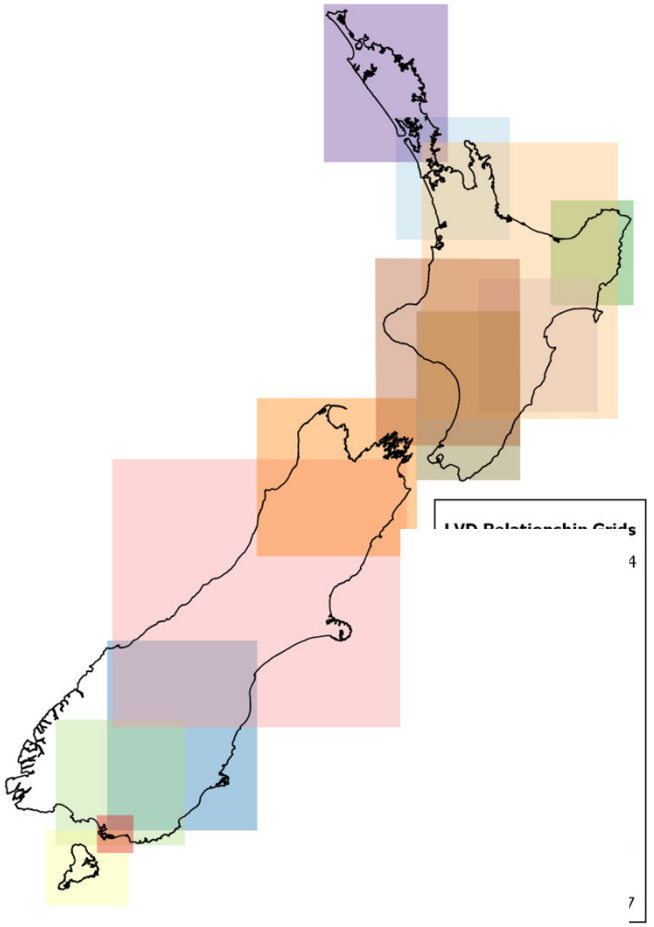




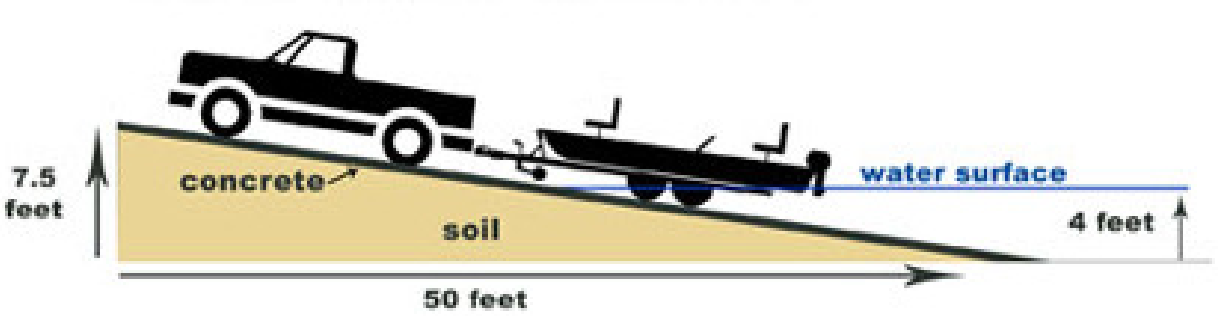
Napier tide gauge

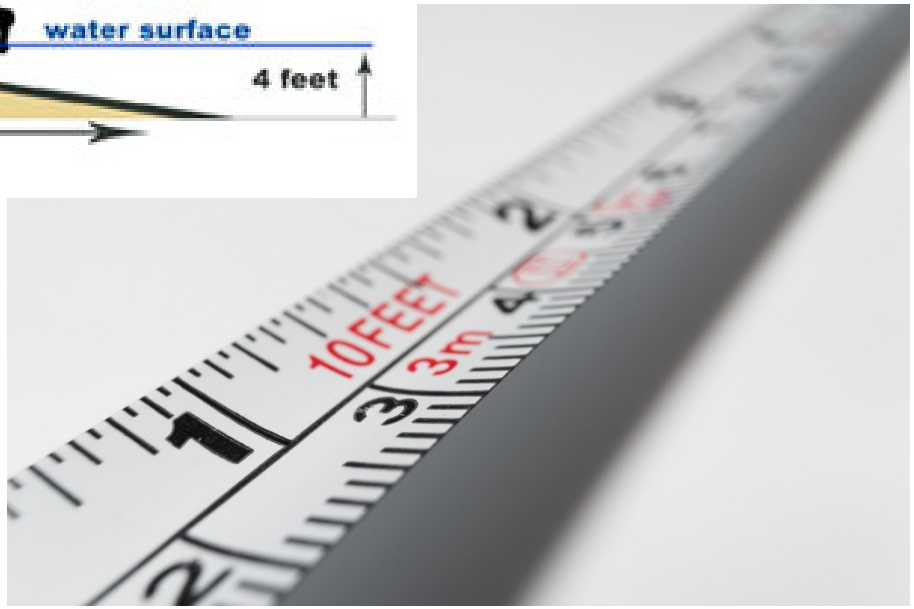
Napier vertical datum 1962





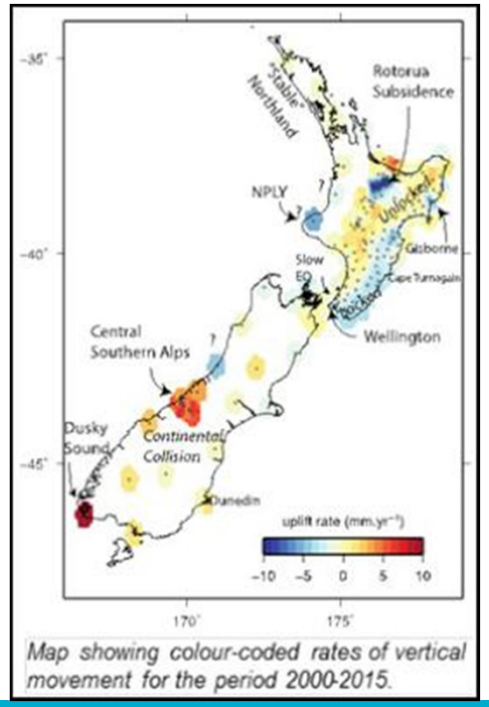
City or Drainage Datums



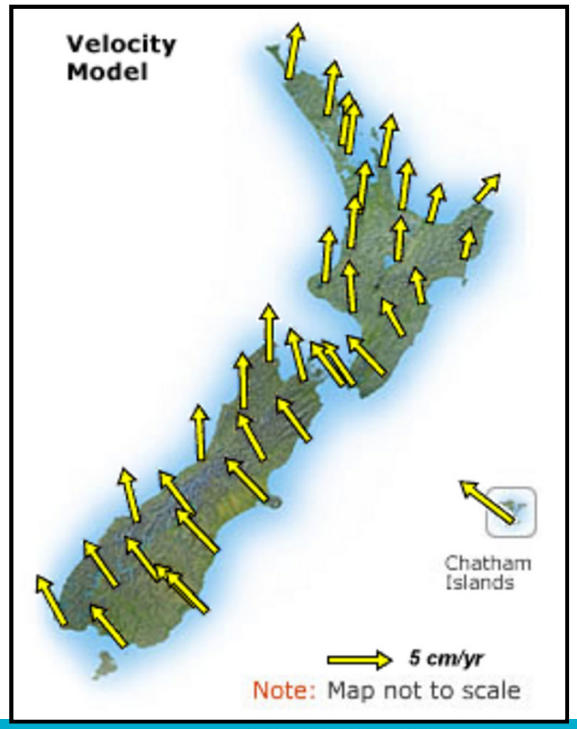


Deformation and change

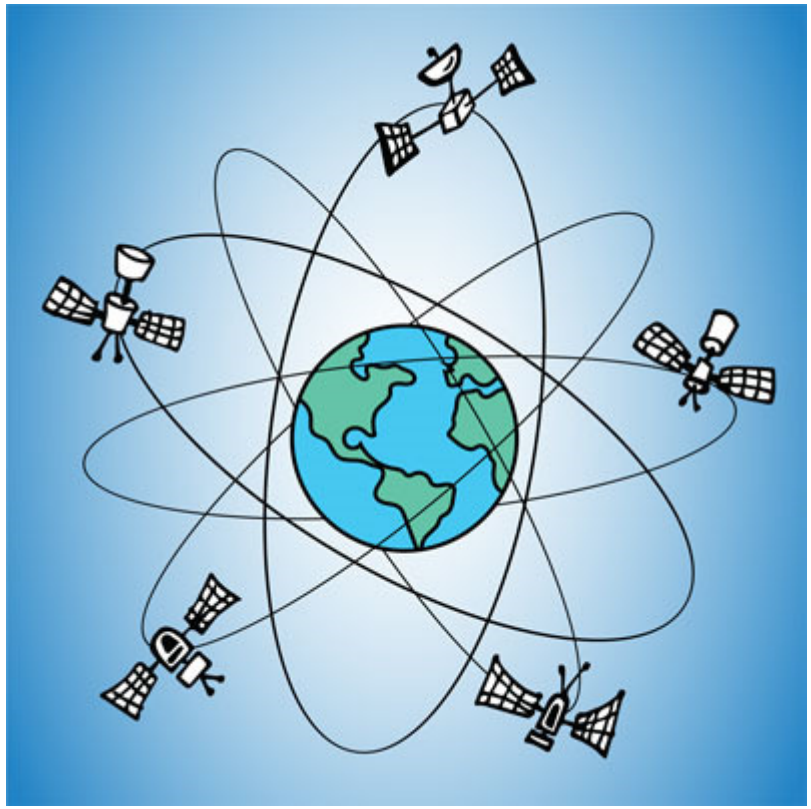
- New Zealand is constantly moving
- Vertical deformation is not always obvious

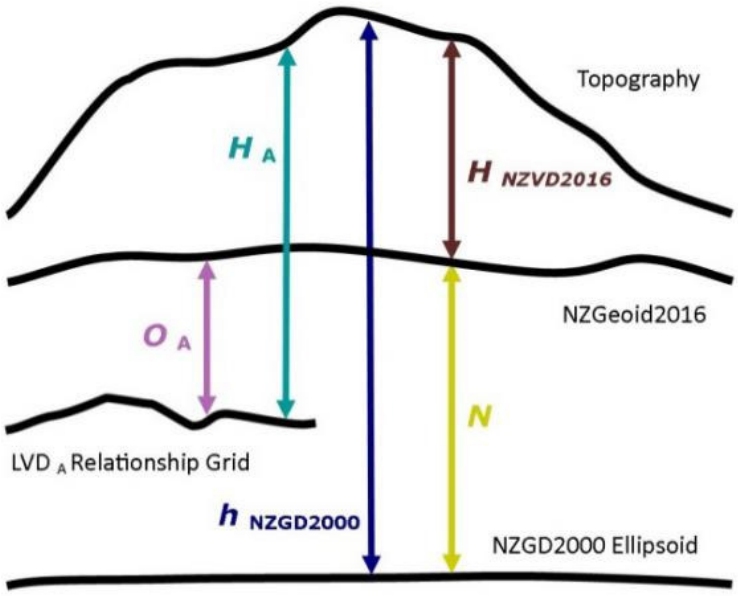


Map showing colour-coded rates of vertical movement for the period 2000-2015.



GPS heights

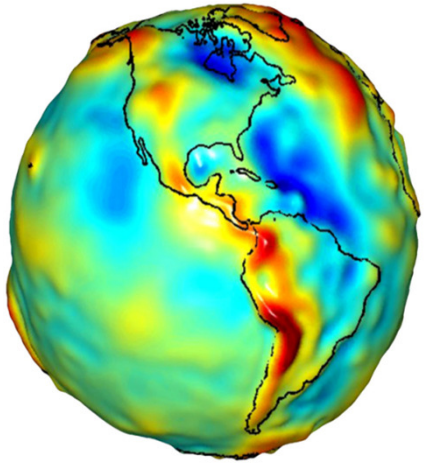


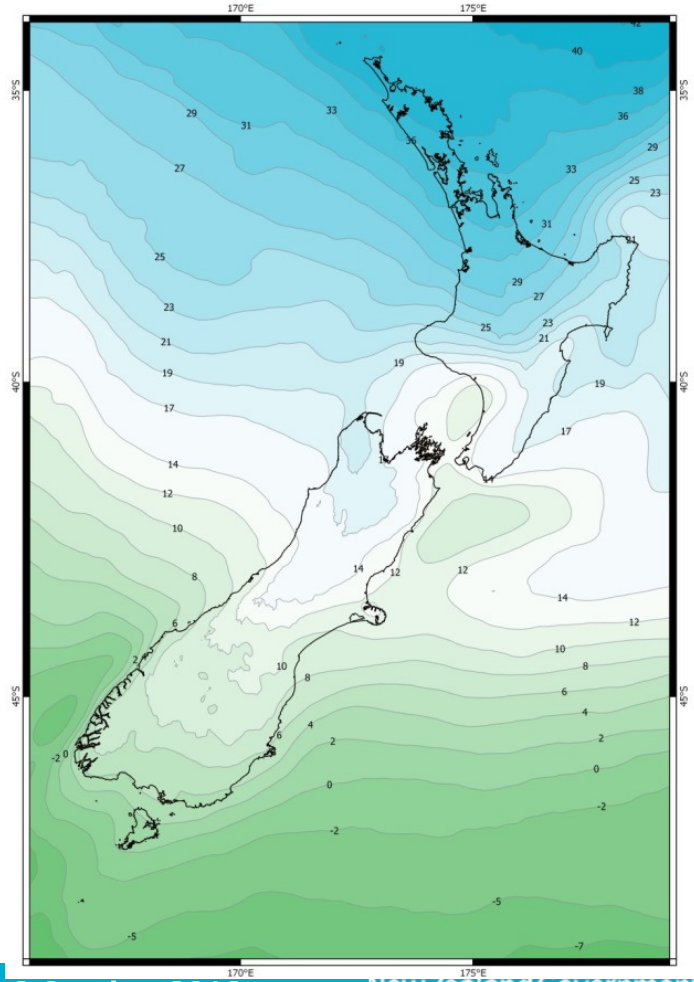

Topography
H A
H NZVD2016
NZGeoid2016
O A
N
LVD A Relationship Grid
h NZGD2000
NZGD2000 Ellipsoid

Nelson Example

NZVD2016

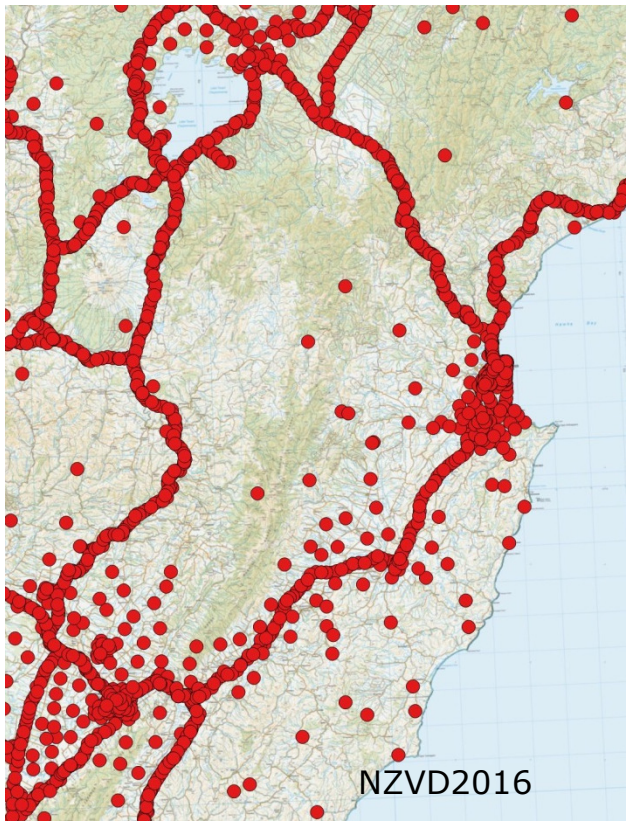
- Local datums coming to end of life
- Based on NZGeoid2016
- Geoid





NZVD2016 Benefits

- Consistent heights
- Recoverable
- Readily accessible
- Easier to analyse multiple datasets

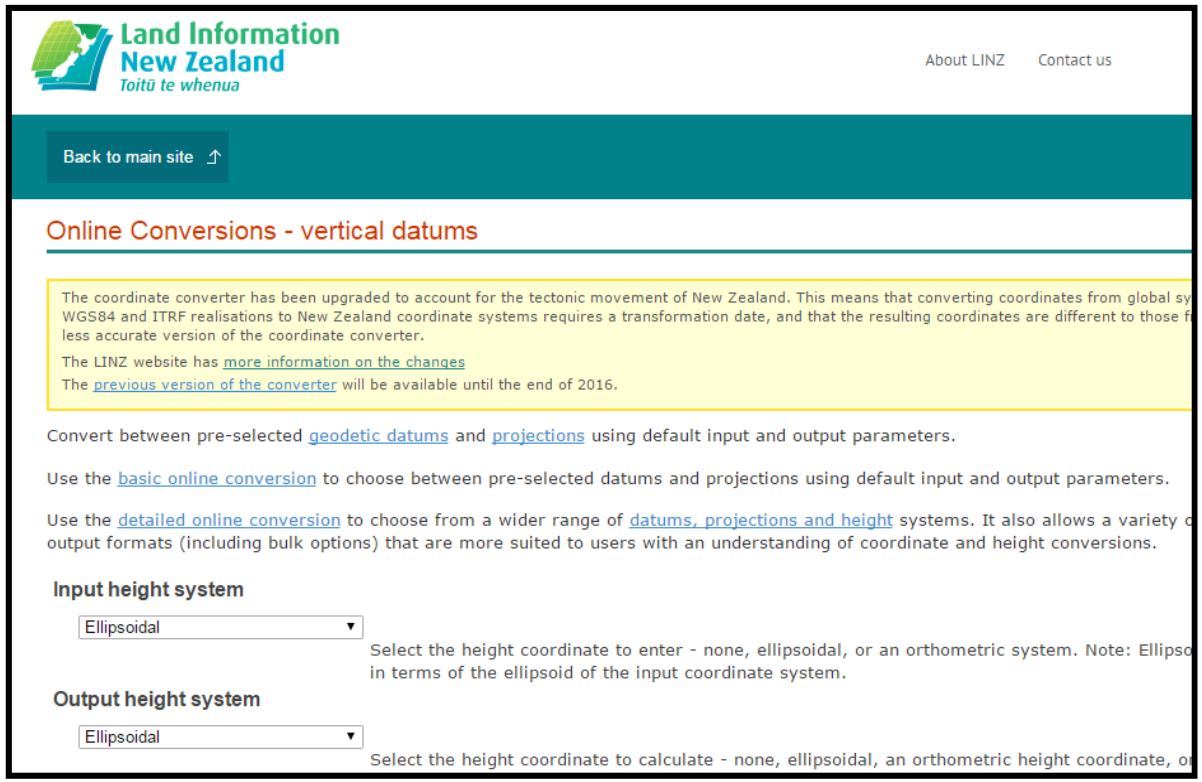


Nelson Example

Challenges

- Existing data is recorded in one of the historic height systems
  - Not all height data is digital
  - Metadata may be incomplete
- Documents: specifications, contracts, etc. specify heights in historic height systems
- A Case for Change

Support



https://www.linz.govt.nz/data/geodetic-services/coordinate-conversion/online-conversions

Nelson Example

Summary

- Heights are important
- There are risks to getting height information wrong
- The heights we are using are not MSL
- New Zealand Vertical Datum 2016 provides a consistent height surface
- There are challenges but LINZ are willing to help

Land Information New Zealand
Toitū te whenua

Questions?

NZVD2016 & Nelson City Council

short clips to answer questions raised in Rachelle’s ppt.

Key question posed for each section is:

1. What was the situation in Nelson?
2. How did you persuade senior managers to invest in adopting the new datum?
3. Was it technically difficult to adopt the new datum?

1. What was the situation in Nelson?

Nelson & Tasman adopted NZVD2016 in July 2017.

However the issue with using a local datum was first identified when we create a regional GIS viewer Top of the South Maps www.topofthesouthmaps.co.nz which was launched in December 2010.

Nelson and Tasman share a border along Champion Road. When looking at the contours , which looked like the Grand Canyon. This is because Nelson City used its own datum, based on the depth of its infrastructure which was 12.07 metres (40 feet) below sea level.

I knew tha[illegible]

It took me a while to build the confidence to push for this change because while I could define a height, I was outside my comfort zone talking about a datum. All the Council engineers, who could run rings around me when talking about datums, saw no reason to change datum. I was simply creating work for them with no obvious gain.

If I had access to the background on why the new datum is so important, and a clear explanation of the limitations of local datums that Rachelle has just presented, this would have saved me a great deal of hand ringing trying to work out how I could get agreement to adopt the new datum.

Possible screenshots to interspace / inform interview

http://www.nelson.govt.nz/building-and-property/property-land-use/maps-and-gis-information/new-zealand-vertical-datum-nzvd2016

2. How did you persuade senior managers to invest in adopting the new datum?

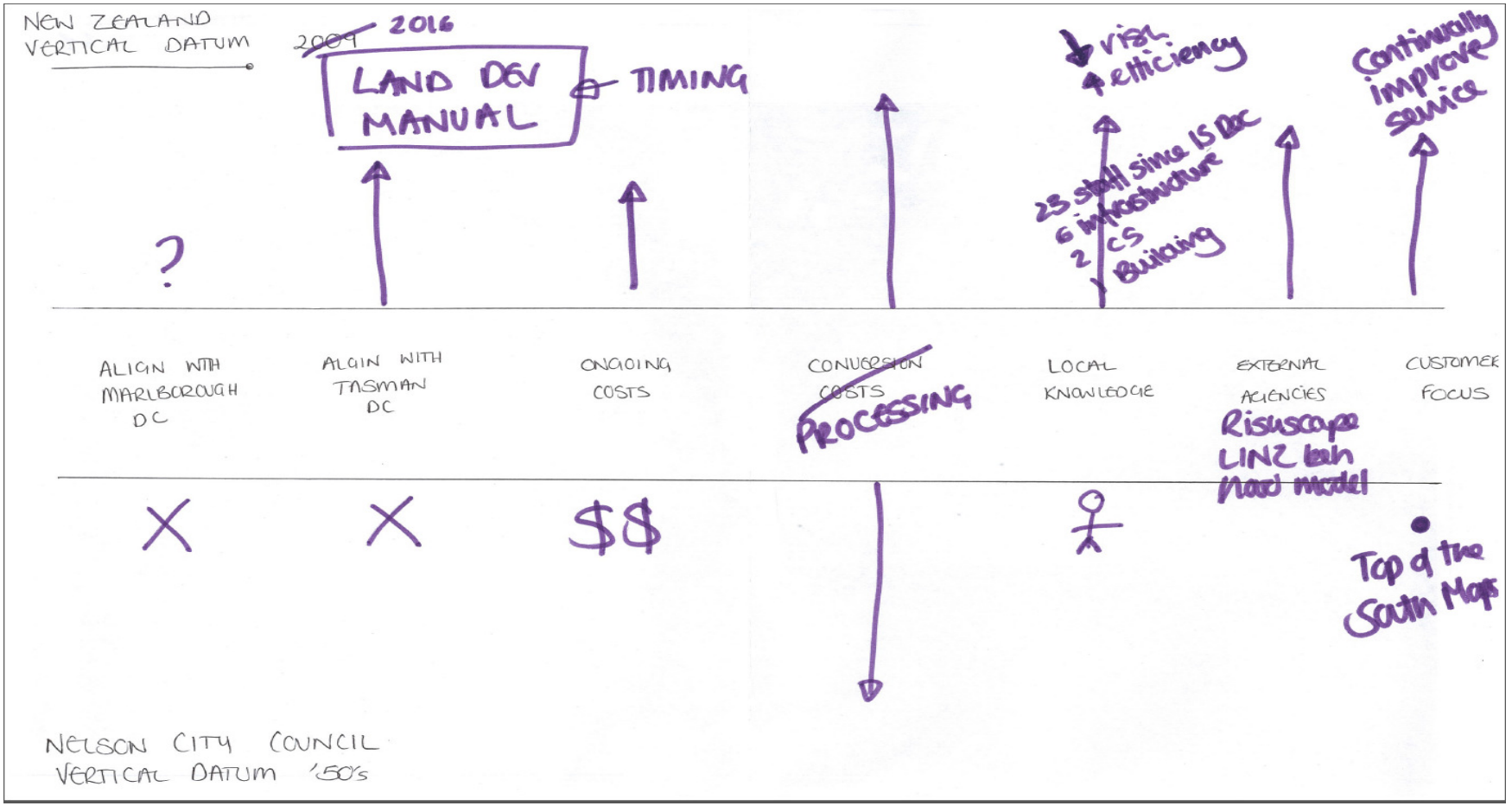
Perseverance was key and I looked for every opportunity to plant the seeds for change.

I learnt about a subdivision off Champion Road where the land was owned by Nelson City, but the water was supplied by Tasman District. This meant that local surveyors had to prepare two sets of plans in two different datums for the two Councils. This local message helped to demonstrate the problems created by having different datums to our close neighbours.

Eventually I was able to identify a champion in both the Planning Team and Engineering Team. Once they were on board the idea started to gather momentum as more people were talking about it, and I gained a better understanding of datums and related issues from working with them.

I was lucky with the timing, as the Planning Team & Engineering Teams at Nelson and Tasman were working together to prepare a joint Nelson Tasman Land Development Manual, which provided a deadline and a focus for adopting the new datum. Both Council's had different datums and adopting a single datum for the LDM started to make sense.

It took 2 attempts to persuade senior managers at Nelson City to support the change, and in the second attempt I talked them through this diagram to demonstrate that real benefits were going to come from adopting the new datum


NEW ZEALAND VERTICAL DATUM
2004 2016
LAND DEV MANUAL
TIMING
?
visit efficiency
25 staff since IS DC
6 Infrastructure
2 CS
Building
Continually improve service
ALIGN WITH MARLBOROUGH DC
ALIGN WITH TASMAN DC
ONGOING COSTS
CONGESTION COSTS
PROCESSING
LOCAL KNOWLEDGE
EXTERNAL AGENCIES
Risuscape
LINZ lean
Nord model
CUSTOMER FOCUS
X
X
$$
Top of the South Maps
NELSON CITY COUNCIL VERTICAL DATUM '50's

3. Was it technically difficult to adopt the new datum?

Not really, it just took a little coordinated planning.

The key thing to remember is that the heights aren't necessarily wrong, they are simply quoted in a different datum.

We simply added an additional attribute field to our infrastructure data, buildings, geodectic marks, and calculated the new datum. This is much simplier to do now as Esri support NZVD2016 in ArcGIS Pro. However we were able to use the LINZ convertor

Lid_Elevation_NCCVD	Lid_Elevation_Nelson1955	Lid_Elevation	Invert_Elevation_NCCVD	Invert_Elevation_Nelson1955	Invert_Elevation
18.016542	5.946542	5.6112	17.5	5.43	5.0947
21.030001	8.960001	8.6246	20.15	8.08	7.7446
20.99	8.92	8.5846	20.059999	7.989999	7.6546
20.1	8.03	7.6947	19.18	7.11	6.7747
20.120001	8.050001	7.7147	19.02	6.95	6.6147
18.540428	6.470428	6.1347	18.299999	6.229999	5.8943
19.24	7.17	6.8343	18.379999	6.309999	5.9743
21.35	9.28	8.9444	20.459999	8.389999	8.0544
21.76	9.69	9.3544	20.73	8.66	8.3244

We outsourced having our LiDAR and contour data transformed (can I say LINZ contributed to the cost of this?) and rebuilt the contour cache for our GIS viewer.

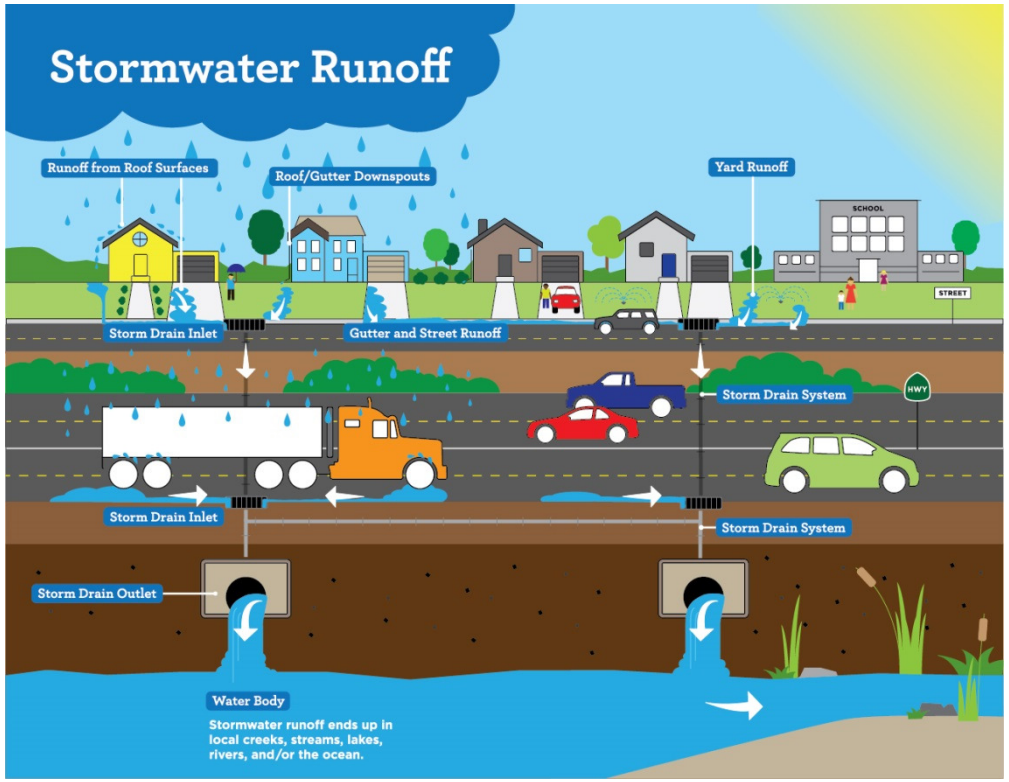
Then agreed a date from which both Councils would adopt the new datum, and updated all our templates for maps and engineering plans to state that heights were referenced in NZVD2016.

Cor

- **A good idea**
- **Well planned**
- **LINZ very helpful**
- **Good communication**
- **Well supported by stakeholders**

Desirable height reference attributes:

- **Predicts the direction of fluid flow**



http://aqua-rodeofarms.com/blog/storm-water-run-off/

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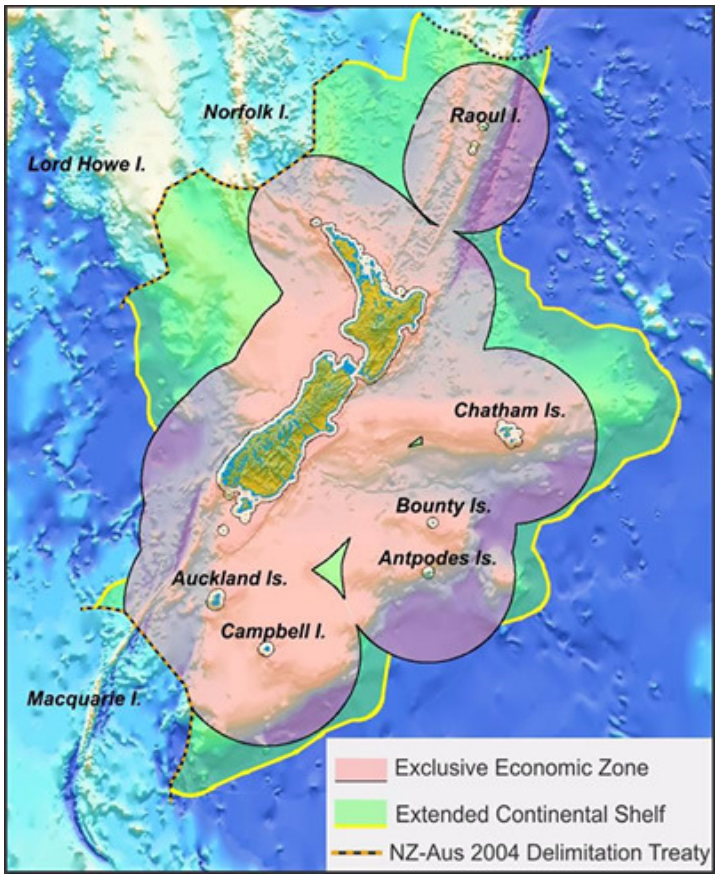

Map of New Zealand Maritime boundaries. GNS Science (2013).

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