Mapping New Zealand's Broadband Infrastructure

NZRS

Some Background

NZRS

- Formerly .nz Registry Services
- Provider of:
  - critical Internet infrastructure, and;
  - authoritative Internet data
- Operate the .nz namespace
  - Registry functions
  - DNS operations
- Operate public services
  - NTP servers
  - RPKI validator
  - OpenPGP Key Server
  - Internet data portal (http://idp.nz)
- Maintain an Internet research function

New Zealand Broadband

- Infrastructure competition
  - Fixed wireless
  - Cellular
  - Fibre
  - HFC Cable networks
  - ADSL
  - VDSL
  - Satellite

New Zealand Broadband

- Aggressive builds
  - 20-30 regional wireless ISPs serving remote and rural - typically 40-150 wireless sites.
  - Government initiated FTTH to 80% of the population - Ultra Fast Broadband (UFB).
  - Government initiated rural and remote deployments - Rural Broadband Initiative (RBI) 99% of the population 50 Mbps+.
    - Copper cabinet upgrades and shortening of copper loops (ADSL => VDSL)
    - Fixed wireless access for outside of copper footprints

New Zealand Broadband

- Retail competition
  - Most fibre networks structurally separated by legislation - open access.
  - Most xDSL network structurally separated by legislation - open access.
  - Independent open access fibre networks.
  - Independent open access wireless networks.

Spatial Data

Mapping

- We’ve pulled together a number of geospatial and temporal-spatial data from networks within New Zealand
  - Collected some
  - Created some
  - Curate some
  - Augment with other data
  - 100 + layers
  - 20-30 used in the National Broadband Map

What do we do with this data?

- Consumer focussed broadband availability tool
- A data service
- Opportunities for research
  - Technical
  - Policy

National Broadband Map

broadbandmap.nz

National Broadband Map

About | Speeds | Technologies
Privacy policy | Terms & conditions

Type address or drop pin

Availability Report

Pin at lat: -41.203553, long: 174.849129

Fibre is Not Available

Cable is Not Available

VDSL is Available

Data from Chorus

Speeds

15-60 Mbps 5-18 Mbps

Next steps

Contact a retailer of the Chorus network, who will check to confirm availability and determine the actual speeds that you are likely to get.

ADSL is Available

Data from Chorus

Speeds

5-10 Mbps 0.5-1.4 Mbps

Next steps

Contact a retailer of the Chorus network, who will check to confirm availability and determine the actual speeds that you are likely to get.

Wireless is Available

Data from Vodafone

Speeds

5-42 Mbps 1-5.8 Mbps

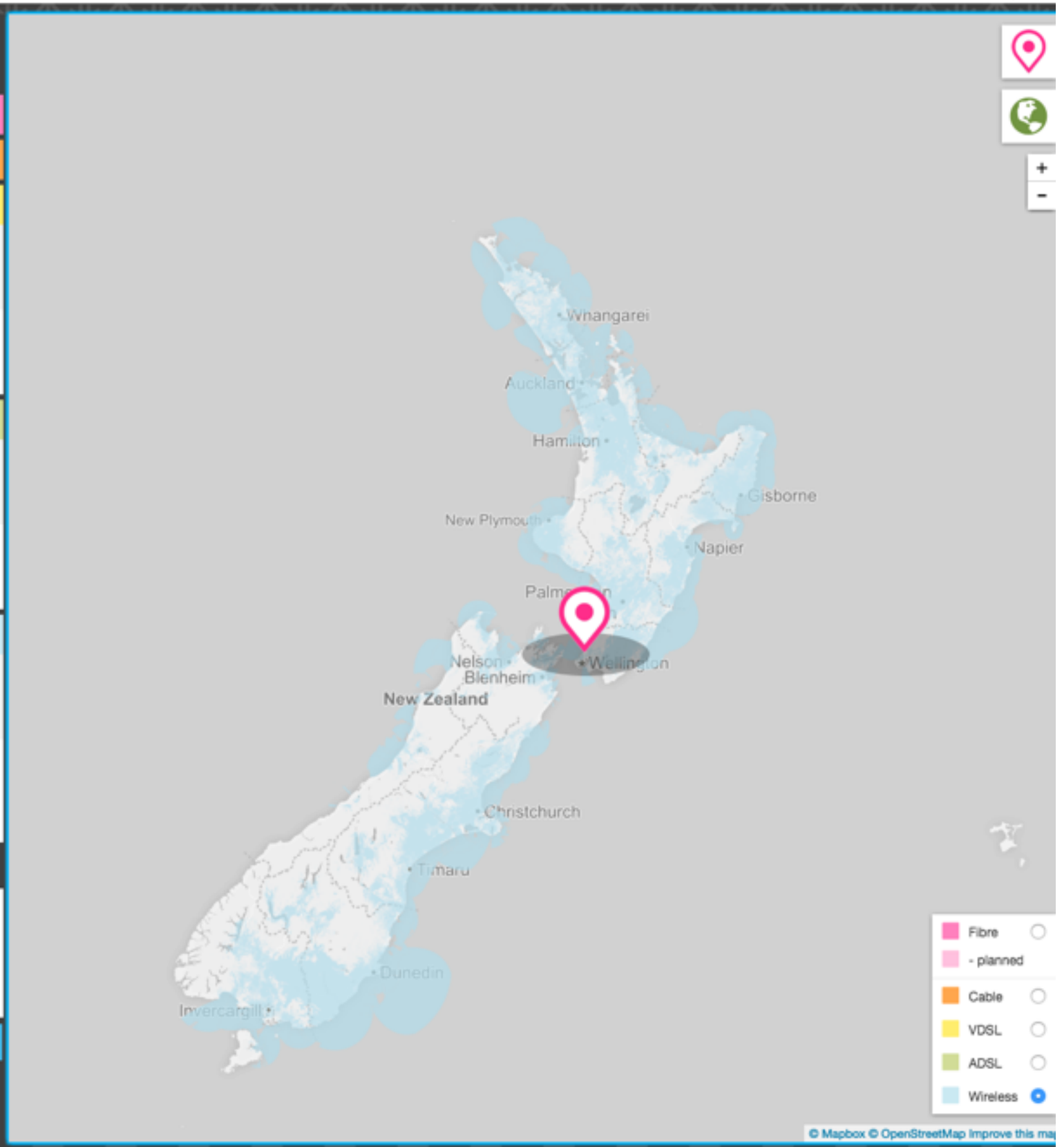
Next steps

Contact Vodafone or a retailer of the Vodafone network, who will check to confirm availability and determine the actual speeds that you are likely to get.

Feedback Form

Help us improve this site by giving feedback here...

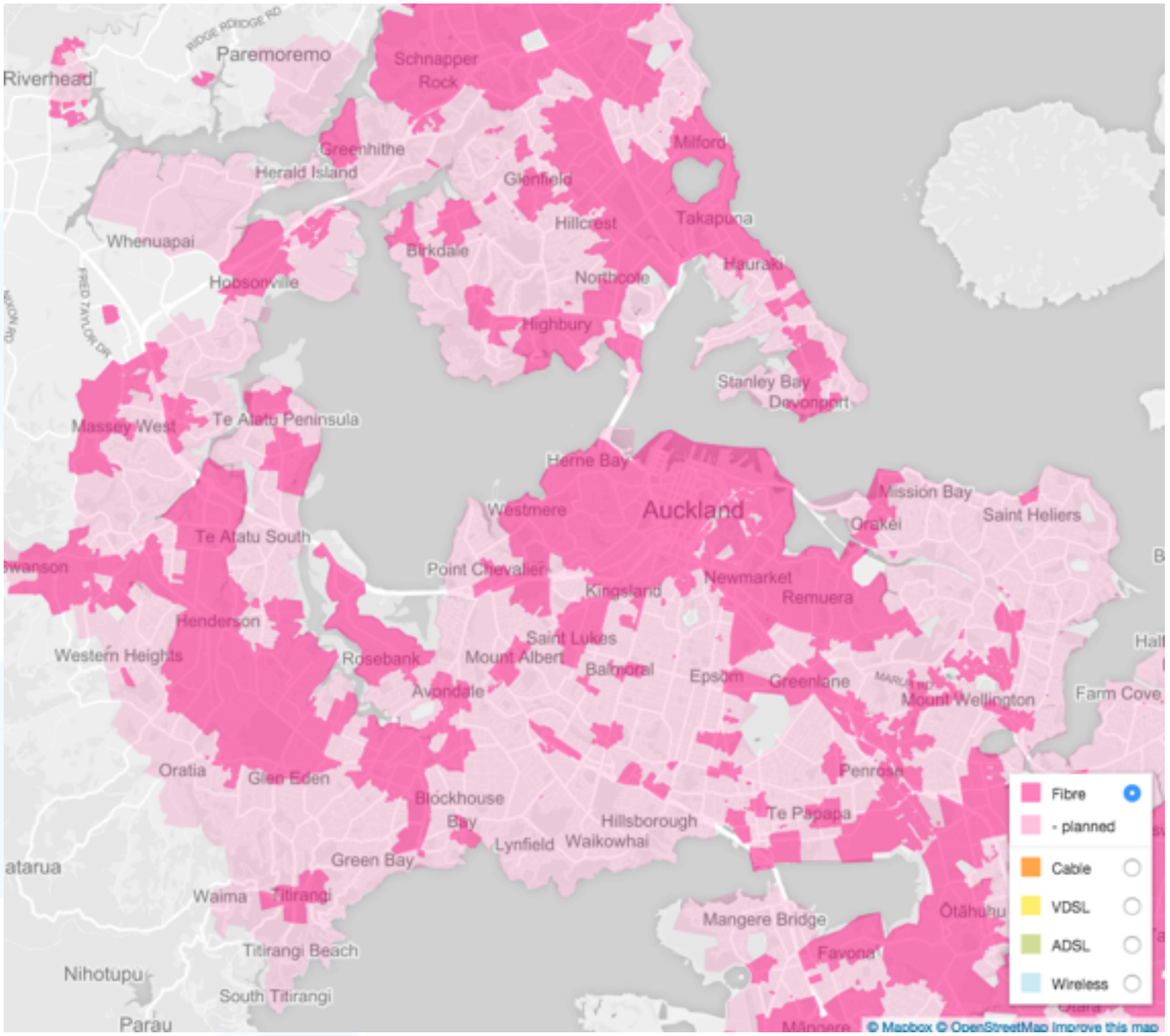
Send feedback



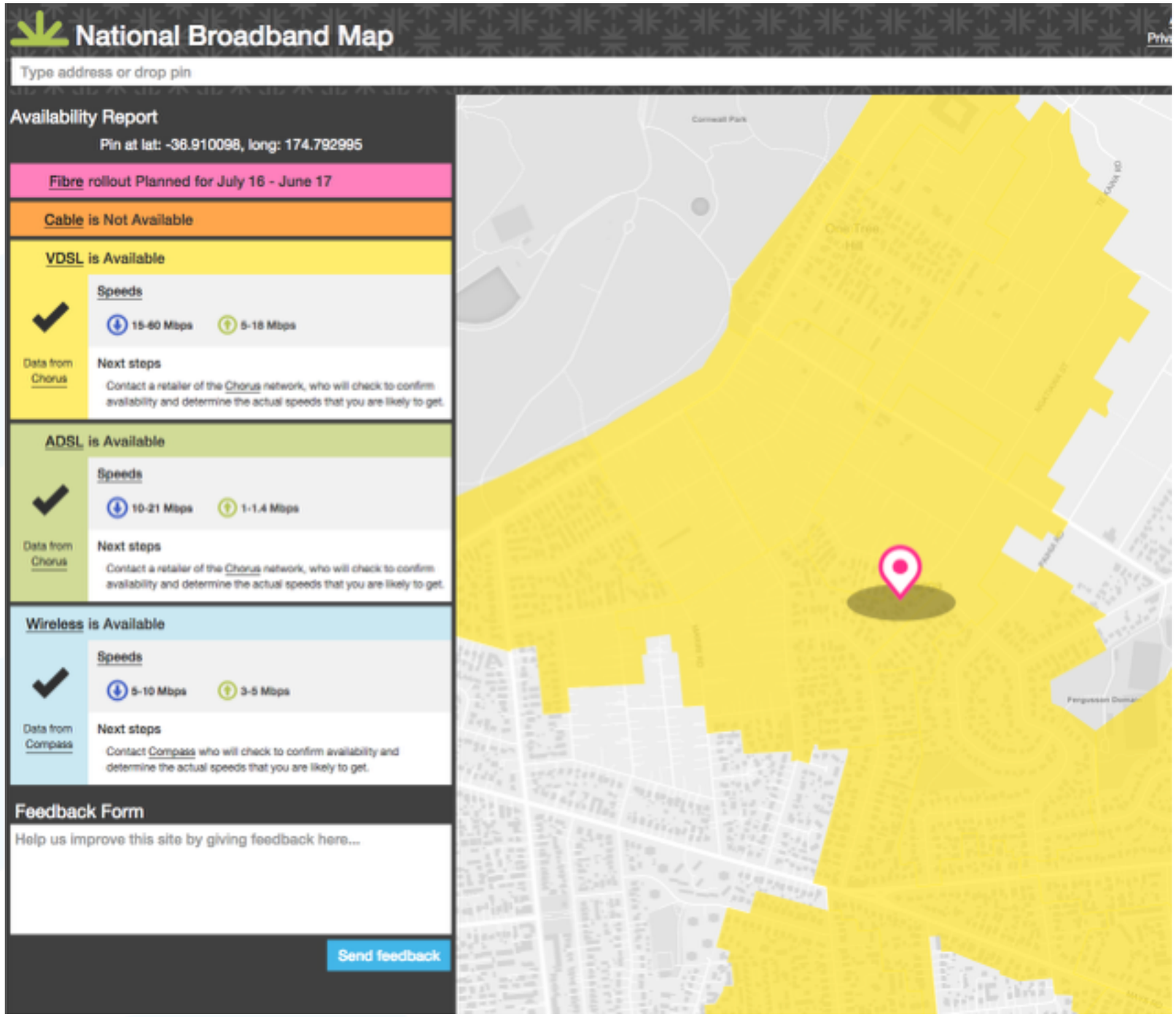
NZRS an InternetNZ company

© Copyright 2015, NZRS Ltd

Visually Represent Broadband Coverage and Timing



Also provide more meaningful textual Information…



Availability Report

Pin at lat: -41.203553, long: 174.849129

Fibre is Not Available

Cable is Not Available

VDSL is Available

Data from Chorus

Speeds

15-60 Mbps 5-18 Mbps

Next steps

Contact a retailer of the Chorus network, who will check to confirm availability and determine the actual speeds that you are likely to get.

ADSL is Available

Data from Chorus

Speeds

5-10 Mbps 0.5-1.4 Mbps

Next steps

Contact a retailer of the Chorus network, who will check to confirm availability and determine the actual speeds that you are likely to get.

Wireless is Available

Data from Vodafone

Speeds

5-42 Mbps 1-5.8 Mbps

Next steps

Contact Vodafone or a retailer of the Vodafone network, who will check to confirm availability and determine the actual speeds that you are likely to get.

Feedback Form

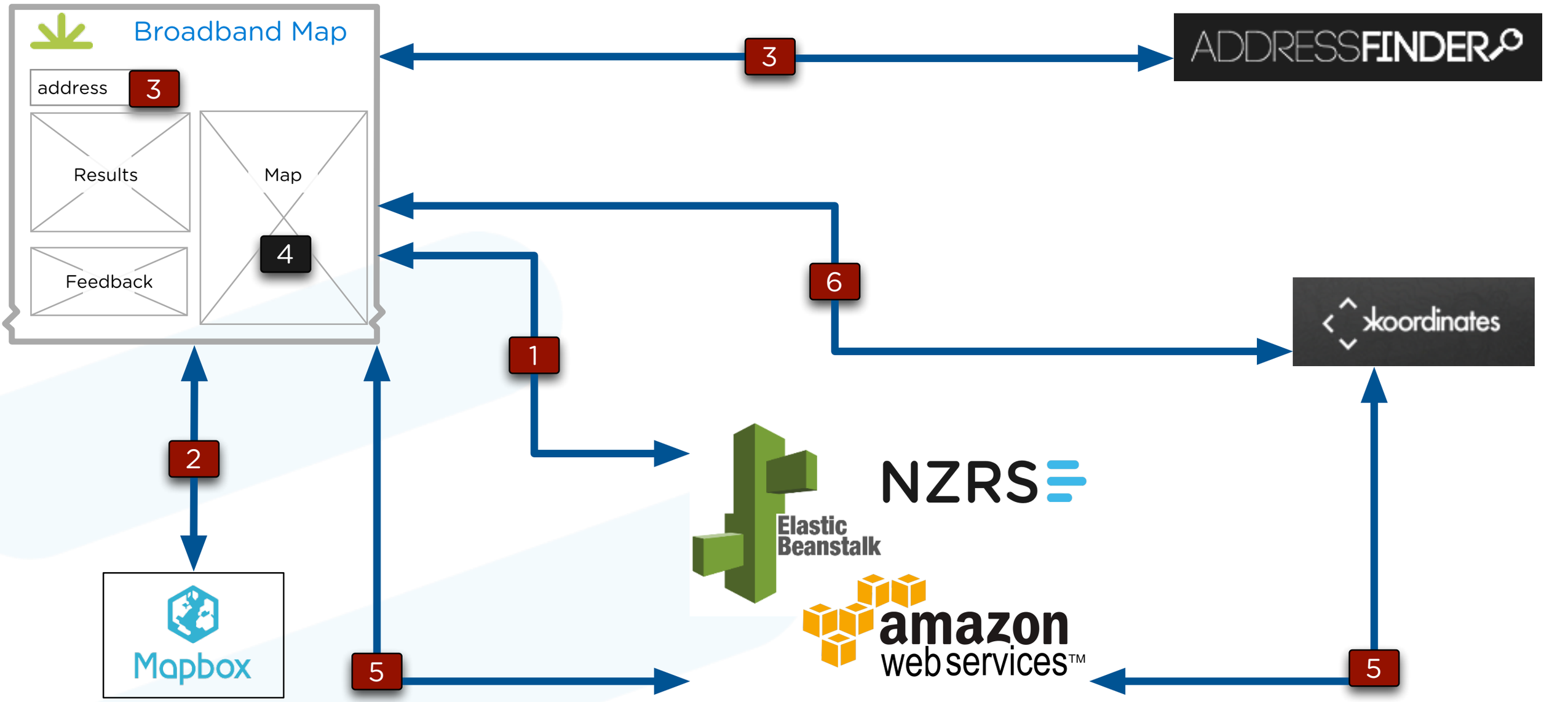
Help us improve this site by giving feedback here...

Send feedback

Some interest

- Released July 2015
- 60,000 visits in the first two hours
- > 150,000 visits to the site since launch
- Lead tech story on major news sites

National Broadband Map - Basic Architecture



1. Static page and Javascript served from Amazon Elastic Beanstalk
2. Base map tiles served by Mapbox (soon to be LINZ)
3. User inputs an address and AddressFinder called to get XY coordinate; or
4. User drops a pin and XY determined by that
5. Query to NZRS API which queries Koordinates to find available networks at that coordinate, supplementary data augmented to the Koordinates response and returned
6. Network coverage tiles requested and served by Koordinates to update the map

We Access Various Interfaces

- AddressFinder
  - Geocoding of addresses
- Koordinates
  - Vector query
  - Web Map Tile Services (WMTS)
- NZRS
  - Augments Koordinates Data with stuff we know

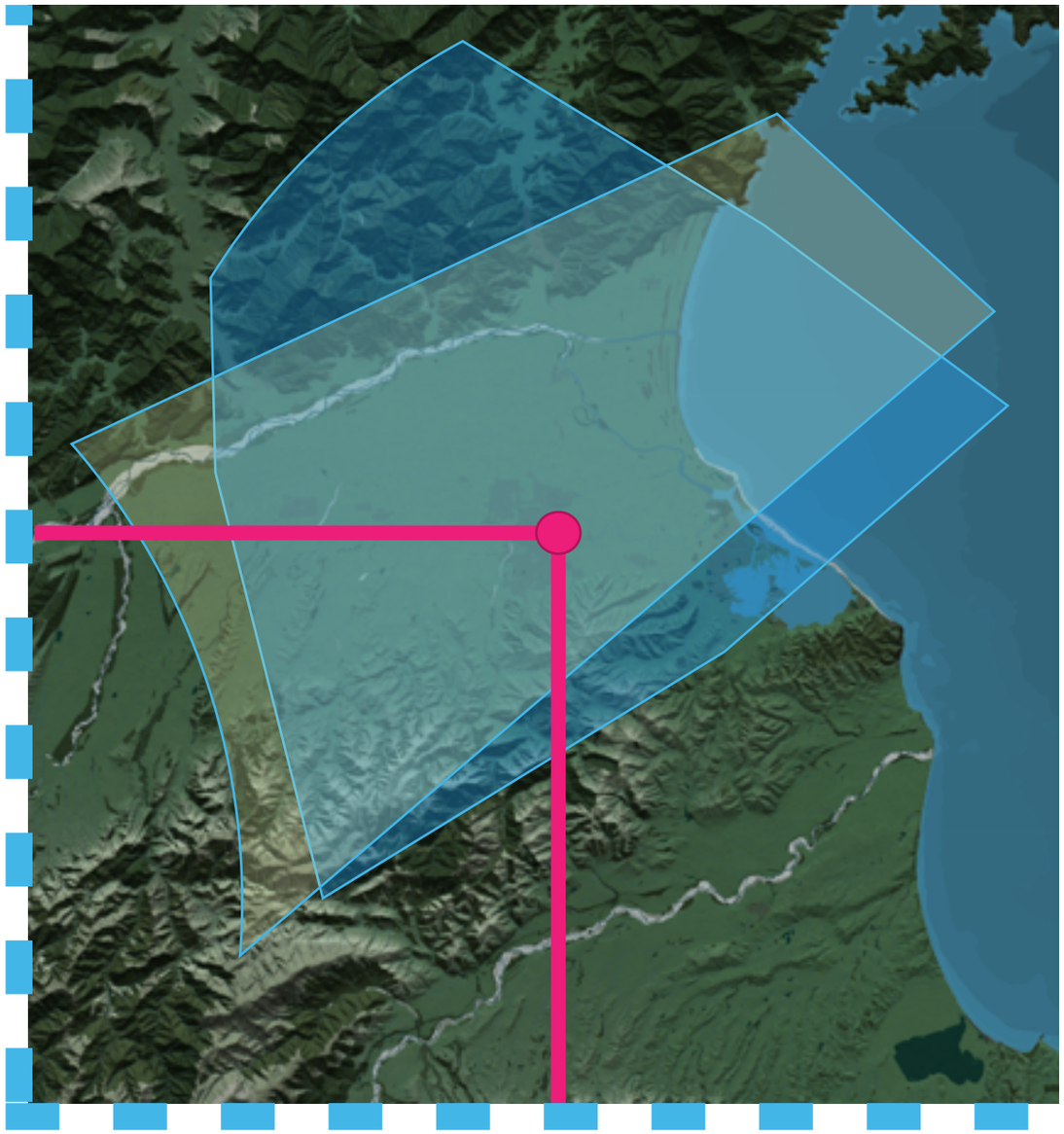
Address Finder

ADDRESSFINDER

- Converts an address to an XY coordinate
- Based off of authoritative NZ address data
- Accessed via a javascript widget

Point in Polygon Query

- We ask a web service if a particular coordinate intersects a network we hold data on

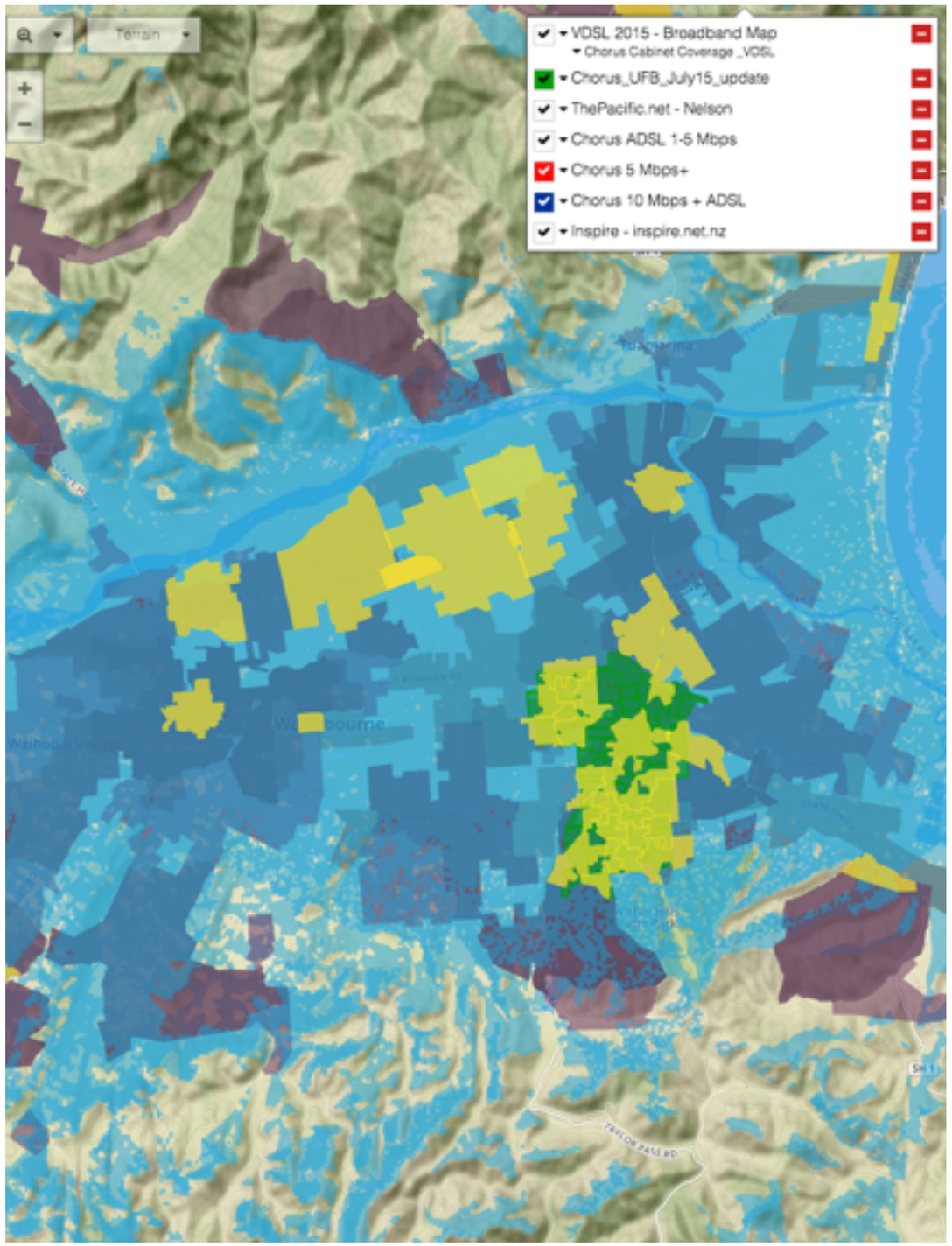


koordinates

https://data.nzrs.net.nz/services/query/v1/vector.json?key=<MY_API_KEY>&layer=7910&x=168.5258101344461&y=-46.81635478996266 6&max_results=3&with_field_names=true

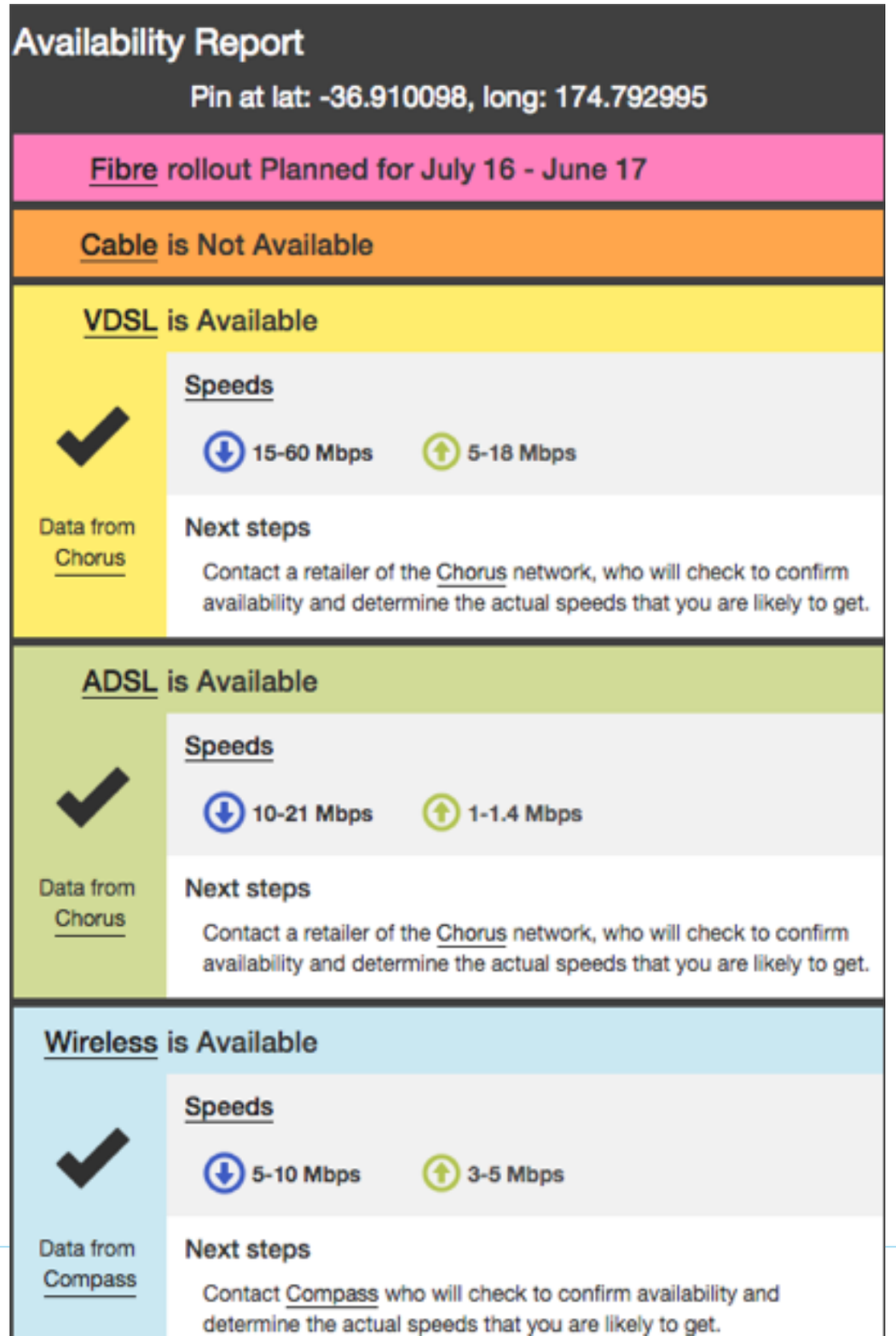
Lots of Networks to Query

- Multiple networks are available at different points
- Aggregated at the National Broadband Map by technology
  - ADSL
  - VDSL
  - Fibre
  - Wireless
  - Cable (HFC)



JSON Response


```
{
  "results": [
    {
      "technology": "Fibre",
      "availability": "Planned",
      "completion": "Available by 2019",
      "set_id": 1822,
      "providers" : [
        {
          "network_name": "Chorus",
          "wholesale network": "Yes",
          "URL": "https:\/\/chorus.co.nz\/",
          "bandwidth_up_max_mbps": 1000,
          "bandwidth_min_mbps": 50,
          "bandwidth_max_mbps": 1000,
          "bandwidth_up_min_mbps": 10
        }
      ]
    },
    {
      "technology": "VDSL",
      "availability": "Available",
      "set_id": 1773,
      "providers": [
        {
          "network_name": "Chorus",
```

NZRS Data Service

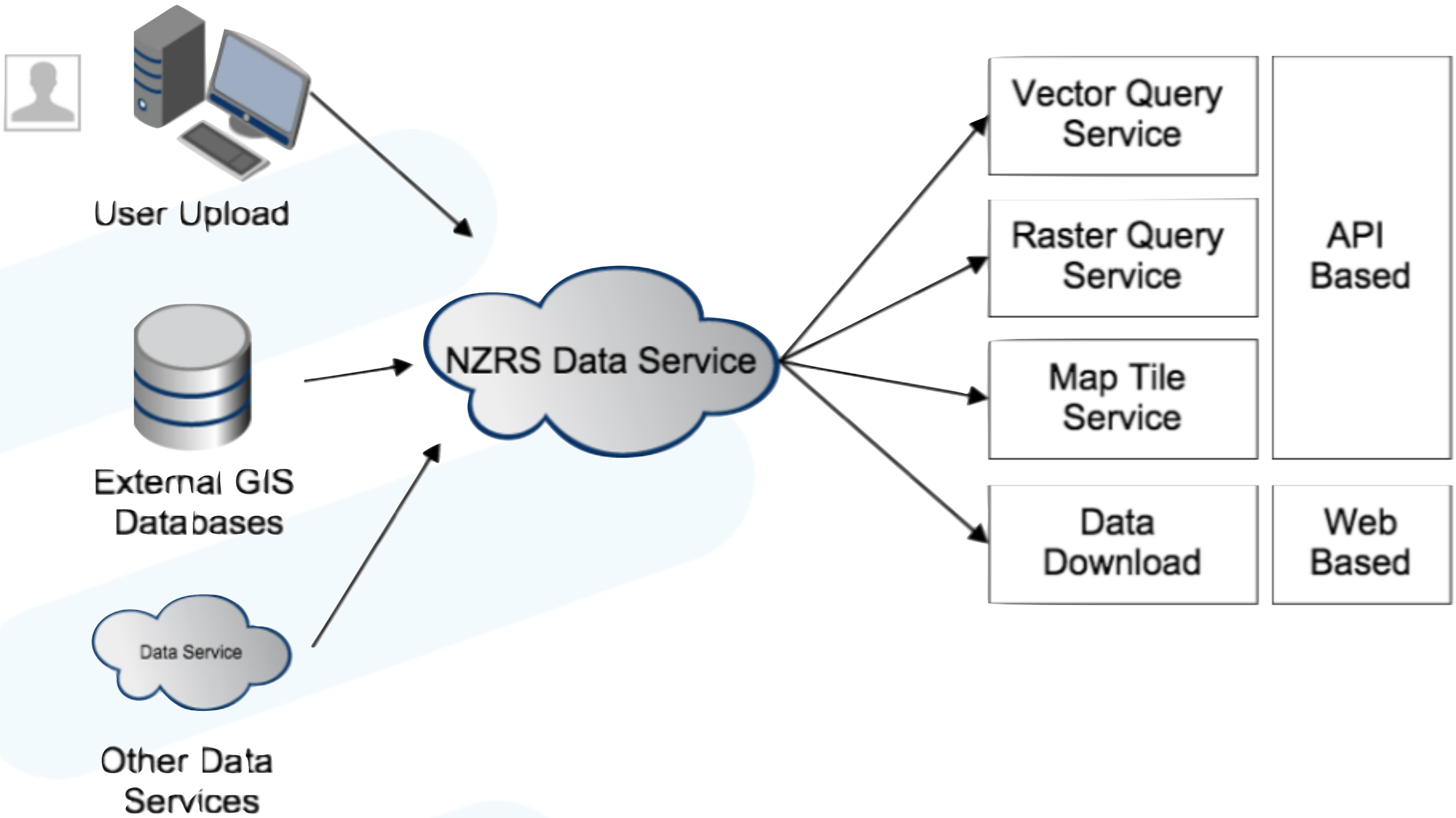
NZRS Data Service

- Its what drives the Broadband Map
- We would like as much data to be open for reuse by others
  - We have a platform to allow that
  - Its not actually NZRS data so we need permission to release the data
  - We can expose the APIs, tile services and allow direct download of the data

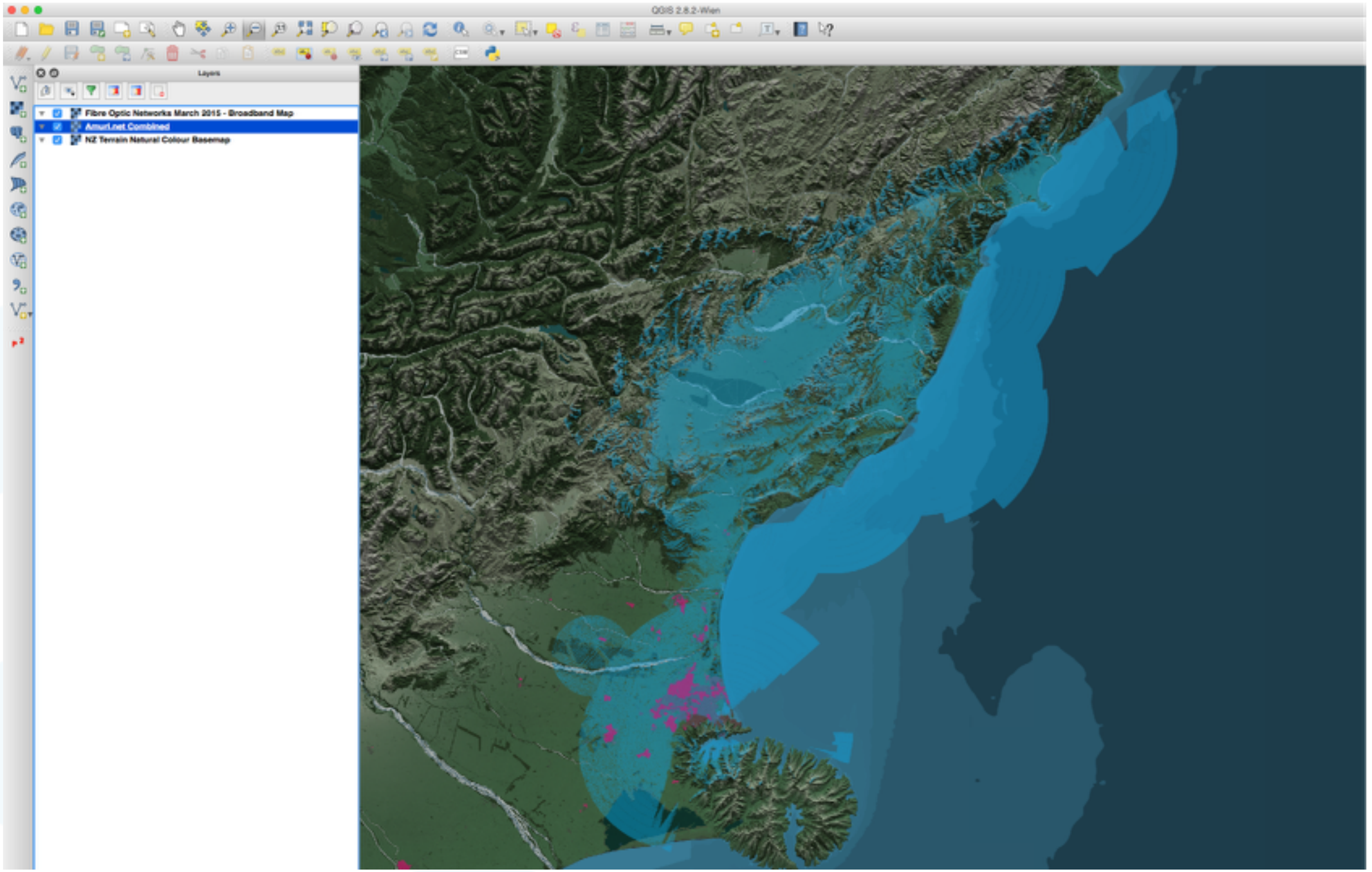
NZRS Data Service

- Enables
  - Vector querying
  - Tile services
  - Storage
  - Permissions
  - Metadata management
  - Distribution

Data Service Architecture



Can Be Consumed in Desktop GIS



Sourcing the Data

The Data

- Over 20 providers of data
- Data is coverage area, not statistical areas
- We work with the providers to understand the data, and;
  - Help them generate the data if required

How do we get the data?

- Ask nicely.
- Don’t misrepresent the providers.
- Play the long game.
- Launching broadbandmap.nz increased enthusiasm to participate.
  - More eyeballs greater motivation to get things right from some providers.
  - We get better data as a result.
- Support from industry is very important

Wireless Propagation Data

Wireless Networks in NZ

- There are a number of wireless networks in New Zealand.
- Of size 20-30 is a reasonable estimate
- Typically filling a rural and remote niche and specific applications
- Smaller operations
- Know their networks well
- Communicating coverage has been problematic
- Where coverage does exist it is often in non GIS formats

A couple of approaches we took

- Converting images geo-referenced with KML to Shapefiles, useful for outputs from:
  - RadioMobile
  - TowerCoverage.com
- Generating coverage using elevation data and Longley Rice Prediction Model.
  - Wavetrace - NZRS Open Source Software

Wavetrace

Longley-Rice based coverage prediction

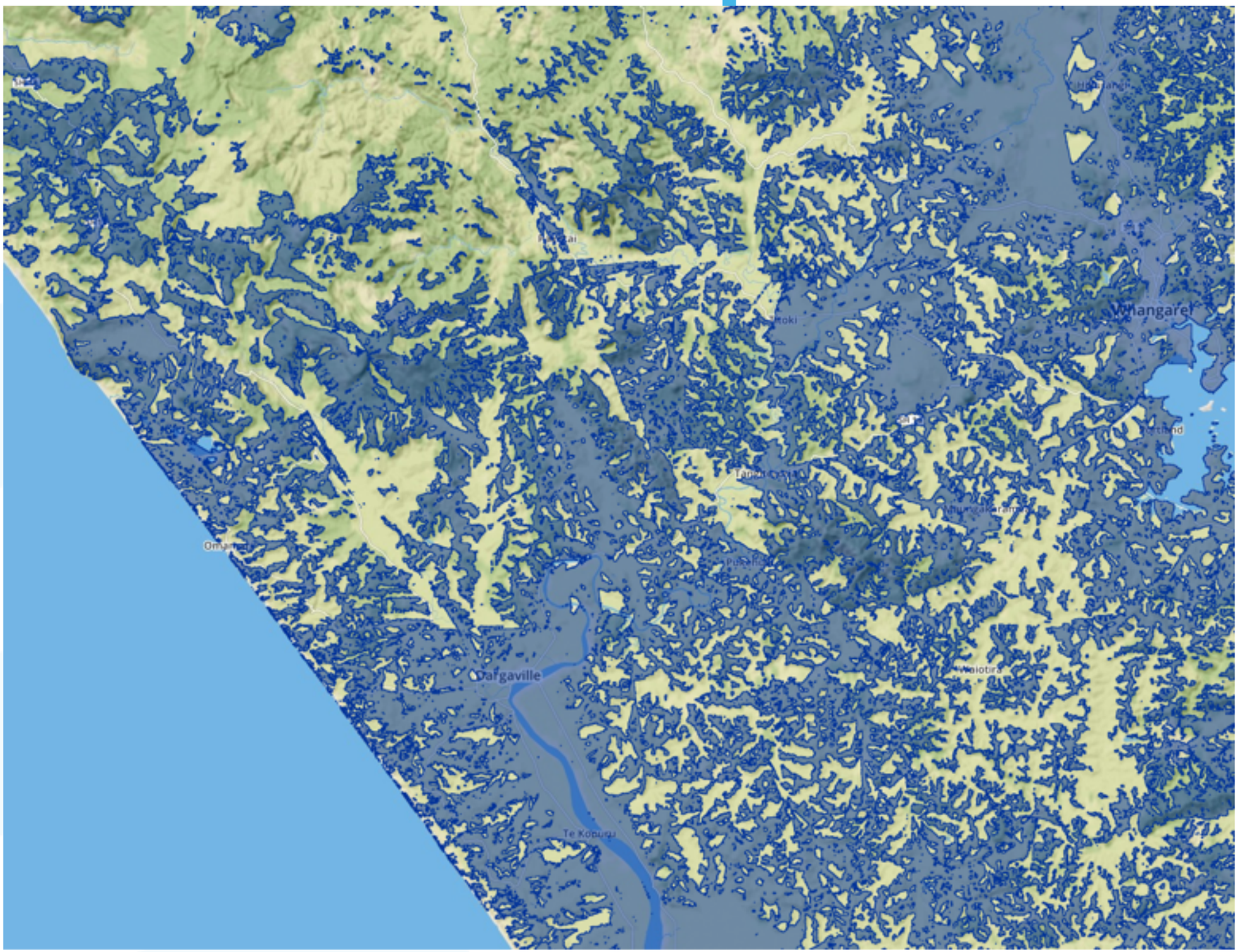
INPUTS

- Digital elevation model*
- Network details*
- Latitude*
- Longitude*
- Antenna height above ground level*
- Frequency (MHz)*
- Power (EIRP)*
- Polarisation
- Bearing
- Horizontal beam width
- Vertical beam width
- Antenna downtilt
- Clutter**
- Receive antenna height above ground level**

* Mandatory input
** Constant at present

https://github.com/NZRS/wavetrace

Wavetrace Output Coverage



Analysis Examples

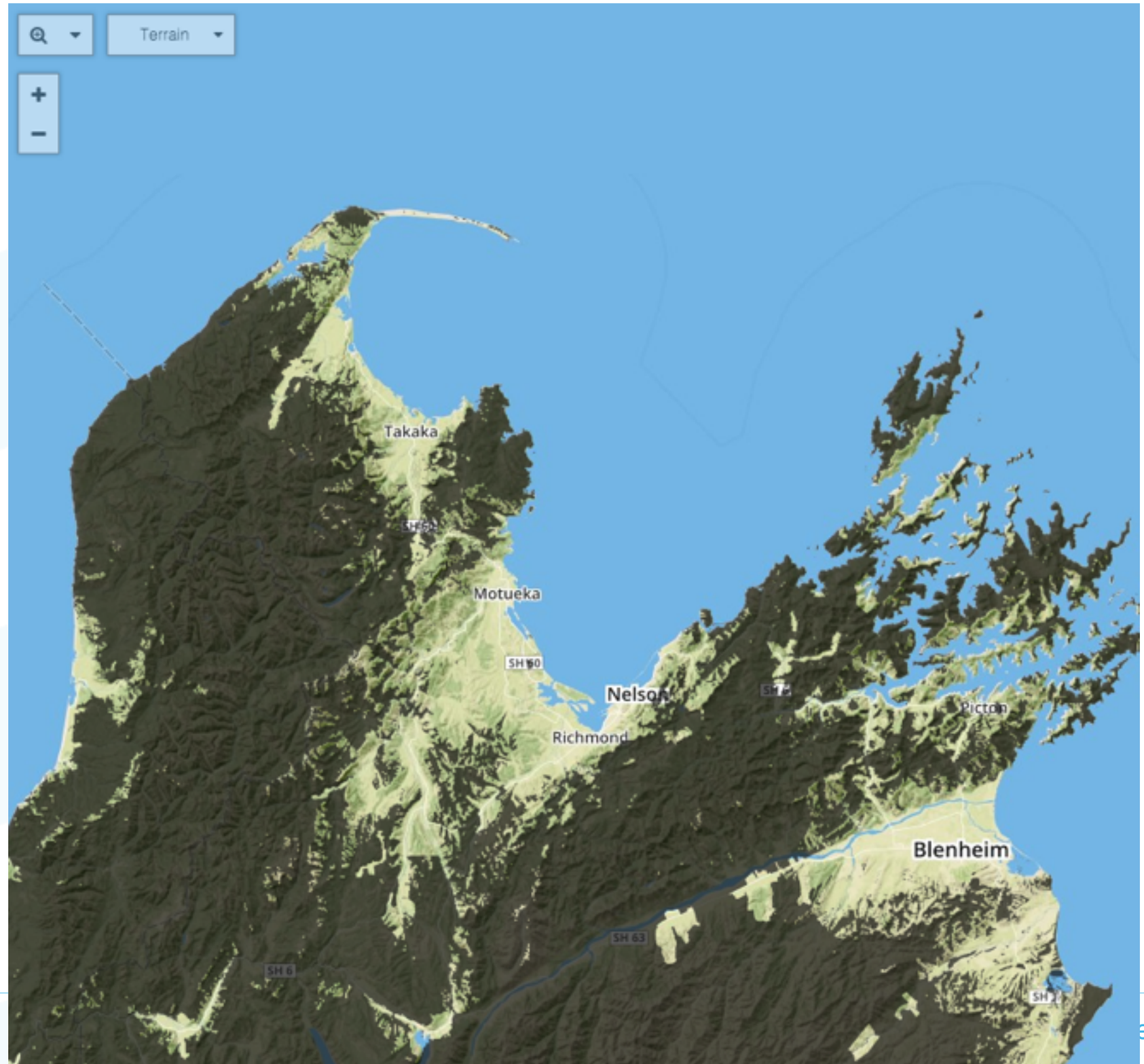
Identifying True Extent of Service

- Finding broadband and broadband blackspots
- Identifying underserved customers
- Informing public policy
- Quantifying availability by bandwidth and technology

Visual Representation

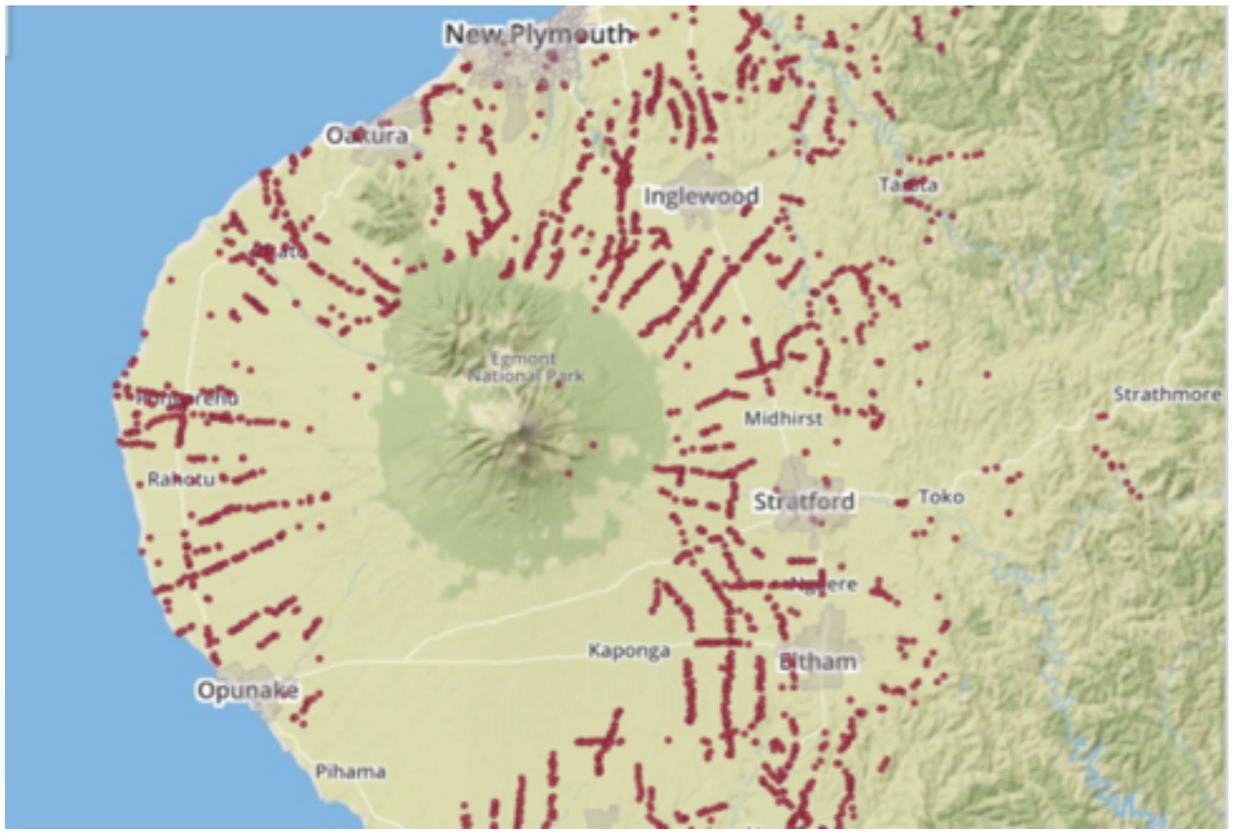
- You can style geographic data with a simple styling language - CartoCSS
- It’s supported by many applications and services
- As we have coverage we can style where we don’t have coverage (broadband blockspots)

Broadband Blockspot Styling Using CartoCSS



Underserved costumers

- In Taranaki - addresses with wireless but no 5 Mbps + copper based service
- How
  - Coverage data from NZRS
  - Address points from LINZ
  - PostGIS



Public Policy Example

- The data service was used by regional authorities in New Zealand to respond to central government funding initiatives.
- Specifically in response to central government funding for FTTH deployment (UFB) and rural broadband extension (RBI).
- Network coverage could be integrated into their GIS systems.
- Maps for public consultation could be produced.
- Network providers could be identified.

Conclusion

- From raw data to user friendly application there is a lot of work.
- Collaboration, Collaboration, Collaboration - its all about working with people.
- The data allows analysis and this analysis is not yet fully tapped.