



## PositionNZ-RT

### *Developing a National Real-time CORS Network in New Zealand*

**Dave Collett**  
Geodetic Surveyor  
Land Information New Zealand



Presentation to XXIV FIG International Congress 2010, Sydney, Australia, 15 April 2010




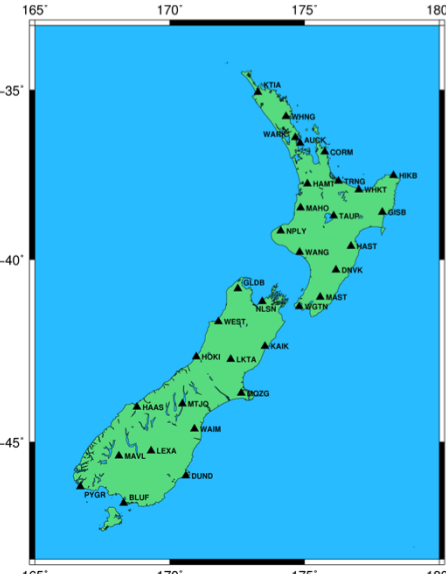
## Overview

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- **Existing PositionNZ Network**
- **Economic Analysis**
- **Planned Upgrades**
- **Coordinated National CORS Network**


## Current LINZ PositionNZ Network






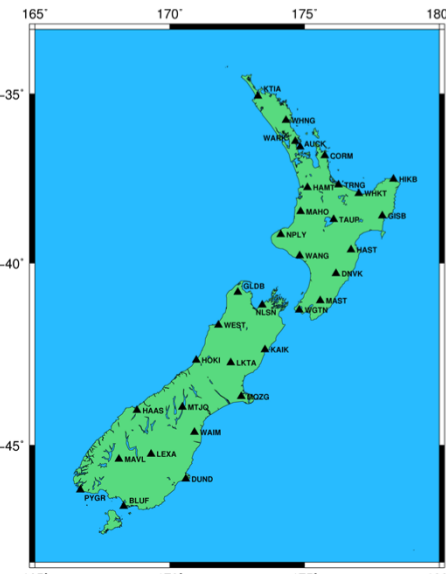
**Primary Objective -**  
Deformation/Datum Monitoring

**Secondary Objective**  
Support provision of traditional geodetic control  
Provision of data for other users to obtain consistent positions e.g. post processed and real-time GPS data



## Current LINZ PositionNZ Network







**Current Situation**  
 33 sites in NZ, 1 on Chatham's, 3 in Antarctica  
 30sec RINEX files (accessed via website)  
 22 sites streaming real time 1" data

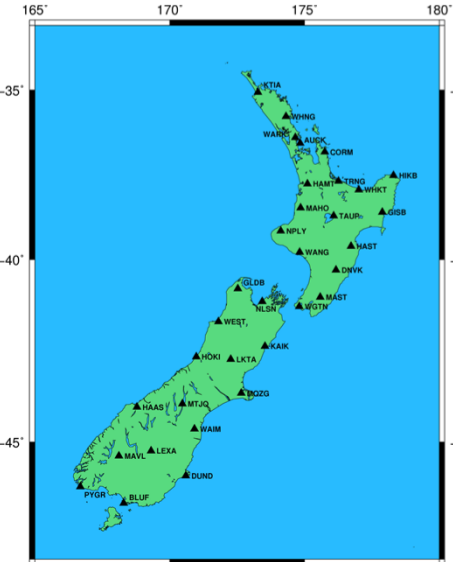
**Network was not designed for streaming – only for 30sec RINEX files**

**Network managed by GNS Science through the GeoNet project**



## GNSS Precise Positioning Benefits - New Zealand







**Recent analysis indicates upgraded PositionZ CORS to provision of real time data suggests a cost benefit ratio of 20 – excluding benefits to LINZ itself.**  
 (Benefits of roading projects are expected to normally be 2-4)

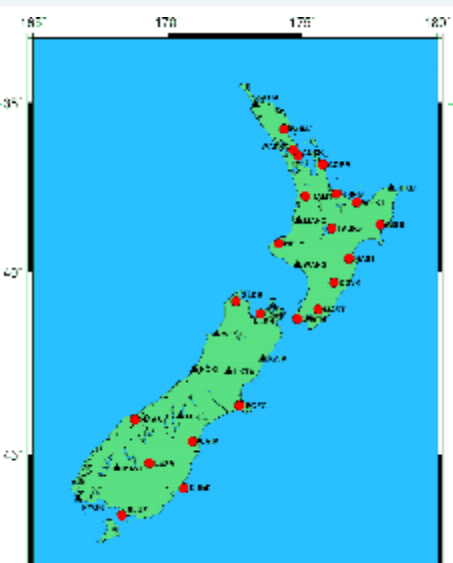
**Analysis also recommends public good is so great data should be provided free of charge**

(McKenzie Podmore report 2009)



## Streaming 1" real-time data from PositionZ






**Currently streaming 1" real-time data**

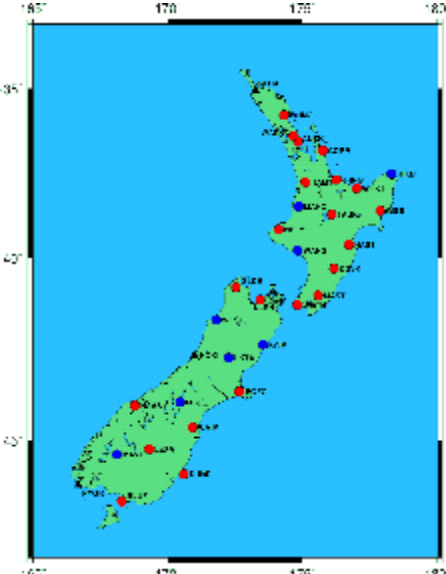

**Limited-trial basis for the last 3 years**

**22 sites streaming to varying quality**

**Streams in industry standard RTCM 3.1 format using NTRIP**



### PositionNZ Network Communications Upgrades




Current upgrades will leave only 3 sites not streaming

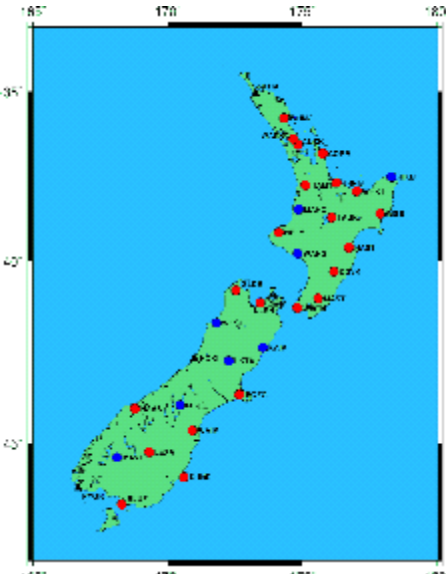

Improving streaming quality at some sites, making streaming possible at others

Whole network streaming by end of calendar year

Data freely available via internet  
<http://www.linz.govt.nz/geodetic/positionz/rt/>




### PositionNZ Network Communications Upgrades




**Upgrades include:**

- Replacing Freewave radio links with WiFi or licensed radio links
- Upgrading VSAT connections for greater bandwidth
- Trial of cellular connections



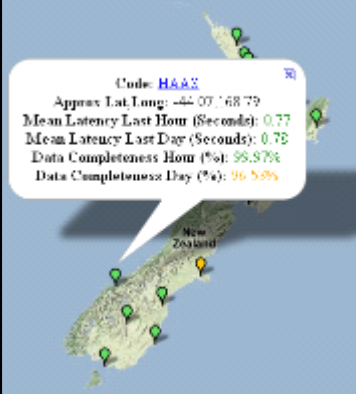
## Performance Monitoring Tool




Currently for internal-only purposes

Further development work needed before public release

**Biggest issue is syncing to GPS time in our wider IT environment – timing GPS not an option**

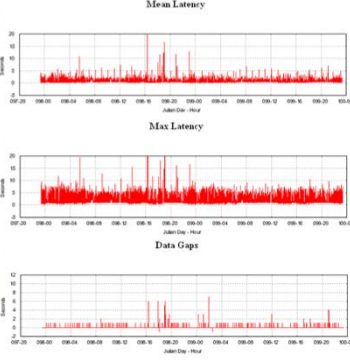


Code: HAAS  
 Approx Lat/Long: -44.07, 168.79  
 Mean Latency Last Hour (Seconds): 0.77  
 Mean Latency Last Day (Seconds): 0.78  
 Data Completeness Hour (%): 99.97%  
 Data Completeness Day (%): 96.53%




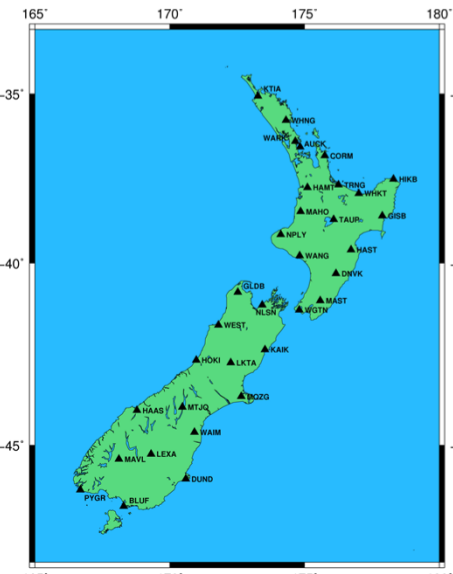
Code: HAAS  
 Approx Lat/Long: -44.07, 168.79  
 Mean Latency Last Hour (Seconds): 0.75  
 Mean Latency Last Day (Seconds): 0.78  
 Data Completeness Hour (%): 99.97%  
 Data Completeness Day (%): 96.53%

HAAS



## PositionNZ and GNSS






Network is GPS only (Trimble NetRS)

Customers increasingly using GNSS


Currently evaluating GNSS receivers

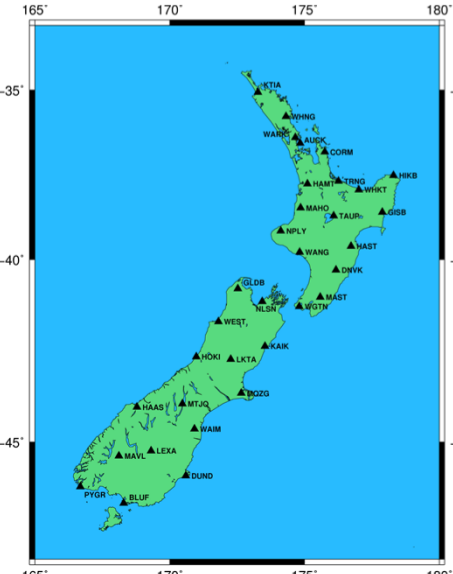
Entire network to be GNSS in next 12 months

Raises problems with continuity of position time-series due to antenna changes



## PositionNZ and Network RTK






**General inter-station spacing of 100-150km**


**Industry standard for consistent Network RTK coverage requires ~70km spacing**

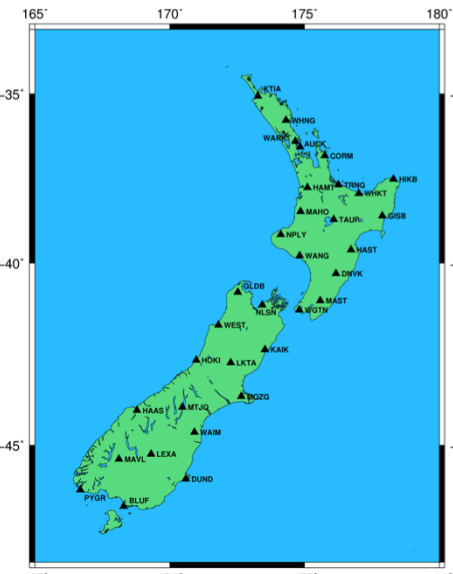
**Private in-fill required for provision of NRTK service**

**NRTK not seen as the role of LINZ**



## LINZ Accreditation of Private CORS






**Benefits to Geodetic users from having private CORS sites in Landonline and Geodetic Database**


**Official NZGD2000 coordinate and geodetic code assigned to mark**

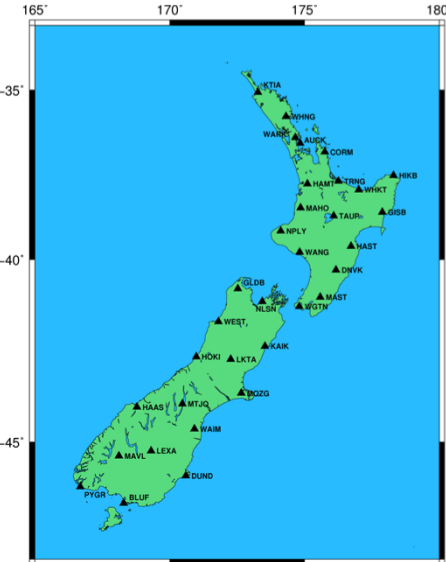
**Survey required to connect to local control**

**Requirements around monumentation to ensure stability.**



## LINZ and a Coordinated National CORS Network






**PositionNZ as the underlying national infrastructure**

**3<sup>rd</sup> Parties to infill and provide NRTK services if viable**


**Accreditation of Private CORS sites**

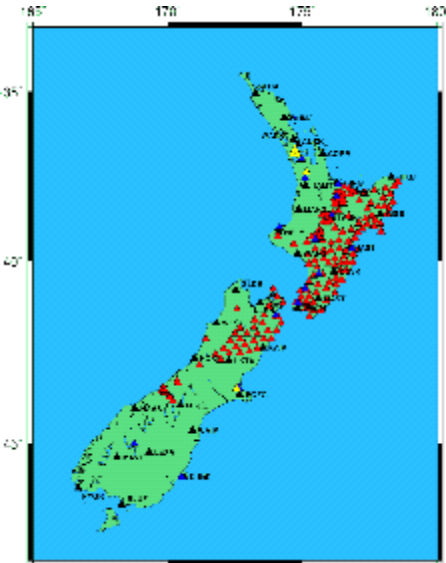
**Coordination of CORS networks**

**Potential to infill stations if economic viability is marginal**



## LINZ and a Coordinated National CORS Network







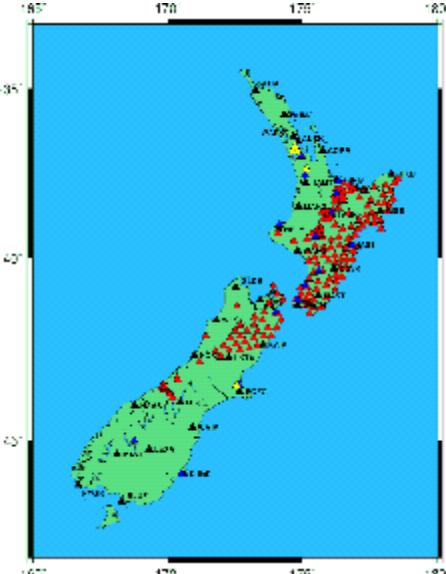
**Several other key CORS providers in NZ**

**GeoNet network consists of >100 GPS CORS**  
 Currently not real-time, but will be upgraded over time  
 Network focused on interesting geophysical areas  
 Developing into South Island over next decade

**>20 commercial real-time CORS provided by two companies**





### Coordinated National CORS Network



**PositionNZ stations**  
**plus existing GeoNet stations**  
**plus existing Private Sector stations**  
**plus future GeoNet stations**

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### International Connections



**IGS Tracking Network**  
- AUCK      -DUND  
-WGTN      -CHTI  
- MQZG


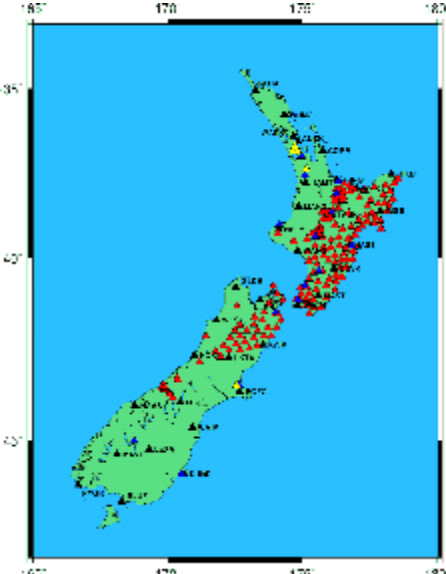
**VLBI**  
- WARK

**Planning to co-locate absolute gravity marks at several stations**

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## Conclusion



**Network not originally designed for real-time data streaming**

**Economic analysis suggested a cost benefit ratio of 20 from upgrading to real-time**

**Upgrades underway and almost complete**

**Whole network will be GNSS by mid-2011**

**PositionNZ is underlying national infrastructure which can be built on by other CORS providers**

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Thank you