Hosted by

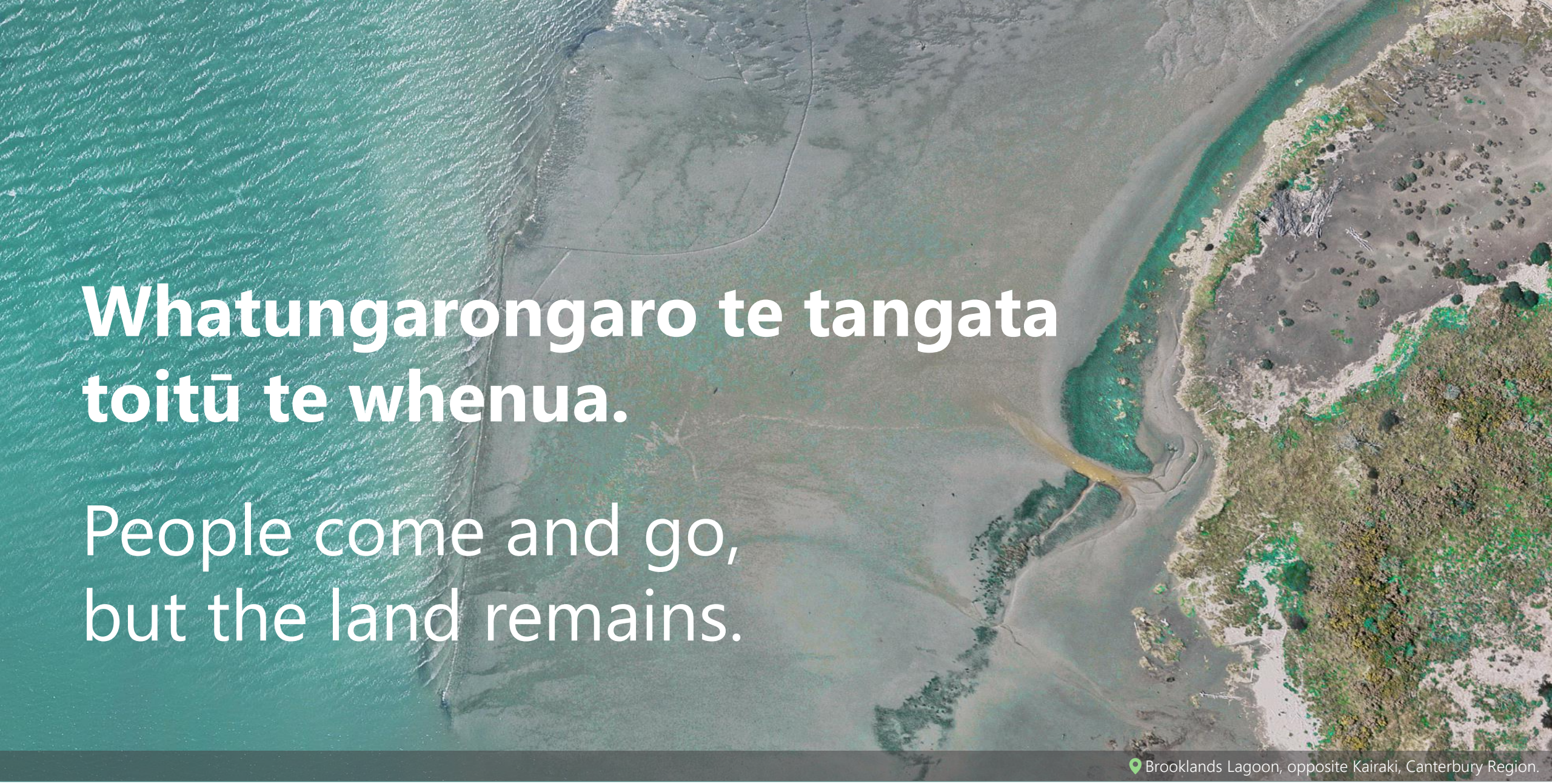
Toitū Te Whenua
Land Information
New Zealand

Starting soon...

Aotearoa Property Data Network

4th Quarterly Webinar - 10am-12pm, Tuesday 4 April 2023

4 April 2023



Whatungarongaro te tangata toitū te whenua.

People come and go,
but the land remains.

Brooklands Lagoon, opposite Kairaki, Canterbury Region.

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Land Information
New Zealand

Te Kāwanatanga o Aotearoa
New Zealand Government

Opening karakia

Whāia te mātauranga kia mārama, kia tupu, kia tiaki ngā whenua, ngā moana, ngā arawai	Pursue knowledge for understanding, developing and caring for the lands, bodies of water and waterways
Kia whai take ngā mahi katoa	Seek purpose in all that we do
Aroha atu aroha mai, tātou i a tātou	Let us show respect for each other
Toi te kupu	Hold fast to our language
Toi te mana	Hold fast to our spiritual strength
Toitū te whenua	Sustain the land
Haumi ē, hui ē, tāiki ē!	Gather and go forward together

Agenda

10am-10:05	Welcome and opening karakia
10:05-10:25	**Toitū Te Whenua** news and updates *- various Toitū Te Whenua stakeholders*
10:25-10:45	**Wellington City Council**: Subsurface mapping programme *– Denise Beazley, Programme Director*
10:45-11:05	**Ministry for the Environment**: LUCAS Land Use Map *- Deb Burgess, Senior Analyst, Carbon Sequestration*
11:05-11:25	**Manaaki Whenua Landcare Research**: Land use classification using a discrete global grid system (DGGS) *- Richard Law, Geospatial Analyst*
11:25-11:45	**Toitū Te Whenua**: Ratings Valuation Rules Review *– Andrew Freeth, Senior Advisor Operational Policy*
11:45-11:50	Closing comments and karakia

LINZ News & Updates

Miramar buildings rendering

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New Zealand Government

- **NZ Addresses** – published. NZ Street Address now deprecated
- **NZ Suburbs & Localities** – publishing and change requests
- **NZ Properties Hybrid Layer Pilot** – preparing for pilot release to public sector stakeholders
- **Key Data for Resilience** – confirm data improvement priorities
- **LINZ Data Service** – point cloud data, owners, user interface, call for case studies
- **Modernising Landonline** – Survey app live
- **Overseas Investment** – new dashboards on LINZ website

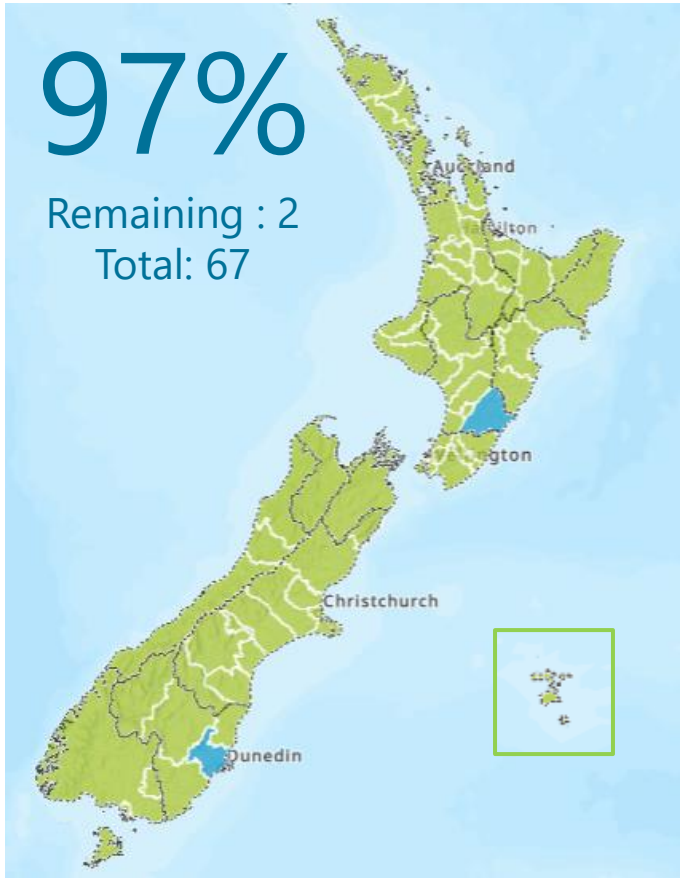
NZ Addresses

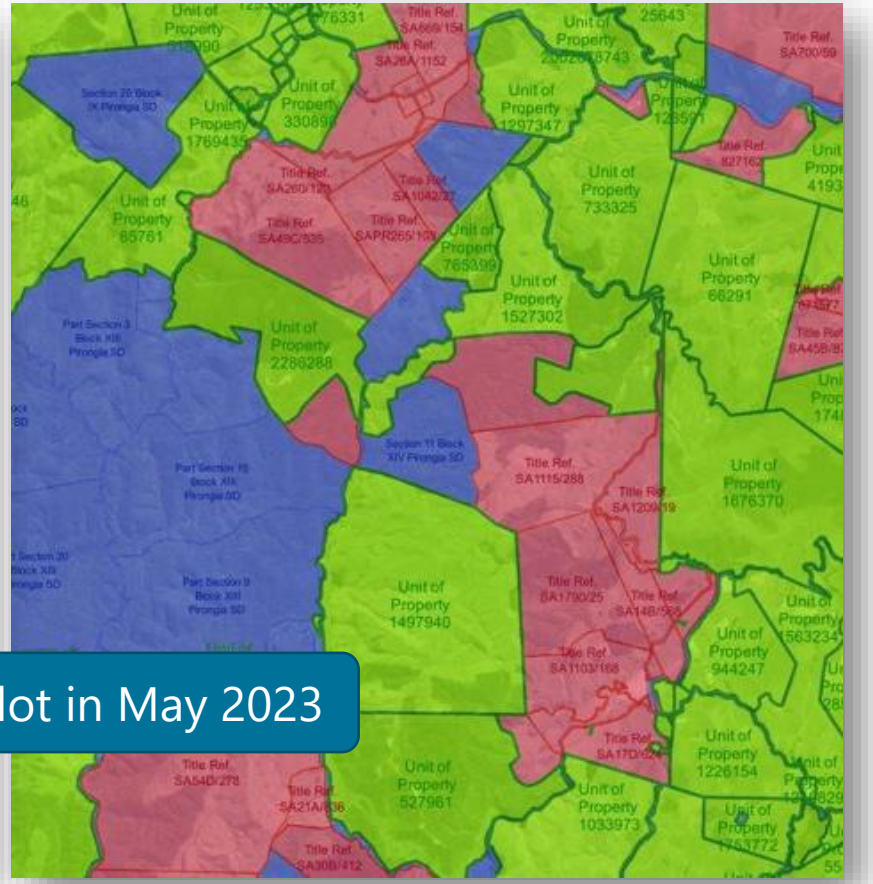
- Released from pilot
- 135,000 additional addresses
- NZ Street Address only available until June 2023

NZ Suburbs and Localities

- Simplified data structure
- Adopted official place names
- Publish before June 2023
- Change request process
- Review Panel members

NZ Properties Hybrid Layer





Releasing into pilot in May 2023

[Public dashboard]

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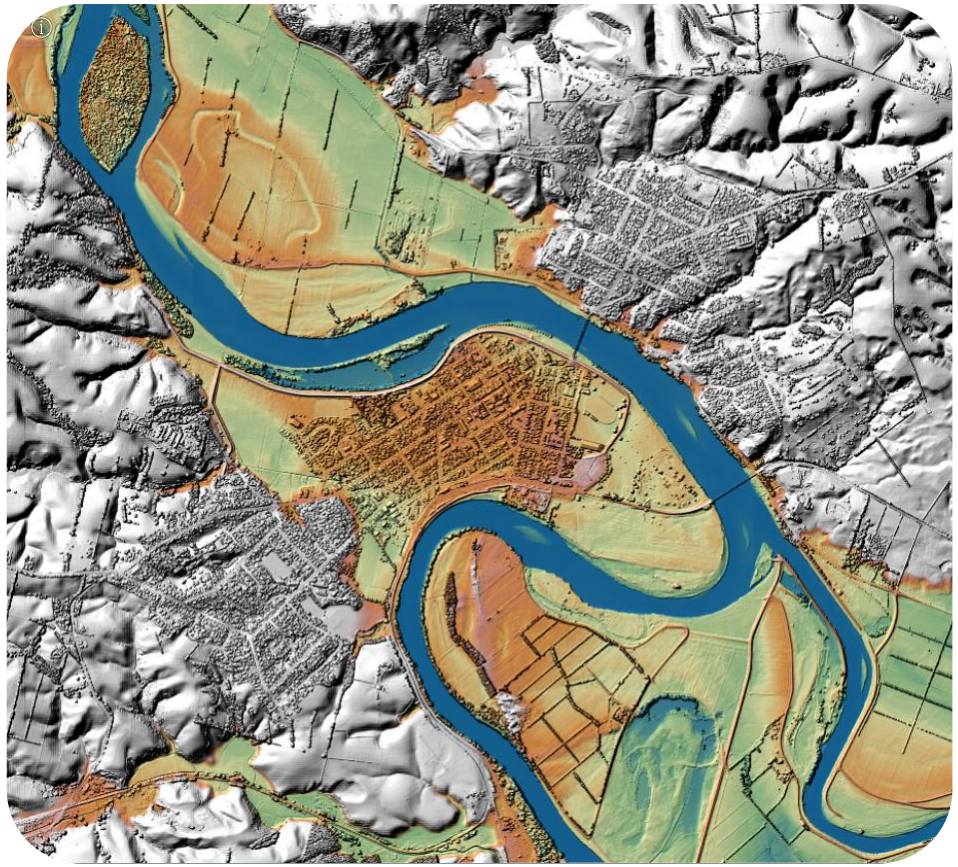
New Zealand Government

Key Data for Resilience

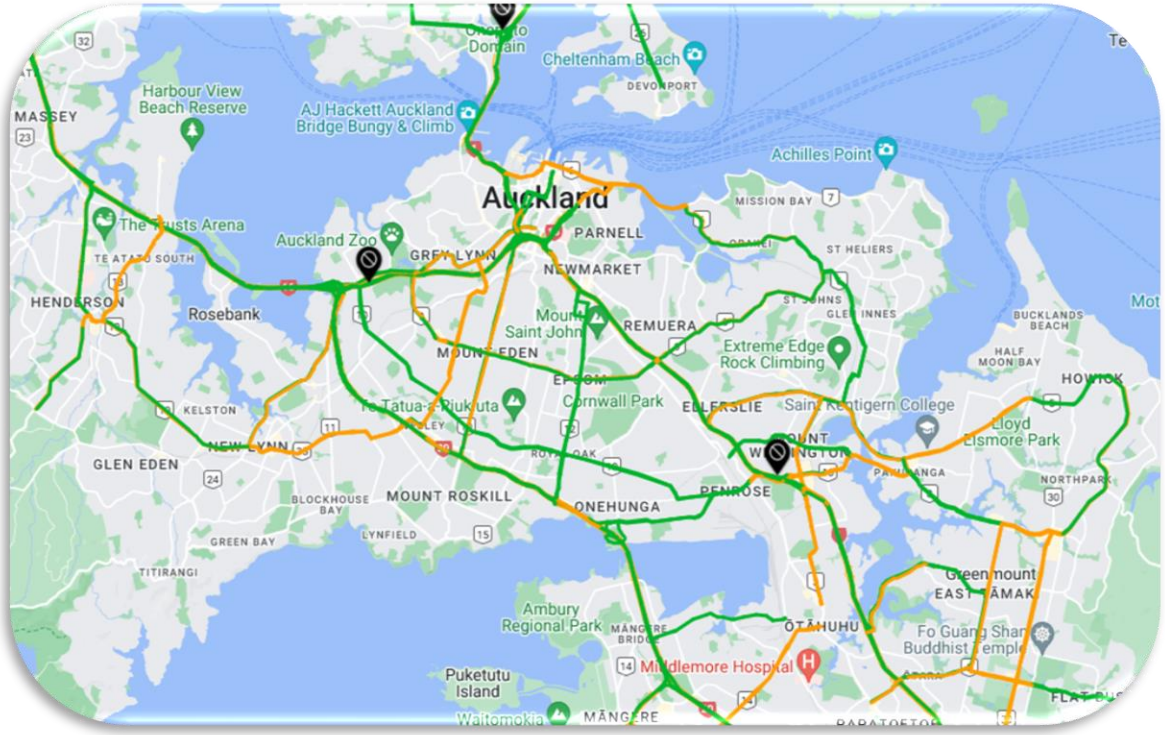
- ✓ Addressing highest priority improvement
- ✓ Suburbs most improved key dataset
- ✓ Imagery most improved LINZ key dataset
- ✓ Rail most fit for purpose for emergency management

What's next?

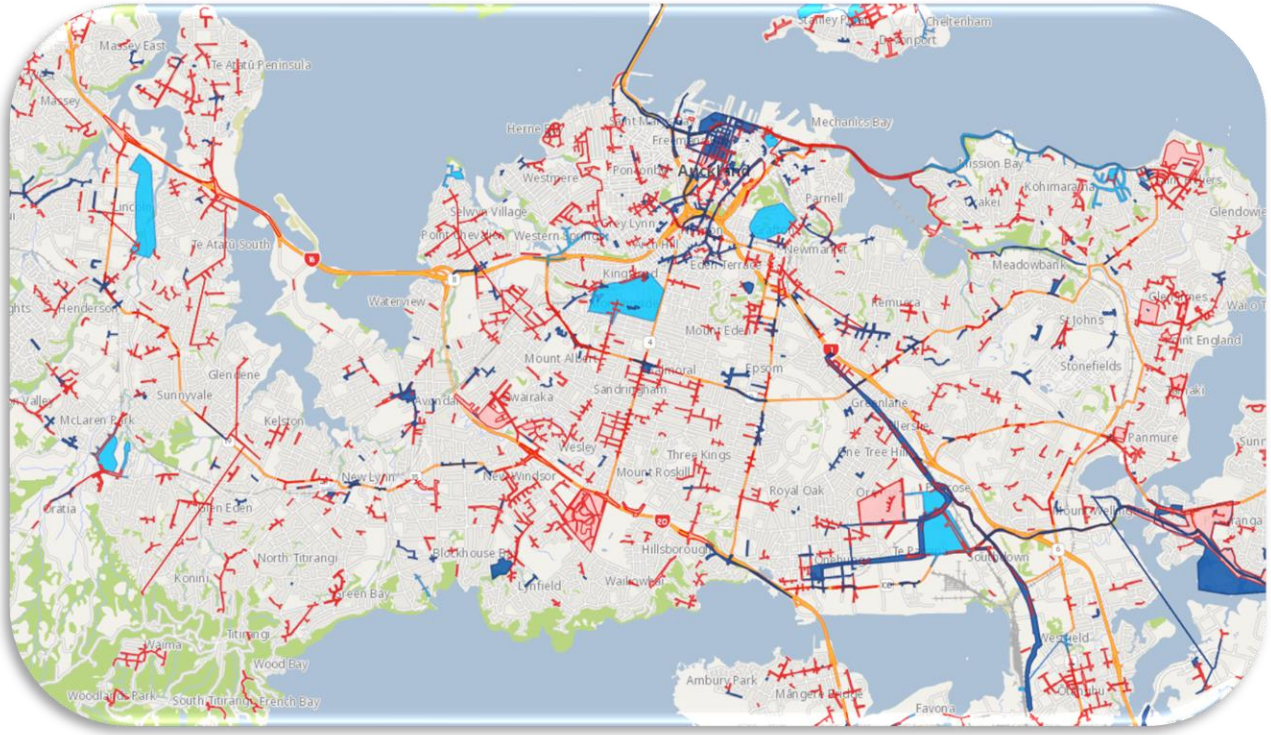
- Discuss with emergency management community
- Property boundaries restricted access
- Building outline attributes
- Closed roads in an emergency



Closed Roads in an emergency



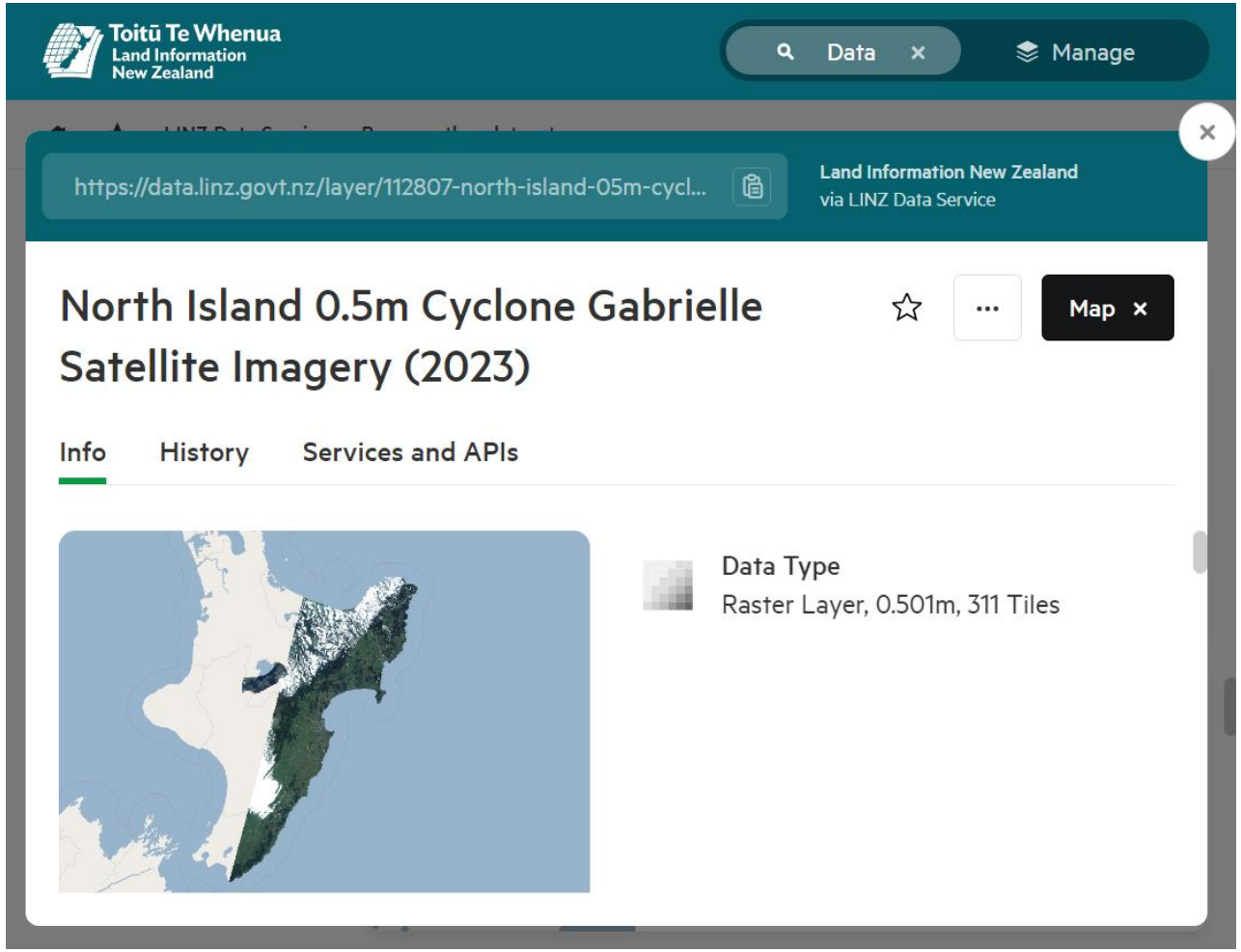
Waka Kotahi Journey Planner



Auckland Transport

LINZ Data Service

- User interface
- Point cloud data
- Property owner data
- Call for case studies



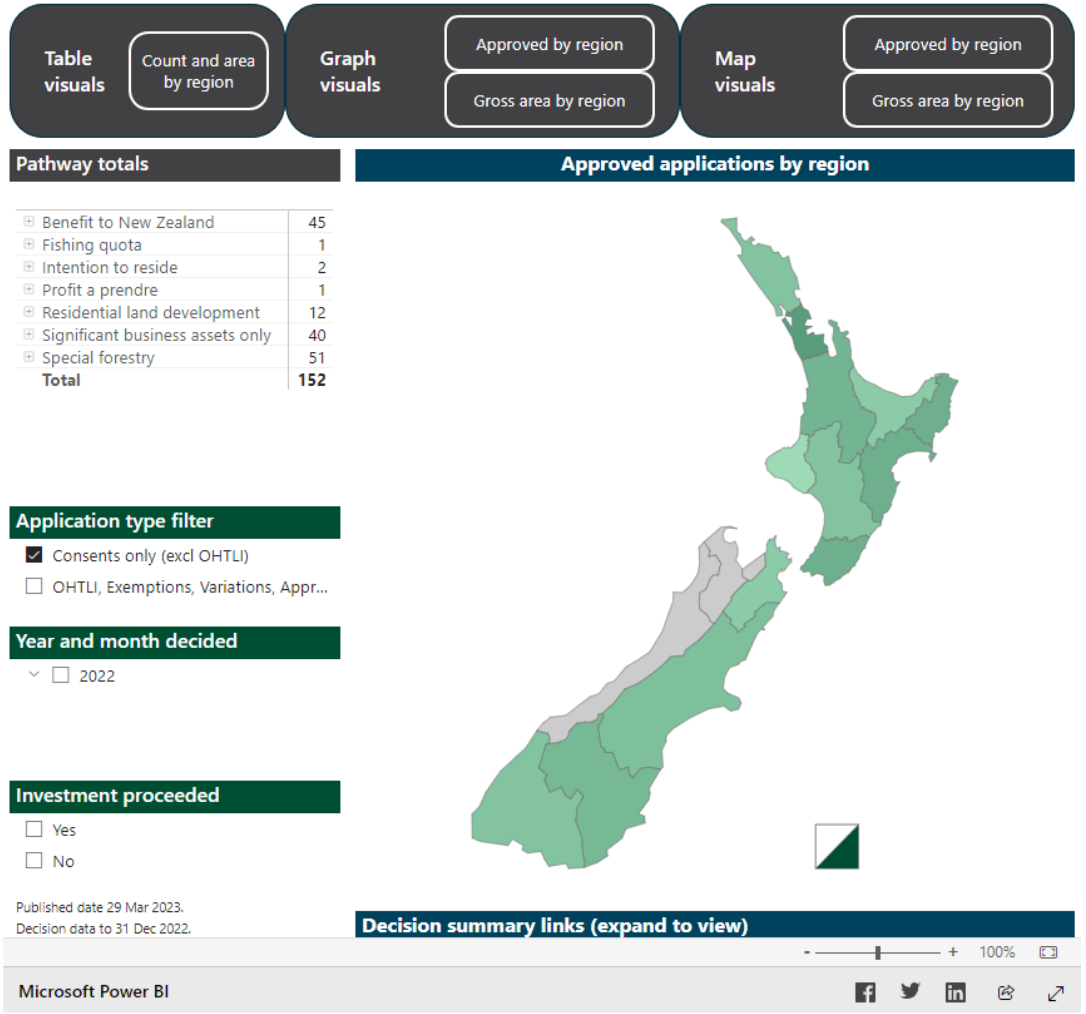
linzdataservice@linz.govt.nz

Modernising Landonline

- Focus on conversion to New Landonline and ‘burn-down’ of Legacy.
- Survey App went live Friday 31 March
- New functions include overlaying georeferenced aerial imagery to help create irregular lines.

Overseas Investment dashboards

- Published to LINZ website in interactive, visual format
- Industry, region, worldwide views
- Information on investment pathways
- Links to:
  - Overseas Investment information dashboards
  - Latest Pānui newsletter



Absolutely Positively **Wellington** City Council

Me Heke Ki Pōneke

Subsurface Mapping Programme

Denise Beazley
Programme Director

Castlepoint, Wellington Region

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New Zealand Government

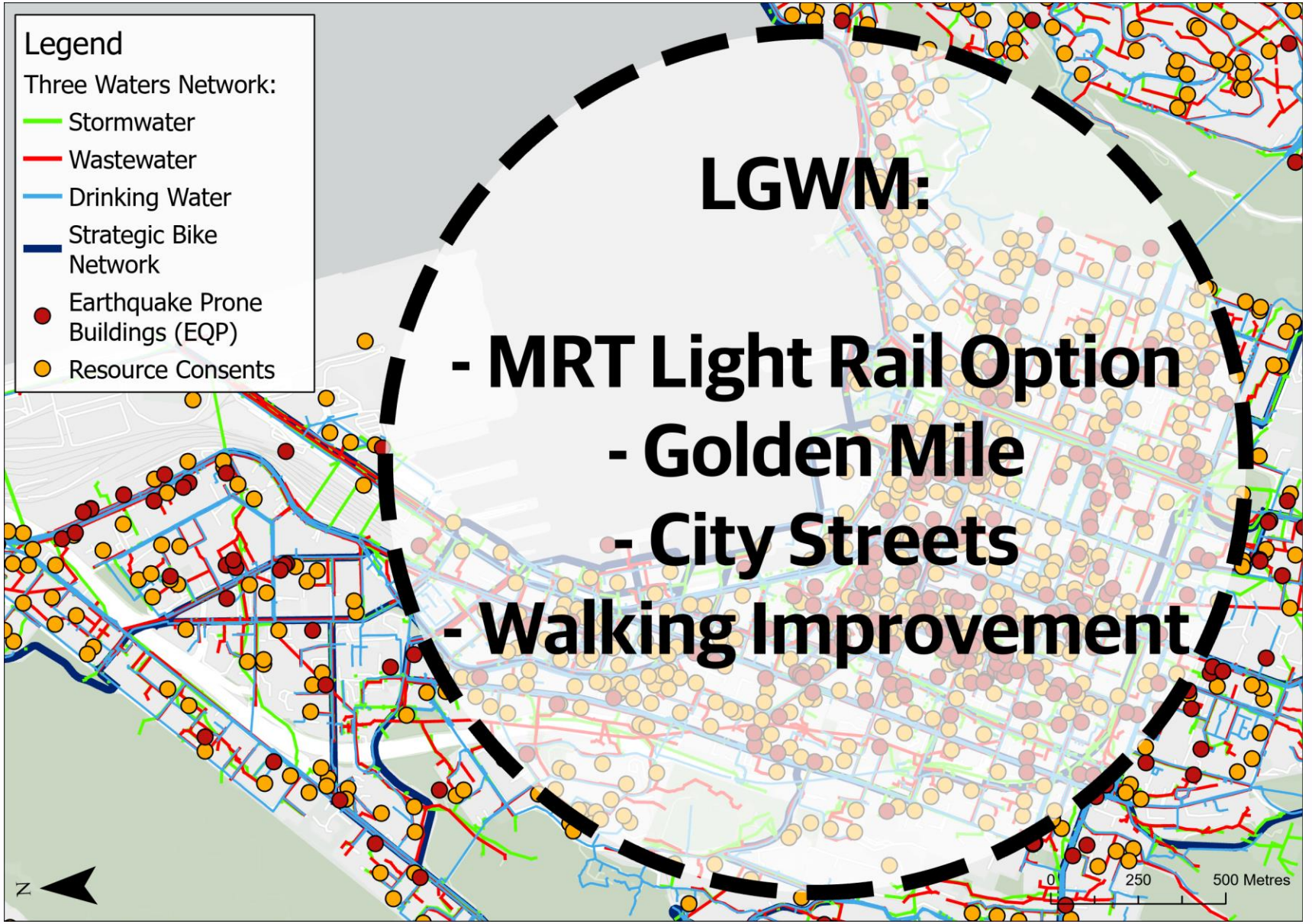
Wellington Underground Asset Map Programme

A ‘market’ twin

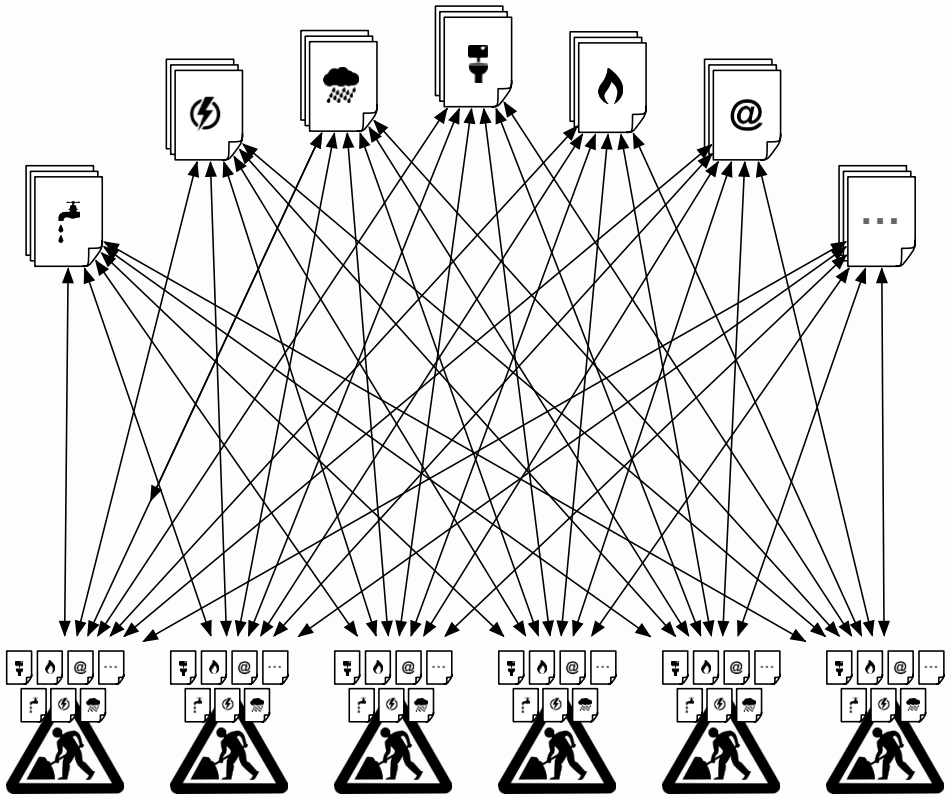
4th April 2023

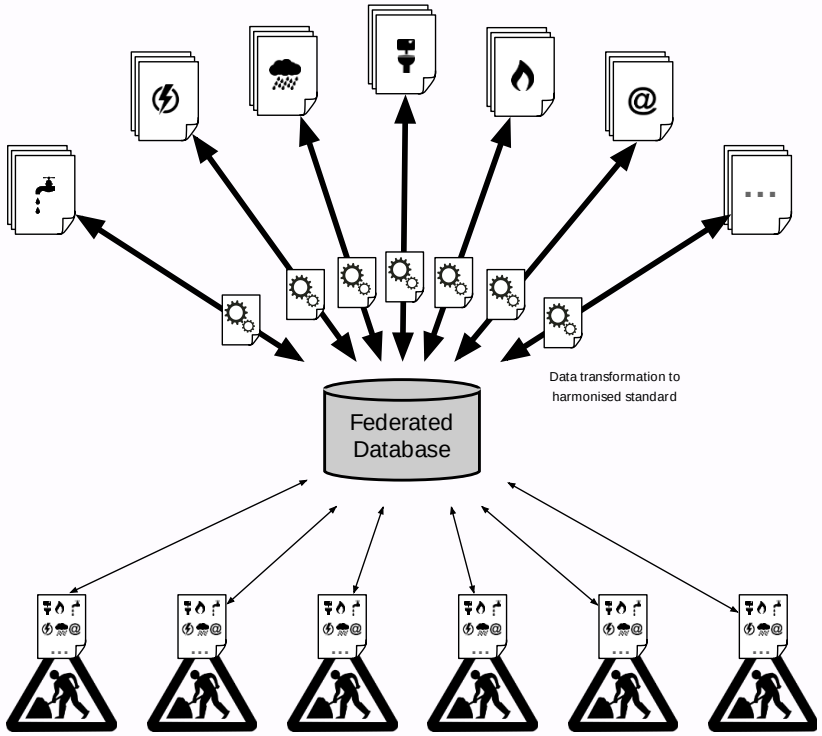
Driver

Why we need change



What we need





A Trusted View

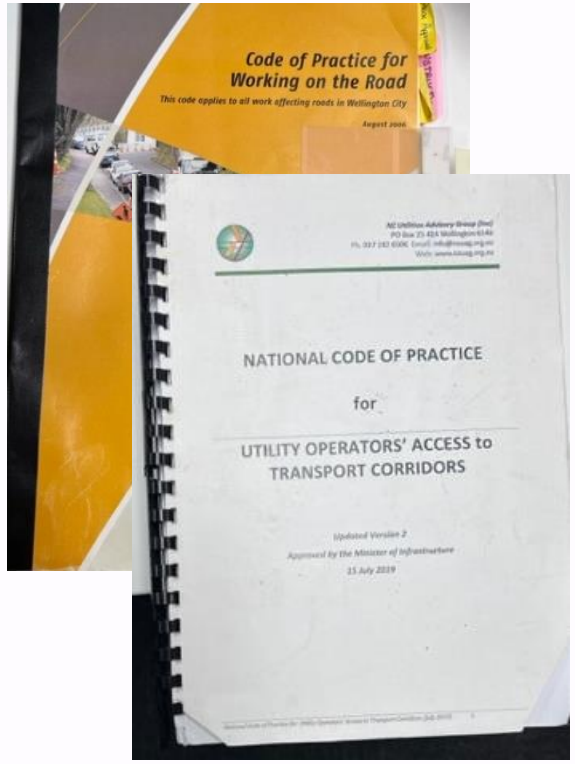
Current State

Future State

Wastewater Pipe (Local)

Attribute	Value
GIS ID	927034
UNIT ID	2071184
COMP KEY	2531766
SERVICE	Local
STATUS	OP
DIAMETER	150
MATERIAL	PVC-U
INSTALLED	11/07/2001
PROCESS	Gravity
POSITION	Buried
GROUP	Pipe
SUBTYPE	Main Line (L)

The Role of the Corridor Manager



- Our responsibility to manage the corridor
- Make it easy to access data
- The compound effect of small changes
- And we have the legal mandate

Why are we doing this: Target Outcomes

- Safety profile of excavation work
- Accuracy in the cost-estimation of projects
- Planning and delivery of construction activity
- Location of underground service corridors (empty space) for the installation of new infrastructure
- Asset knowledge and stewardship in lifecycle planning and maintenance
- Compliance with regulatory obligations
- Market Performance and Management

- Time, cost and risk for the design phase of subsurface infrastructure projects
- Contract cost risk
- Disruption to the community – particularly businesses and road users

Estimated
Rate of Return

~12x

With Potential National Economic Benefit Cost Ratio of **up to 30x** *

* UK NUAR estimates

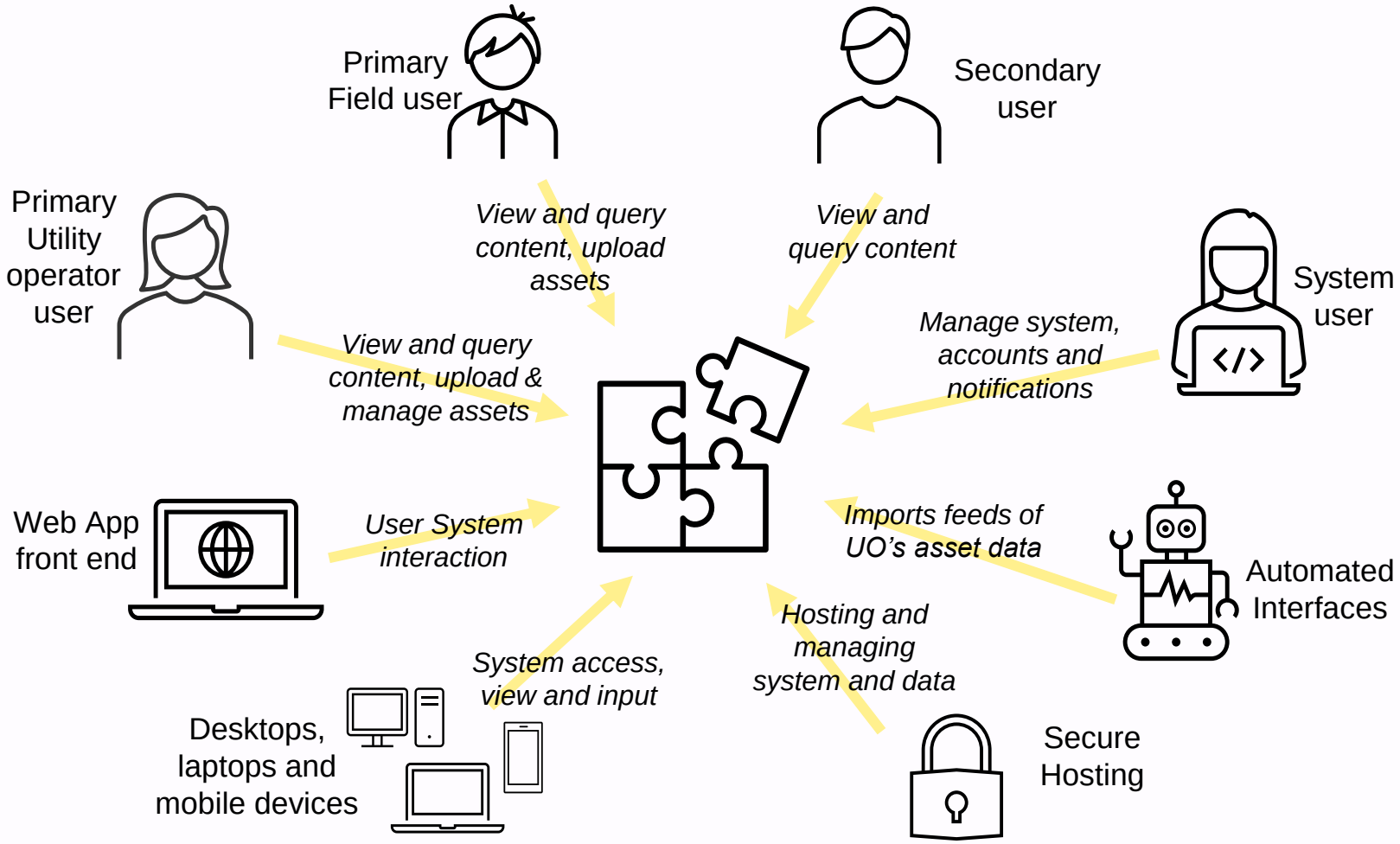

Scotland
England
Minnesota
Colorado
Milan
Singapore
Putting us on the map!!
NSW
Victoria
WELLINGTON

Our Vision for the Platform – Scope & Actors

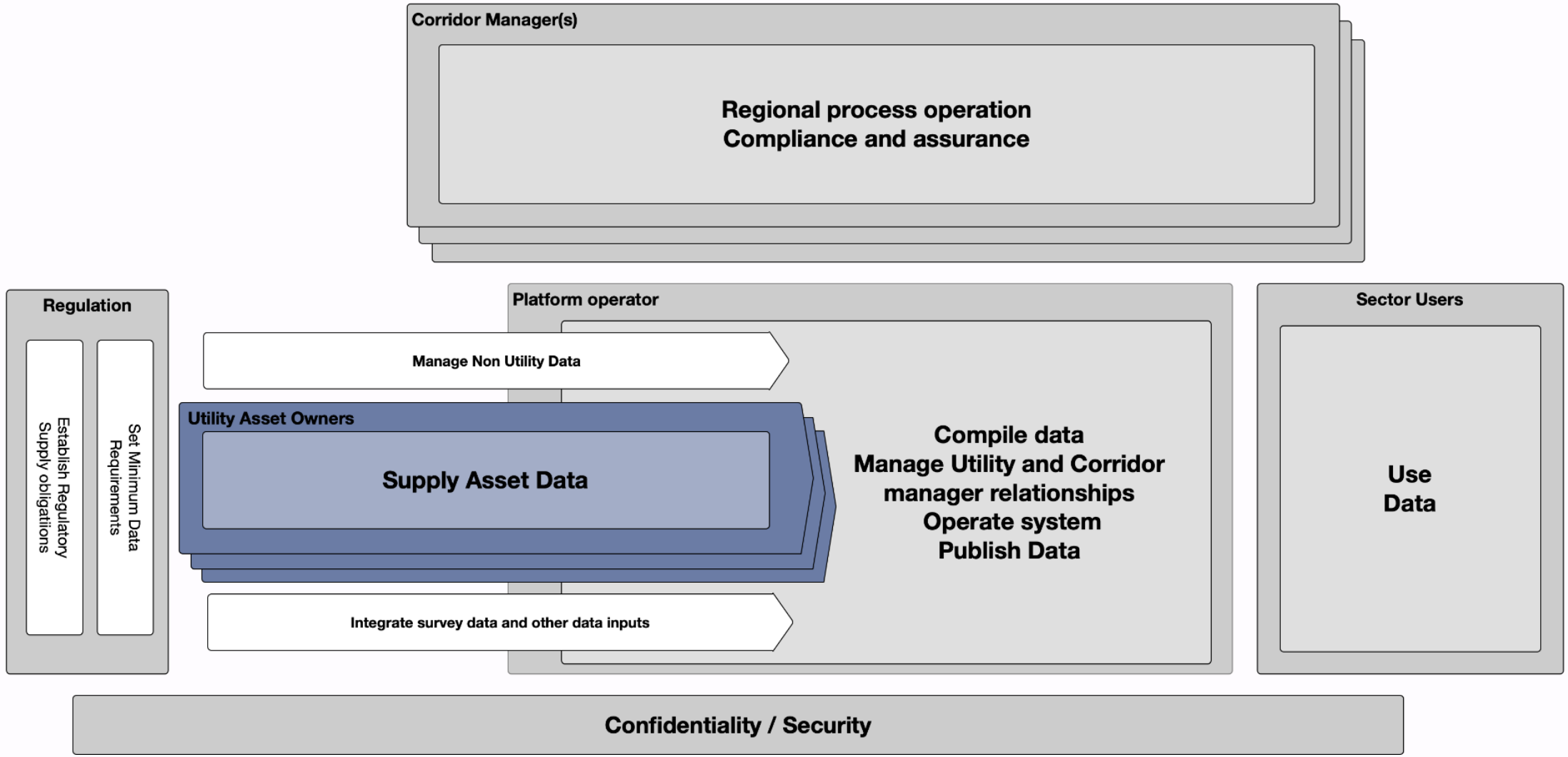
To provide a single, authoritative, and trusted view of relevant asset and contextual data so that work in the subsurface environment can be undertaken safely and efficiently

Business Use Cases

BUC No	BUC Name	Inp
WORKSTREAM 2: CORE PLATFORM		
1	View content	- Se - C cor
2	Upload data	- U obs - D
3	Manage assets	- M - C (ou
4	Manage accounts	- C - C
WORKSTREAM 5: WORKFLOWS AND PROC		
5	Query content	- M (inp - Q
6	Manage notifications	- M - N
7	Manage system	- M (inp - A (ou



Our Vision for the Platform - Blueprint Model

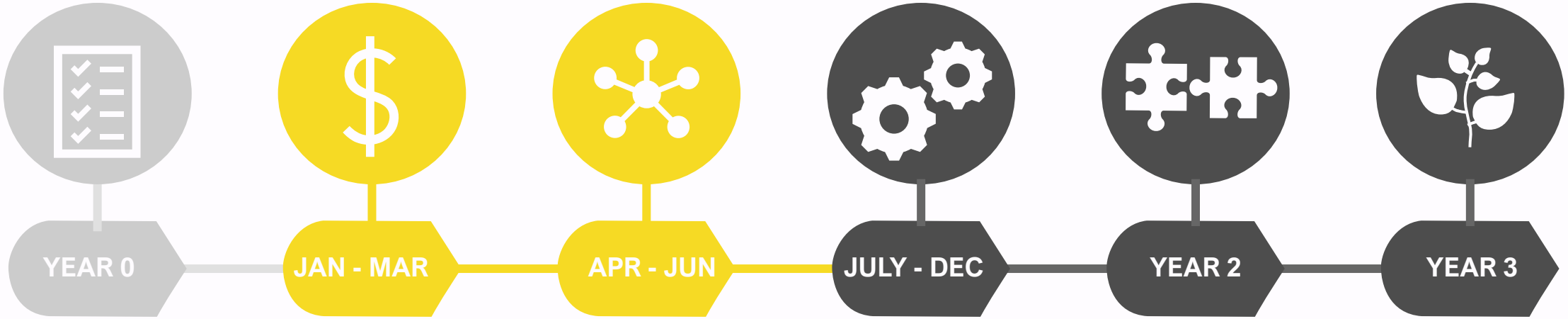


Our Guiding Principles

Purpose: Must have clear purpose	**Public good** Must be used to deliver genuine public benefit in perpetuity	**Value creation** Must enable value creation and performance improvement	**Insight** Must provide determinable insight into the built environment
Trust: Must be trustworthy	**Security** Must enable security and be secure itself	**Openness** Must be as open as possible	**Quality** Must be built on data of an appropriate quality
Function: Must function effectively	**Federation** Must be based on a standard connected environment	**Curation** Must have clear ownership, governance and regulation	**Evolution** Must be able to adapt as technology and society evolve

Source: *Gemini Principles, Centre for Digital Build Britain*

Our Roadmap



- Industry Consultation
- Business Case Development
- Minimum data requirements

- Funding Confirmed
- Proof of Concept launched

- Technology Approach
- Design Procurement
- Industry Engagement
- Business, Policy and Process Development

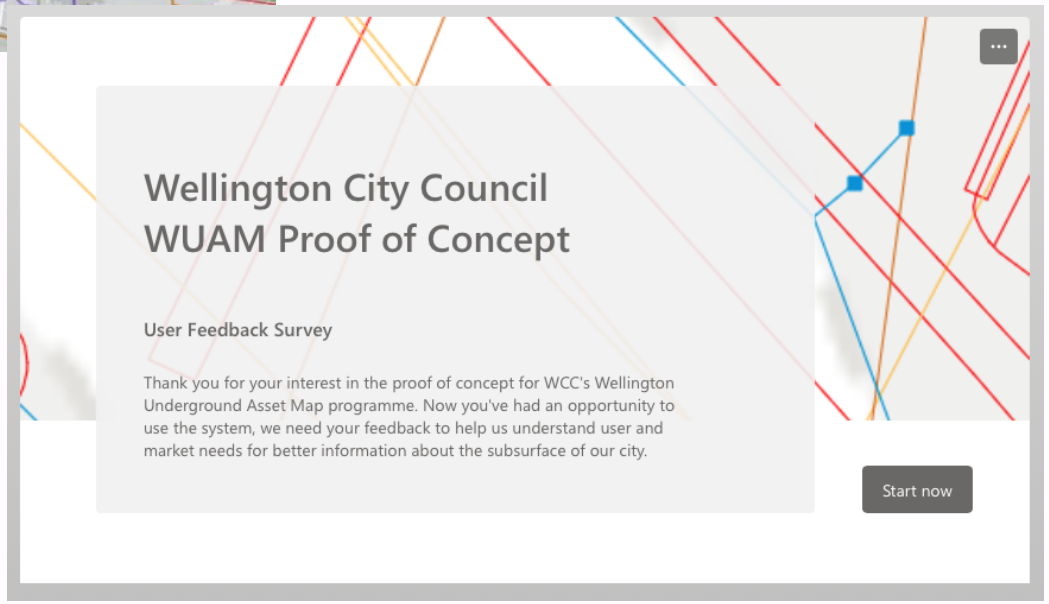
- Procurement
- Design, test and Build the new Operating Model

- Target **Go Live***
- Incremental implementation of the Operating Model (technology, process and policy)

- Grow system
- Technology Enhancement
- Augmentation

**MID 2024*

Surveying the city and a Proof of Concept



Our Focus

Workstream 1	Workstream 2	Workstream 3	Workstream 4	Workstream 5	Workstream 6
Policy / Process	Asset Data Sharing Platform (Technology)	Internal Change & Alignment for WCC	Sector support & national engagement	Corridor management integration (technology)	Value Add (technology augmentation by private sector)
• Minimum Data Requirements • Update Protocol • Notification Period • Data Sharing Mandate • Security & Access	• Federated Asset Database • Buy / Build / Adapt?	• Legal • Process • Resource • Training • Systems • Data	• Engagement with government departments • Engagement and communication with sector • Technical support to sector	• Workflow development • System integration with corridor consents • Seamless interaction between sector & council	• Wider market opportunity • Standardised input / output protocols • Permissions and authentication • Integration with private sector applications

Operating Model

How we expect the platform to operate

Wastewater Pipe (Local)

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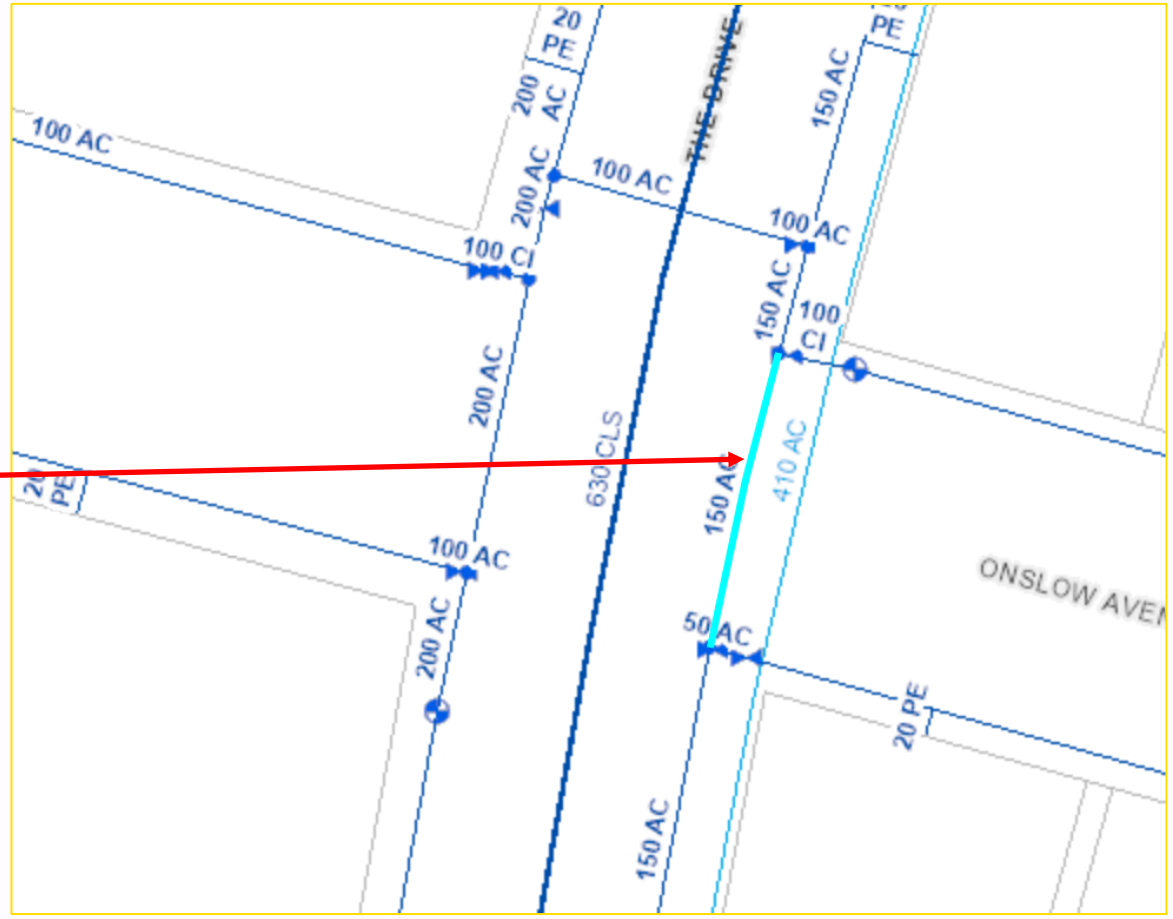
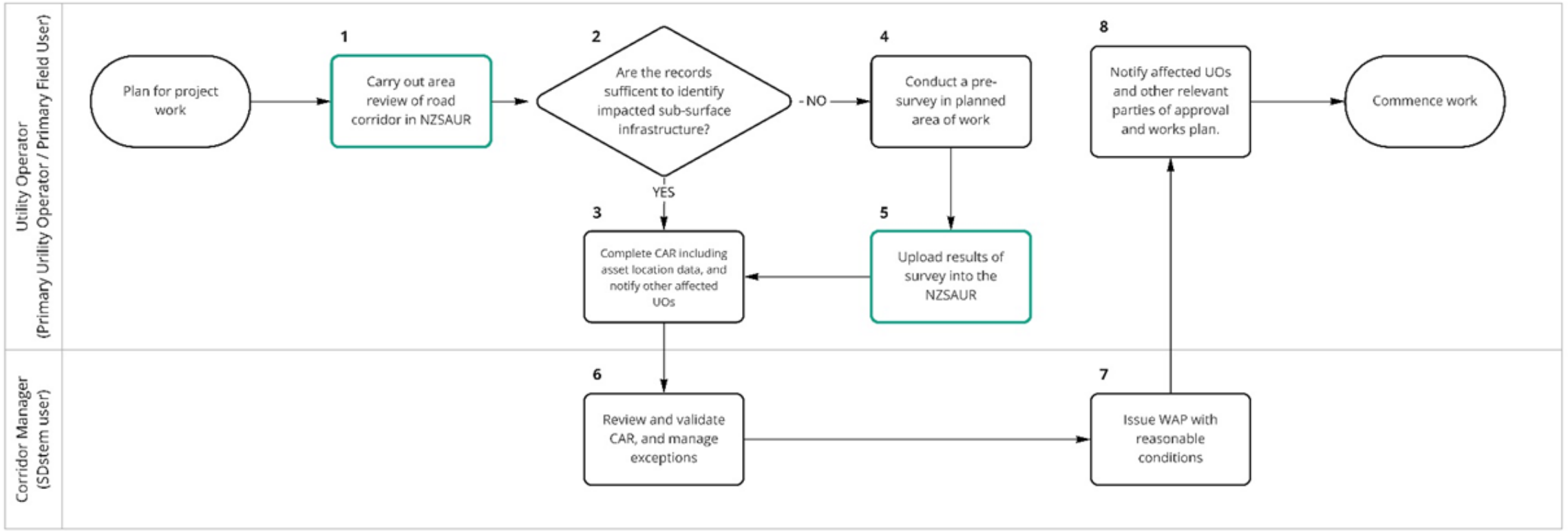


How we expect the platform to operate

Plan, approve work access & submit survey data



Asset data structure:

Concept (MUDDI)

OWNER INFORMATION

- The owner and business contacts of the data
- The sensitivity and criticality of the asset

UTILITY INFORMATION

- Asset type (based on utility)
- Specific asset details (e.g. Operating voltage)
- Geospatial data
- The quality and the accuracy of the data

OBJECT INFORMATION

- Dimensions and thickness of the asset
- Asset material
- The age, condition of the asset
- Status and permanence

Detail

Mandatory

- Required minimum data to understand what and where the asset is located, as well as any critical safety risks associated with the asset.

Conditional

- asset type.

Optional

- available and would be useful / important to know.

Future

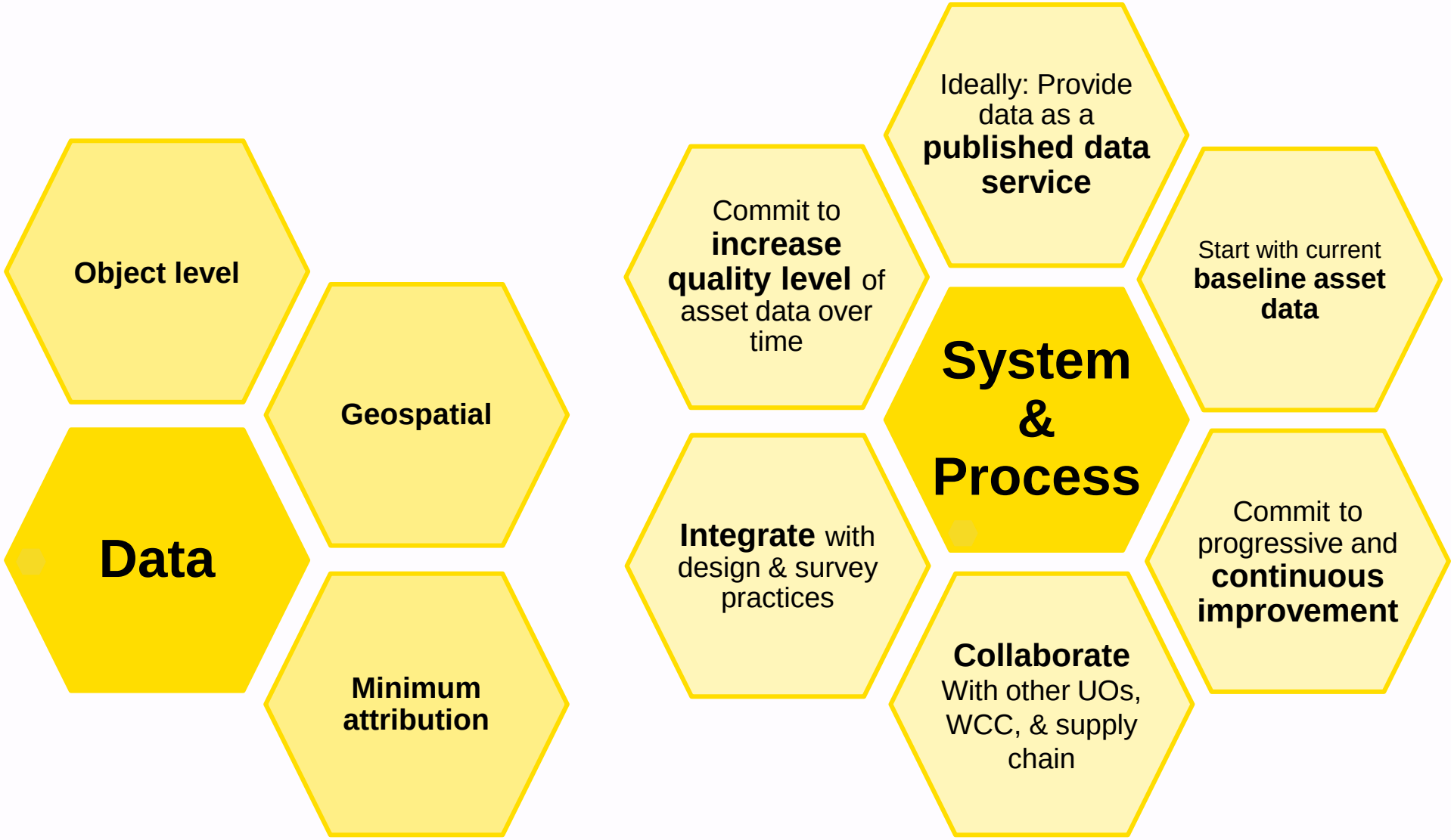
- by MUDDI that could be used within future system.

Focus: Electricity Network Information

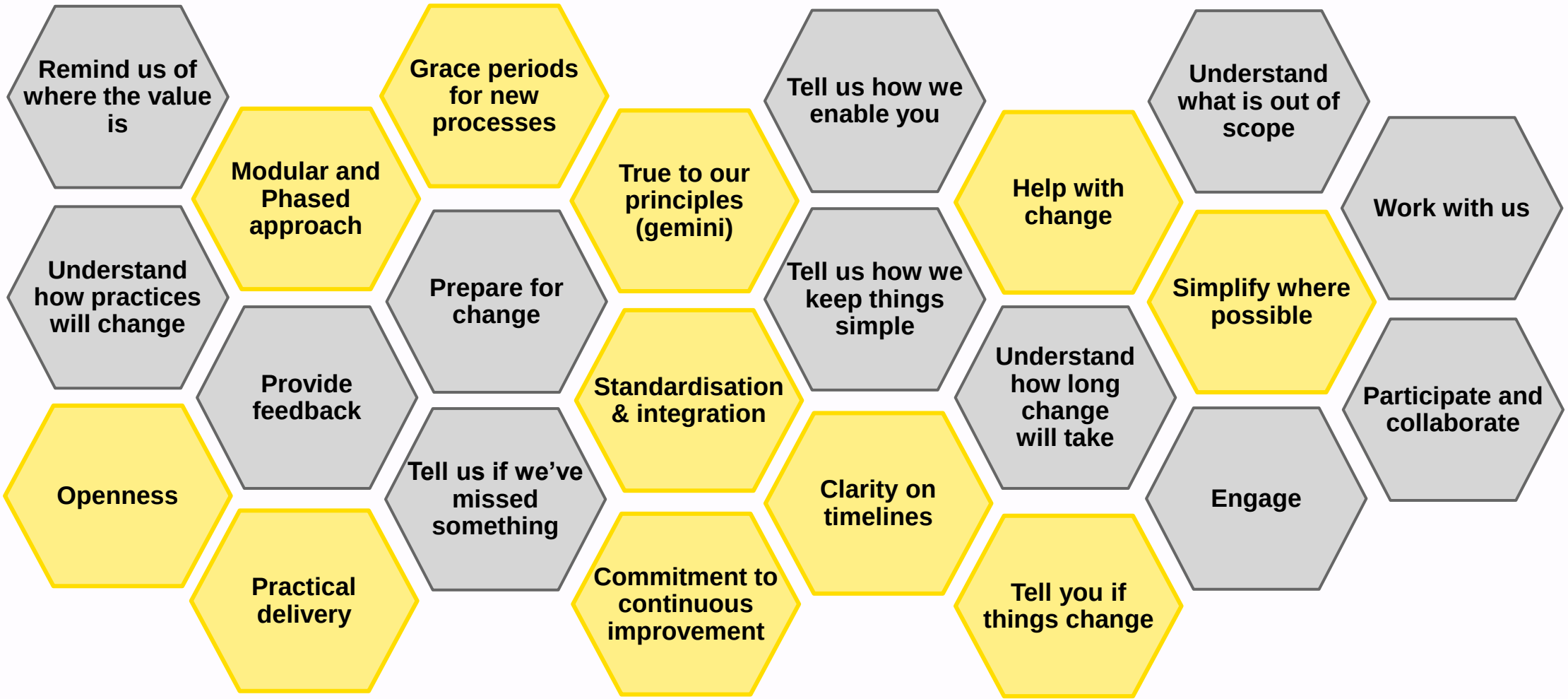
	Object	Utility	Owner
Mandatory	Object / Asset ID	Utility type	Asset Owner
	Geospatial position	Utility sub type	Asset Owner ID
		Operating voltage	
Optional	Depth		Operational status
	Age		Business Contact
	Quality level		Emergency Contact
	Material		

HV electrical cable

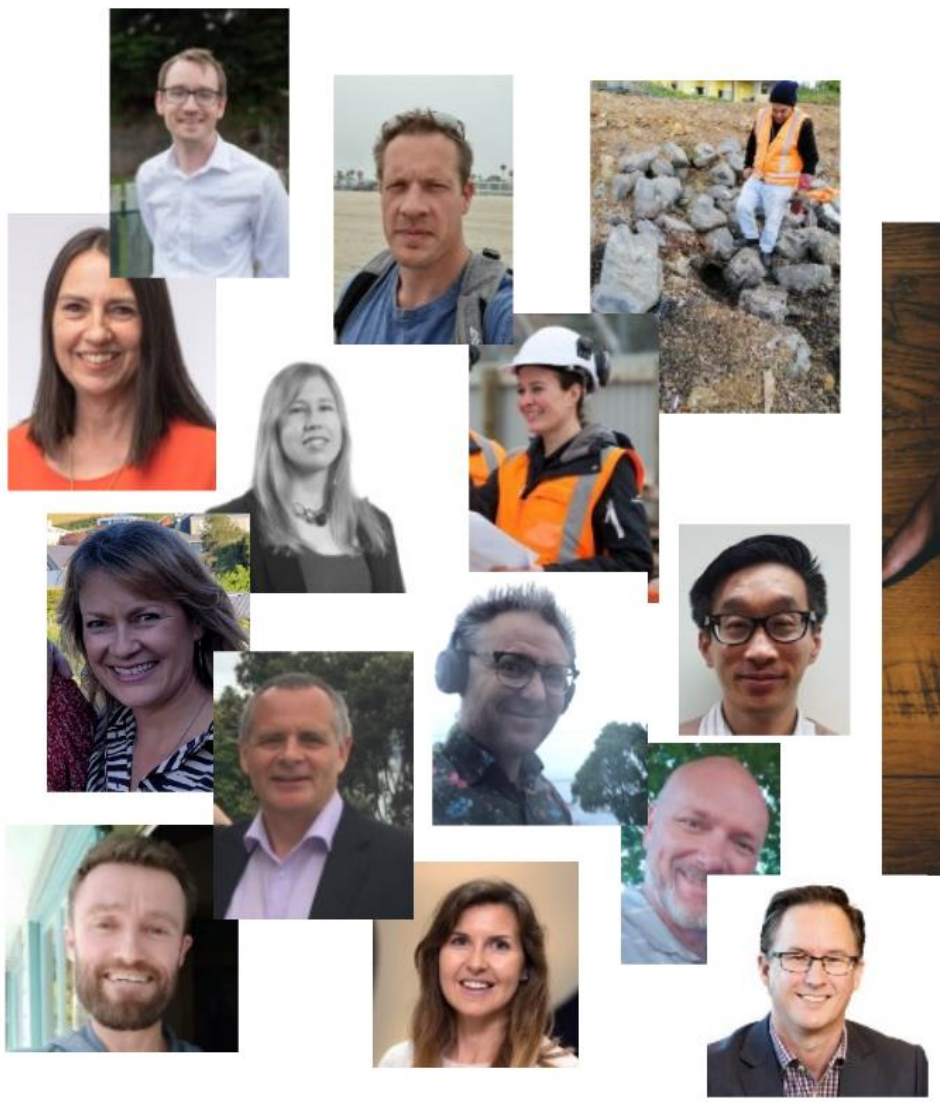
Our expectations on Utility Operators and Asset Owners



Our expectations on Sector Participants



What you can expect from us




Do To
Vs
DO WITH

The Big Opportunities…

What should that future operating model look like?

Keeping the data current – adapting practices

…start small 

WUAM@wcc.govt.nz

021 597 166 or 021 240 7243

Denise Beazley or Viv Winch

Wellington City Council Web Page

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LUCAS Land Use Map

Deb Burgess
Senior Analyst, Carbon Sequestration

Wairau Valley, Marlborough District.

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Land Information New Zealand

Te Kāwanatanga o Aotearoa
New Zealand Government

LUCAS Land Use Map

Aotearoa Property Data Network Meeting
4 April, 2023

Presented by:

Deborah Burgess, Senior Analyst

New Zealand Ministry for the Environment

Making Aotearoa New Zealand
the most liveable place in the world
Aotearoa - he whenua mana kura mō te tangata

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Outline

1. Why do we have a LUCAS land use map?
2. What is it (and what isn't it)?
3. How do we make it?
4. What's next?

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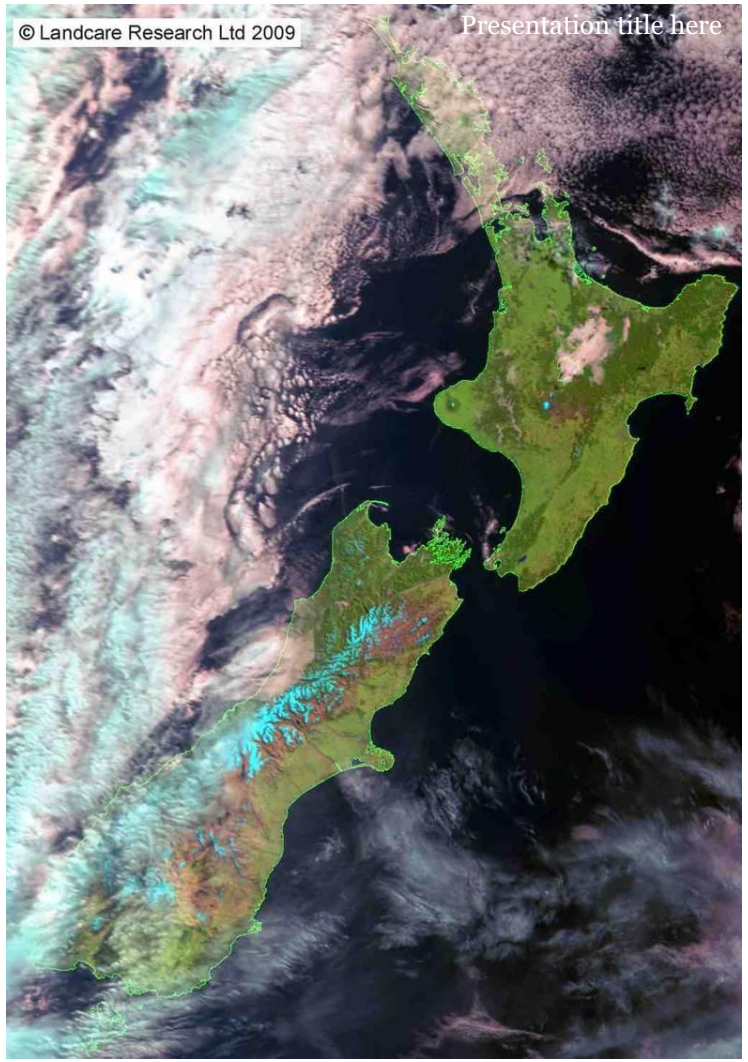
1. Why do we have a LUCAS land use map?

- New Zealand is a signatory to the United Nations Framework Convention on climate Change (UNFCCC), the Kyoto protocol and now the Paris Agreement.
- These agreements come with reporting and accounting requirements.
- One of the sectors is called “LULUCF”- Land Use, Land-Use Change and Forestry.
- We need to account for all the emissions and removals associated with land use change and forestry activity.



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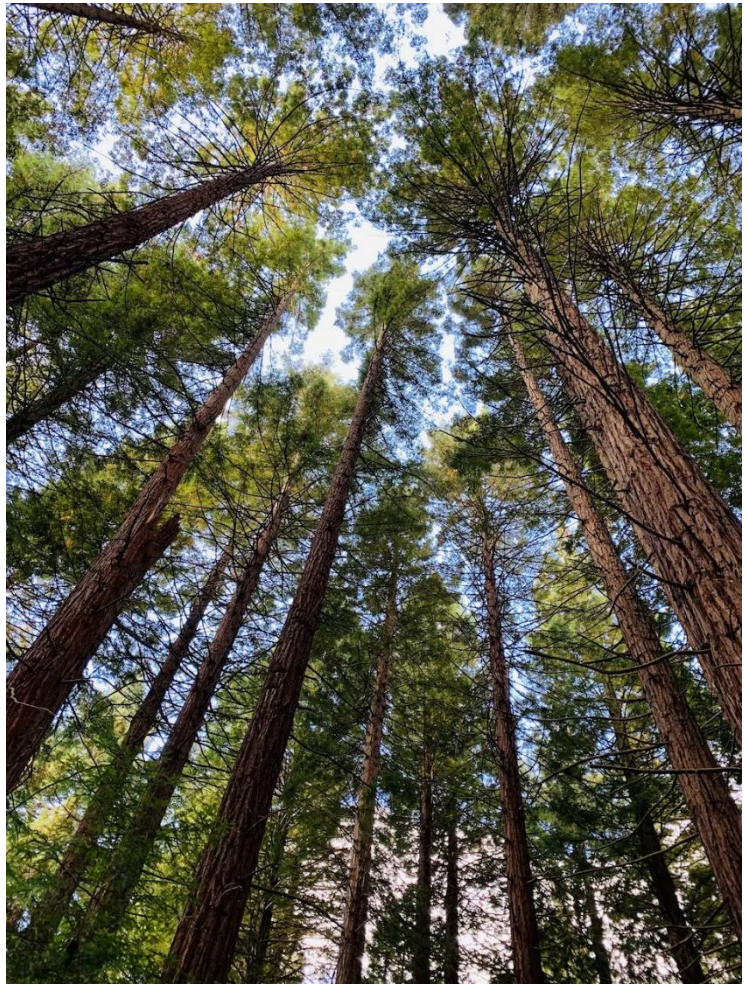
National circumstances

- No national spatial forest inventory
- Significant areas of "Post-1989" forest
- Limited administrative data on land use
- Steep terrain
- Persistent cloud cover



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UN reporting requirements

- Annual area changes across six land use categories : forest land, grassland, cropland, wetlands, settlement, other land
- Compliant with IPCC guidance (TACCC principles = Transparent, Accurate, Consistent, Complete, Comparable)
- Area changes don't have to be mapped – could use sample grid or administrative data *but* -
- Kyoto Protocol required spatial annual tracking of deforestation to 1 hectare or finer scale

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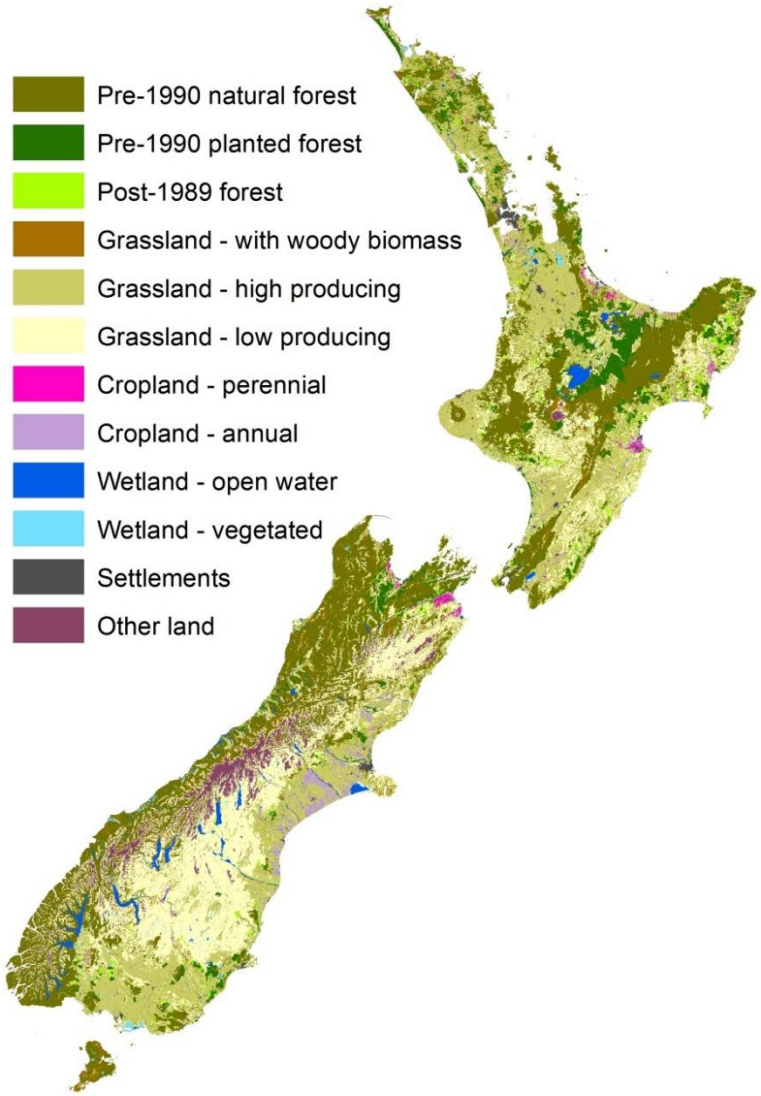
2. LUCAS LUM – What is it?

- 12 *land use* classes
- New Zealand mainland and Chatham Islands
- Minimum mapping unit: 1 hectare
- Minimum width: 30 metres
- 4 mapping dates aligned to commitment periods: 1990, 2008, 2012, 2016
- Interpolation and extrapolation used to derive annual change for entire reporting period (1990 to current year).



LUCAS LUM land use classes

IPCC category	New Zealand land use
Forest land	Pre-1990 natural forest
	Pre-1990 planted forest
	Post-1989 natural forest(1)
	Post-1989 planted forest(1)
Cropland	Annual cropland
	Perennial cropland
Grassland	High producing grassland
	Low producing grassland
	Grassland with woody biomass
Wetlands	Open water
	Vegetated wetland
Settlements	Settlements
Other land	Other land

Note: (1) Mapped as a single land use but stratified into 'post-1989 natural forest' and 'post-1989 planted forest' for calculating carbon stock and stock change using data from the plot network.

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Forest definitions

- New Zealand has defined Forest land to have:
  - At least 30% crown cover; and
  - At least 5 metres height at maturity *in situ* (i.e. with the potential to reach 5 metres in height within a 30-40 year timeframe).
- *Natural forest* refers to self-seeded forest – indigenous *and* wilding
- *Planted forest* refers to intentionally planted stands – exotic *and* indigenous planting
- Pre-1990 planted forest refers to forest planted on land which was forested at 1990 – not necessarily the same forest
- Post-1989 forest refers to forest planted on land which was not forested at 1990.

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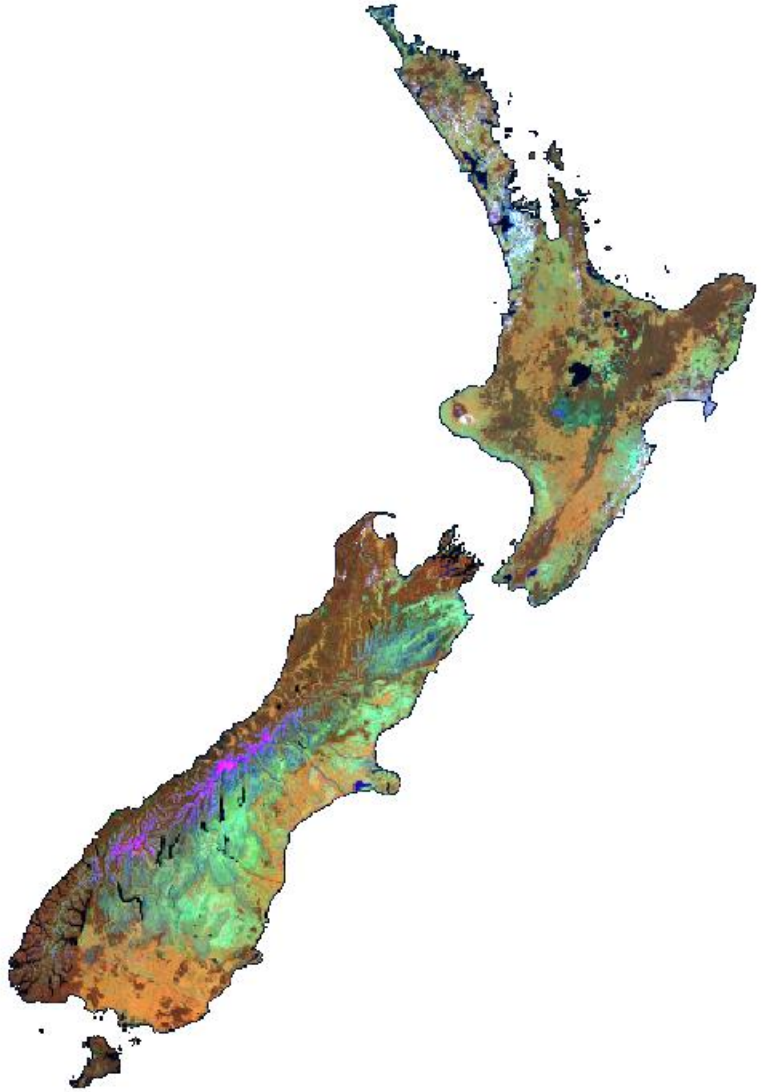
3. How do we make a LUM?

- Based on cloud-minimised mosaics of multispectral satellite imagery (10m resolution)
- Image-to-image change detection within forest and non-forest areas
- Mapping from MPI forestry schemes incorporated
- National map ever 4-5 years and deforestation mapping every 2 years.



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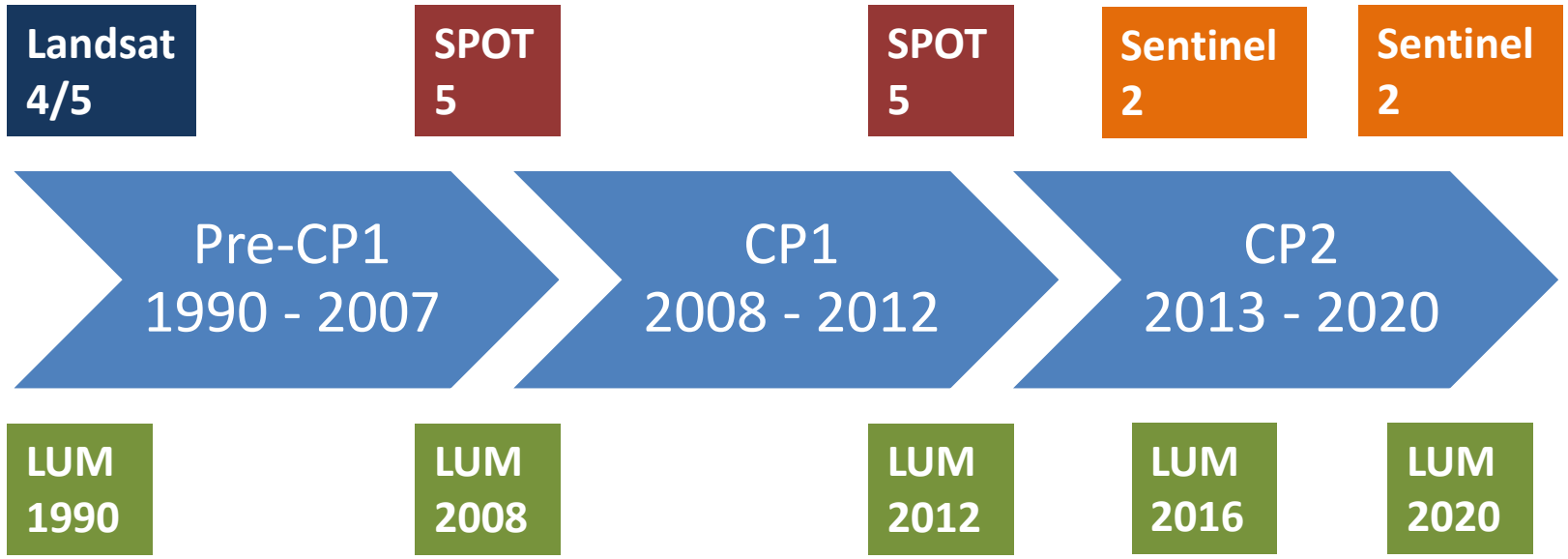
LUCAS Land Use Map series



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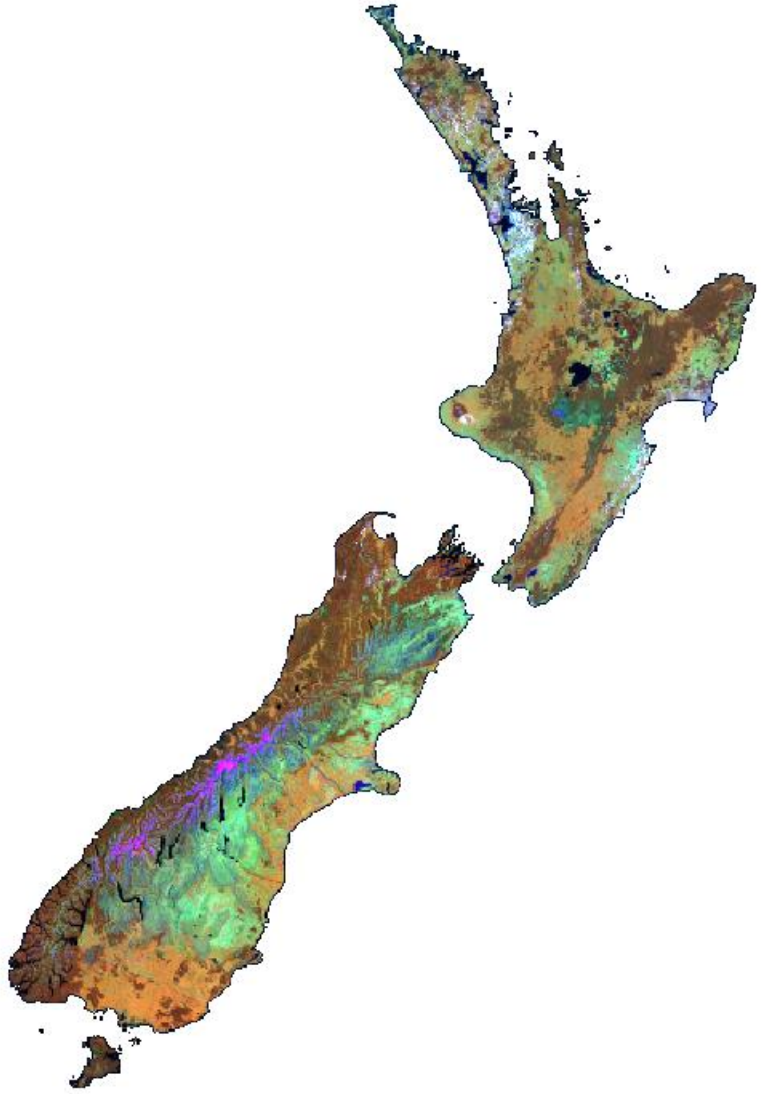
- National map ever 4-5 years and deforestation mapping every 2 years
- Property land use data incorporated into grassland mapping



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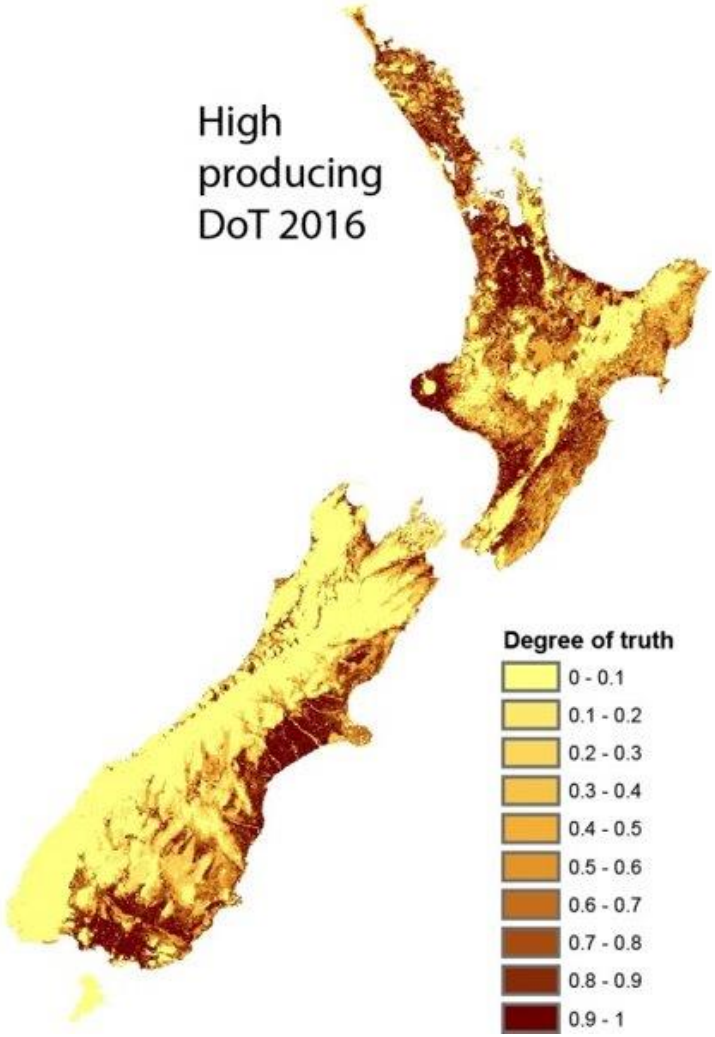
Grassland mapping using property data

- Mapping high and low-producing grassland from a single satellite image is unreliable
- Time series was not showing intensification (low to high-producing grassland change)
- Manaaki Whenua's Innovative Data Analysis project offered solution for combine diverse input data sets to map probability of high-producing grassland
- It also allowed us to sub-class grassland into dairy, non-dairy and ungrazed grassland.



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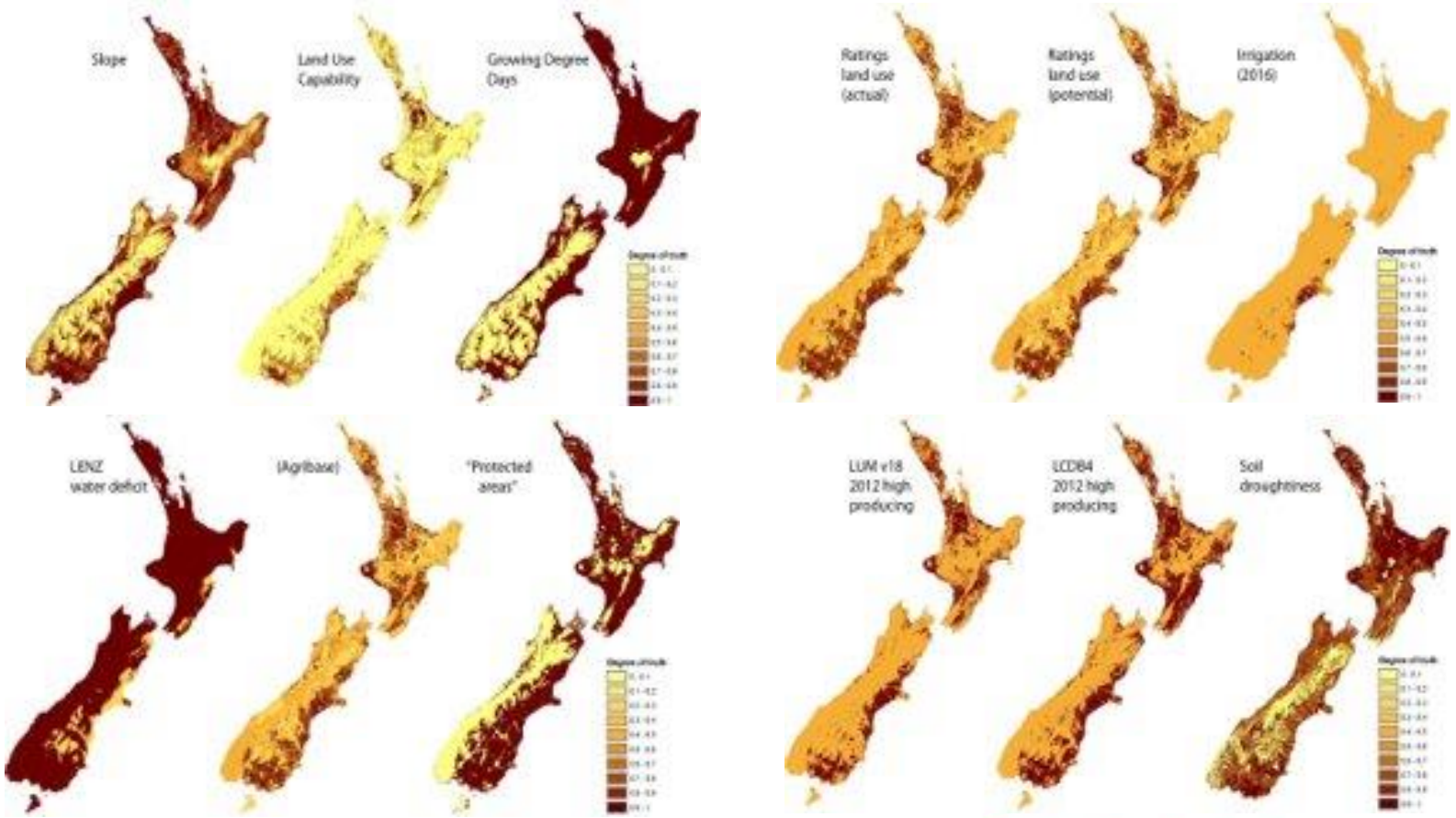
Grassland mapping – input data sets



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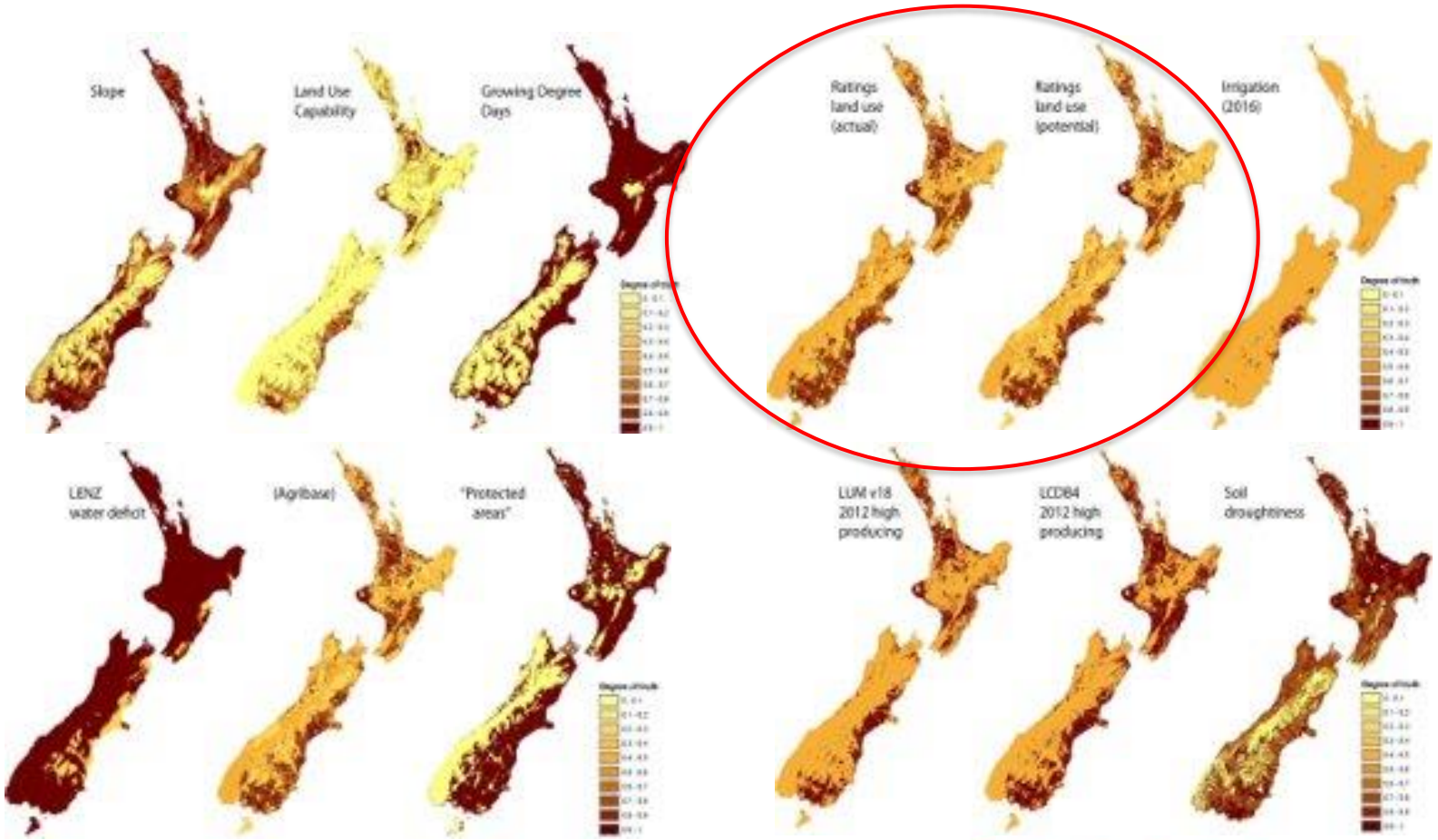
Grassland mapping – input data sets



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4. What's next?

- Currently producing the 2020 LUM (to be released April 2024)
- Incorporates:
  - Changes to data schema to make attribute names more intelligible and introduce placeholder attributes for a start year for any change
  - New deep learning methods to identify "forever" missed forest
  - New techniques to identify crop to grass conversion

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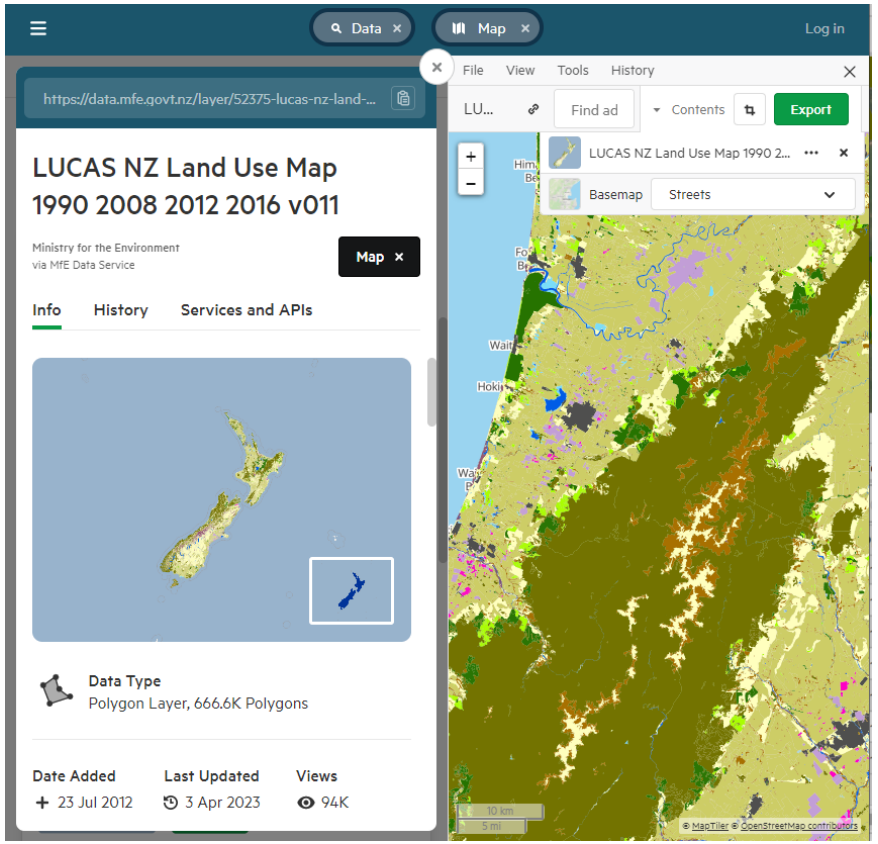
Accessing LUCAS LUM data

- Available on the MfE Data Service (with reports)
  NZ:
  https://data.mfe.govt.nz/layer/52375
- Chatham Islands:
  https://data.mfe.govt.nz/layer/99857
- NZ Forest Clearing (2008-2020) data set also available:
  https://data.mfe.govt.nz/layer/99909



Making Aotearoa New Zealand
the most liveable place in the world
Aotearoa – he whenua mana kura mō te tangata

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Further information

- On the LUCAS mapping approach in New Zealand's Greenhouse Gas Inventory: https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-1990-2020/

- On LUCAS land use classification:
  LUCAS Satellite Imagery Interpretation Guide for Land Use Classes,
  https://environment.govt.nz/publications/land-use-and-carbon-analysis-system-satellite-imagery-interpretation-guide-for-land-use-classes-2nd-edition/

Manaaki Whenua
Landcare Research

Land Use Classification using a Discrete Global Grid System (DGGS)

Richard Law
Geospatial Analyst

Tapora, Northland Region.

Toitū Te Whenua
Land Information
New Zealand

Te Kāwanatanga o Aotearoa
New Zealand Government

Land use classification using a Discrete Global Grid System (DGGS)

Richard Law

Manaaki Whenua – Landcare Research

lawr@landcareresearch.co.nz

Originally presented at
GeoCart'2022
24-26 August 2022

Overview

The task of landuse classification

Overview

The task of landuse classification

Raster-vector integration

Overview

The task of landuse classification

Raster-vector integration

How does a DGGS improve raster-vector integration?

Overview

The task of landuse classification

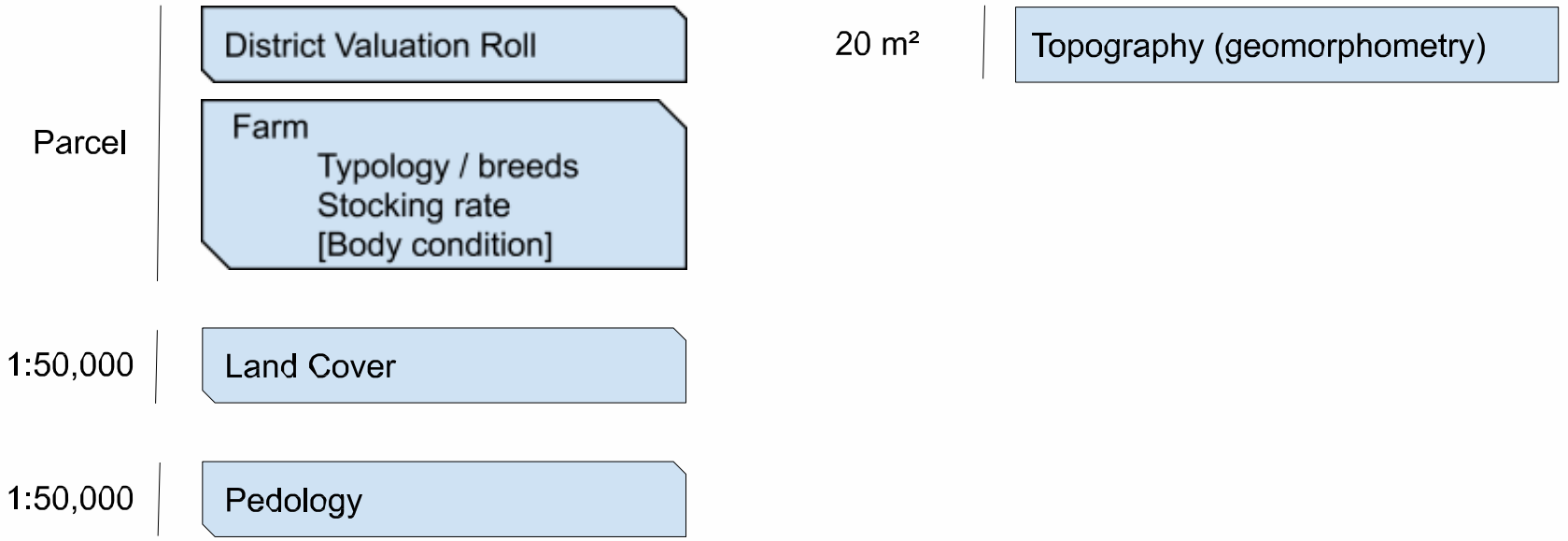
Raster-vector integration

How does a DGGS improve raster-vector integration?

Example of DGGS-based land use classification

Landuse classification requires both raster and vector data

North Island Hard Hill Country Farm
Steep hill country or low fertility soils with most farms carrying 6 to 10 stock units per hectare. While some stock are finished a significant proportion are sold ir store condition.



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An adaptive system

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Raster-vector integration: common practice

- Conversion to raster
- Conversion to vector
- Zonal statistics

Raster-vector integration: limitations

- Conversion to raster
  - Loss of native scale
  - Loss of semantic vector objects (esp. paths)
  - Loss of overlapping features
  - Loss of rich attribute data
  - Lack of an authoritative grid

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  - “Sliver polygon hell”
- Zonal statistics
  - Typically expensive polygon clipping algorithms
  - May not account for partially covering polygons
  - Requires a decision on an appropriate spatial unit

What is a DGGS?

- “A DGGS is a spatial reference system that uses a hierarchical tessellation of cells to partition and address the globe. DGGS are characterized by the properties of their cell structure, geo-encoding, quantization strategy and associated mathematical functions.” - OGC Abstract Specification
- A spatial **data structure**, based on hierarchically nested subdivisions of the Platonic solids.
- They are composed of **discrete** cells (like a vector object), **global** in coverage, and are used to quantise vector and raster data into a common hierarchical **grid system** (like a raster).
- A **hybrid data structure** that retains properties of vector and raster data structures, with additional benefits.
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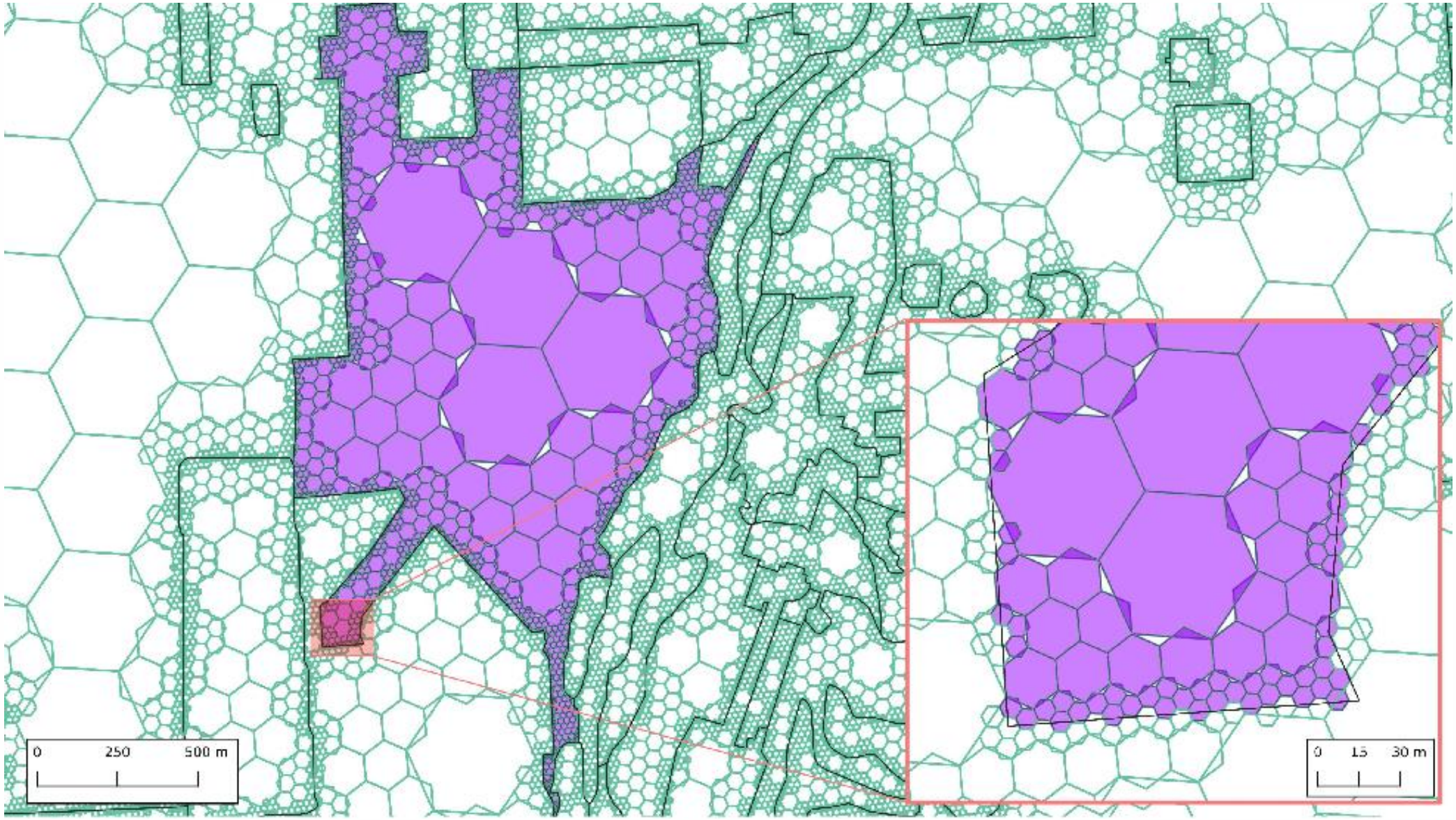
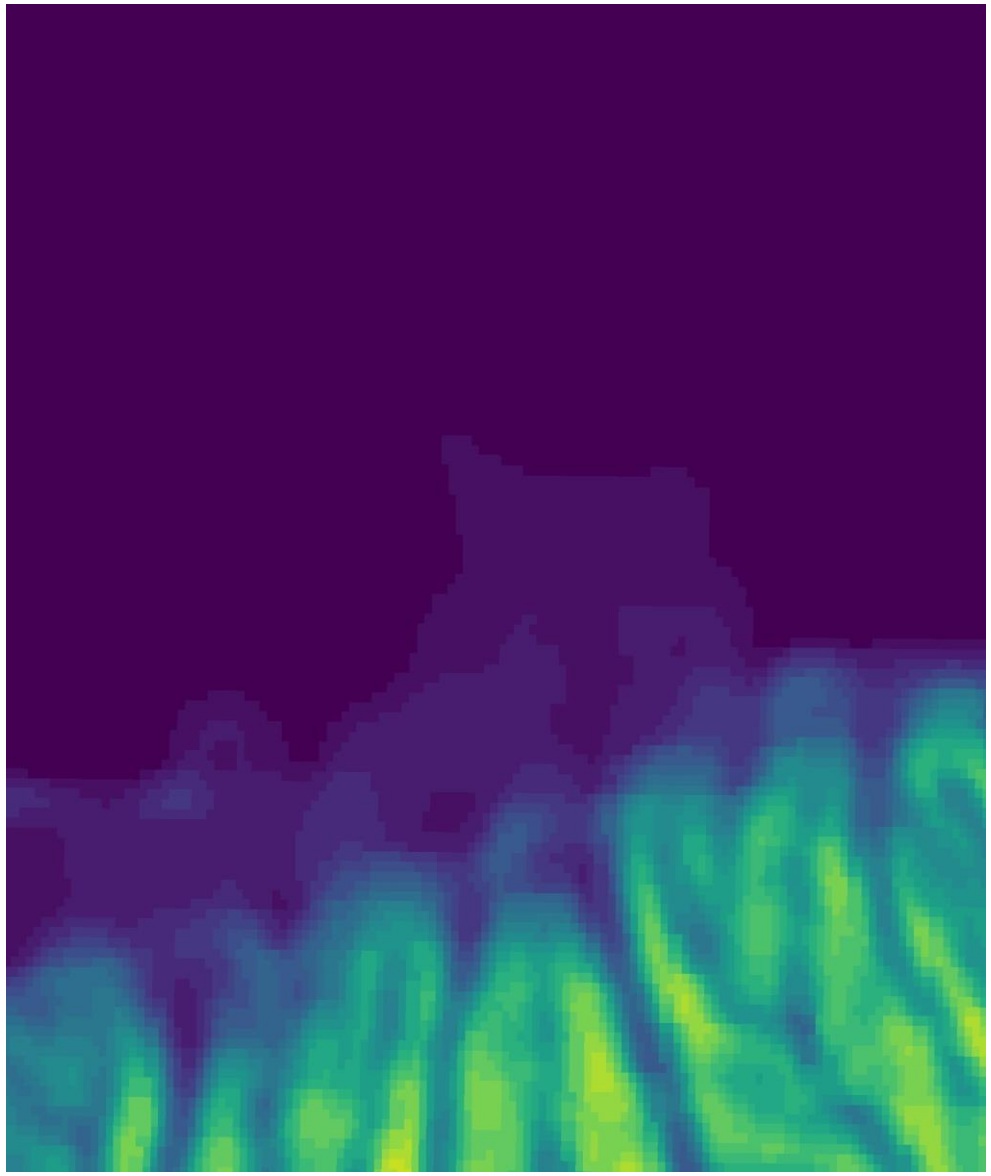
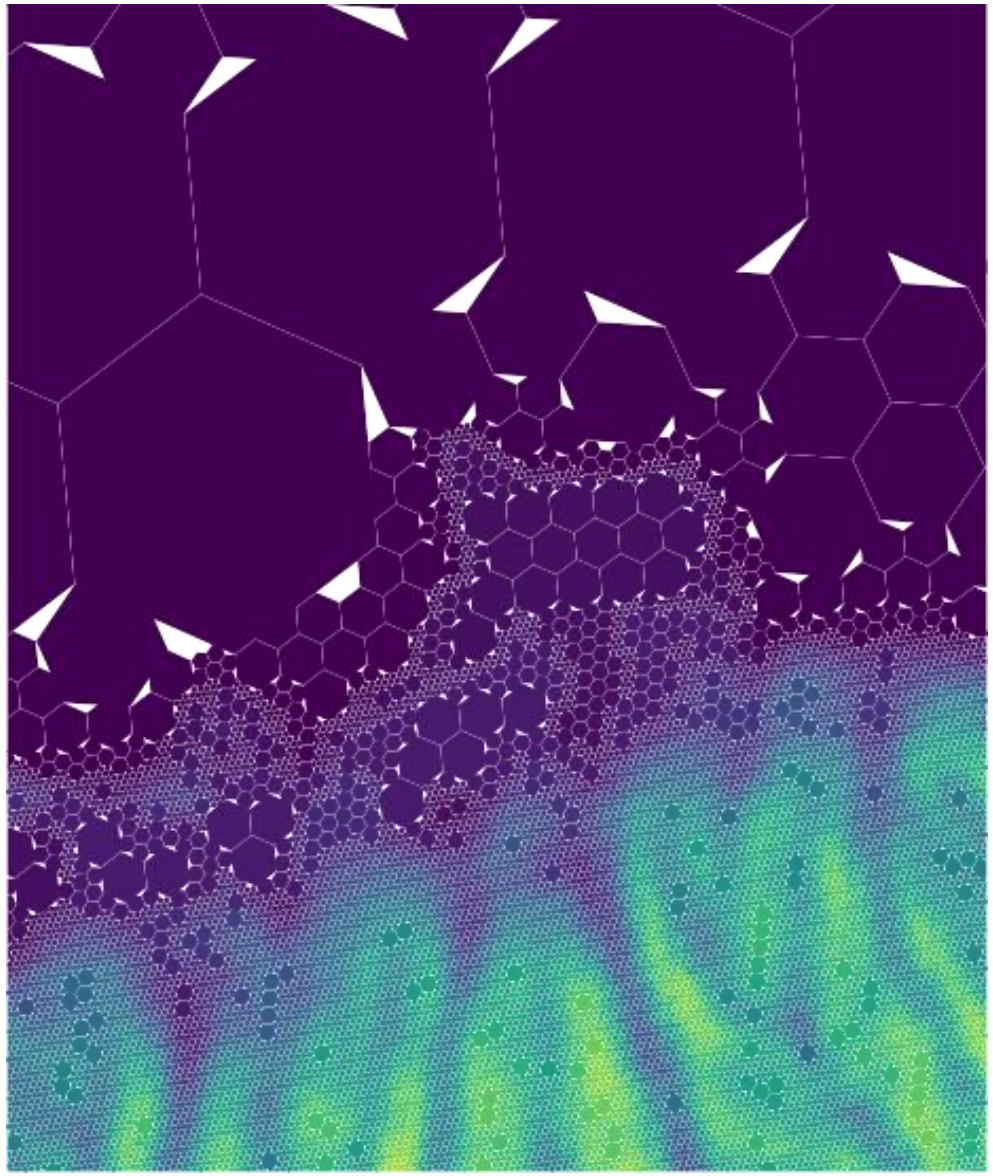
Indexing vector data



Indexing raster data





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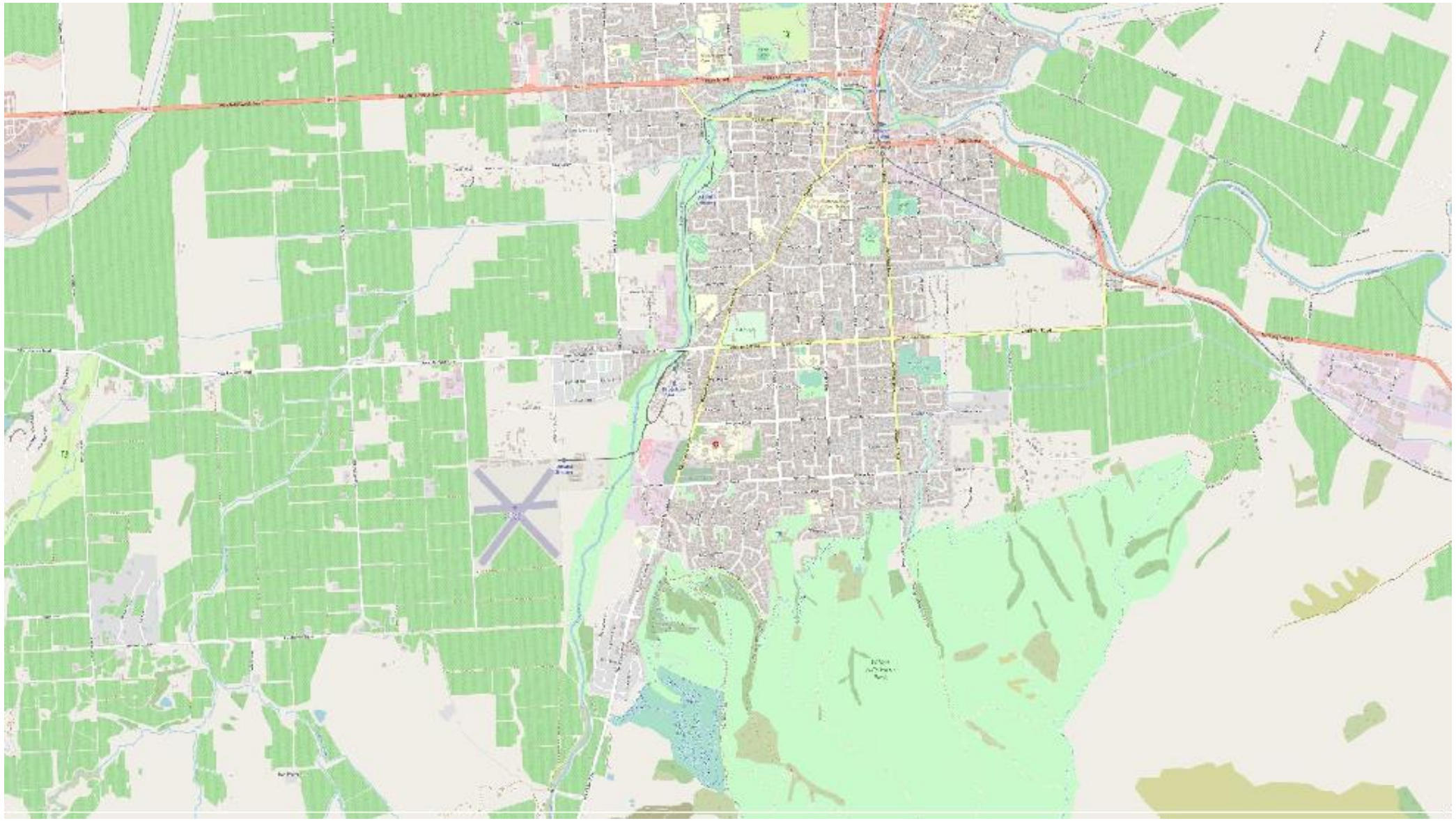
- Precision is explicit
- Geospatial operations can be done with discrete mathematics (set theory)
- Ready for use in RDBMS and dataframes

Raster-vector integration example (spatial join)

```
SELECT A.*, B.*, (A.p * B.q) AS foo
FROM parcels AS A
JOIN slope AS B
ON
    -- Spatial relationship
    A.h3_index && B.h3_index
WHERE
    -- Filter raster
    B.y > 10 AND B.y < 15
AND
    -- Filter vector
    A.description NOT LIKE 'Hydro%';
```

Example of DGGS-based land use classification



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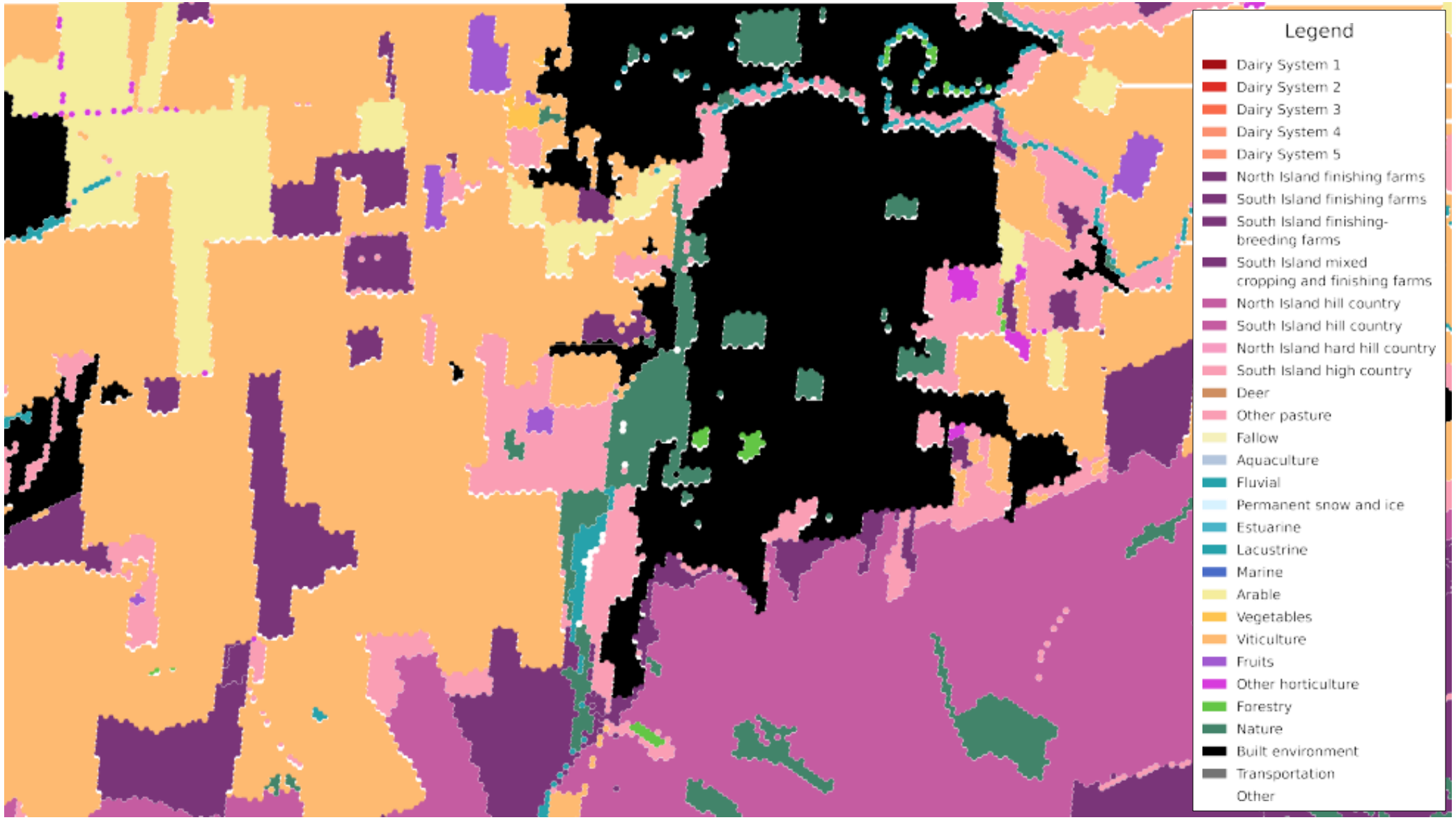

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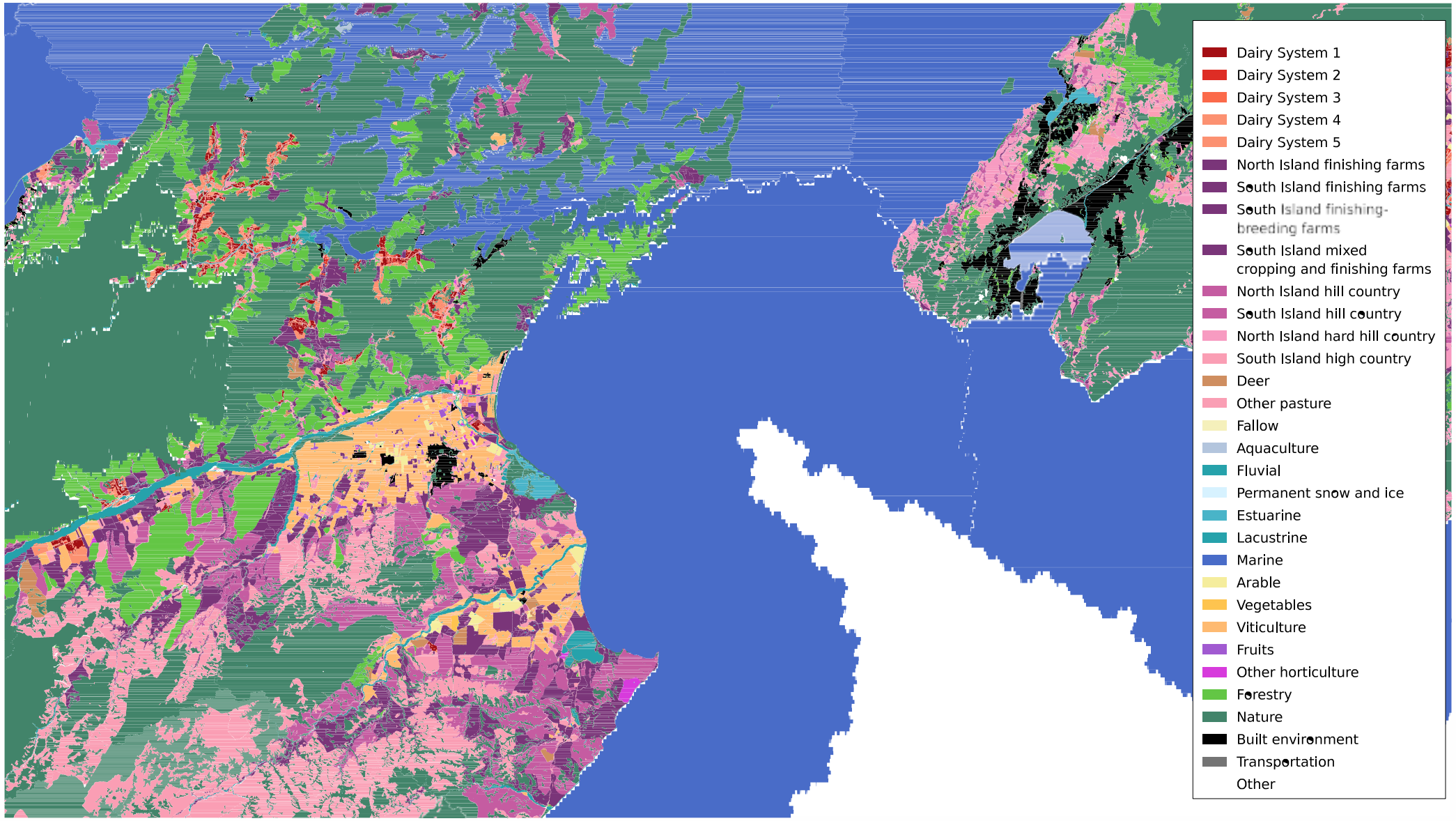

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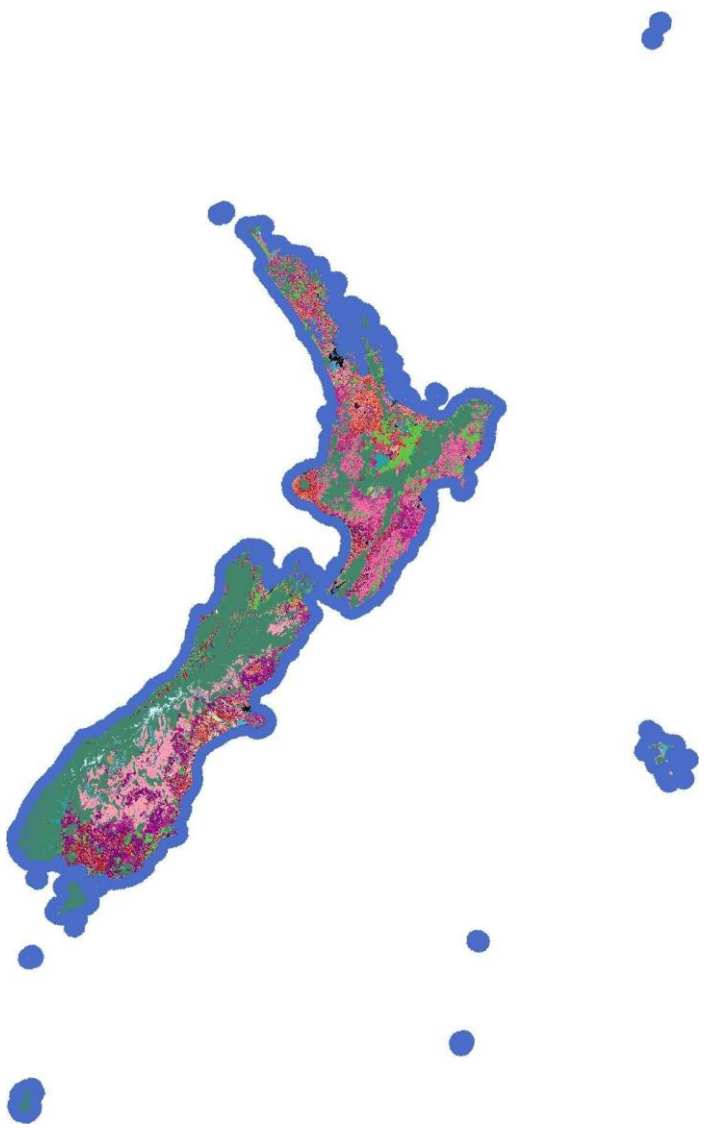
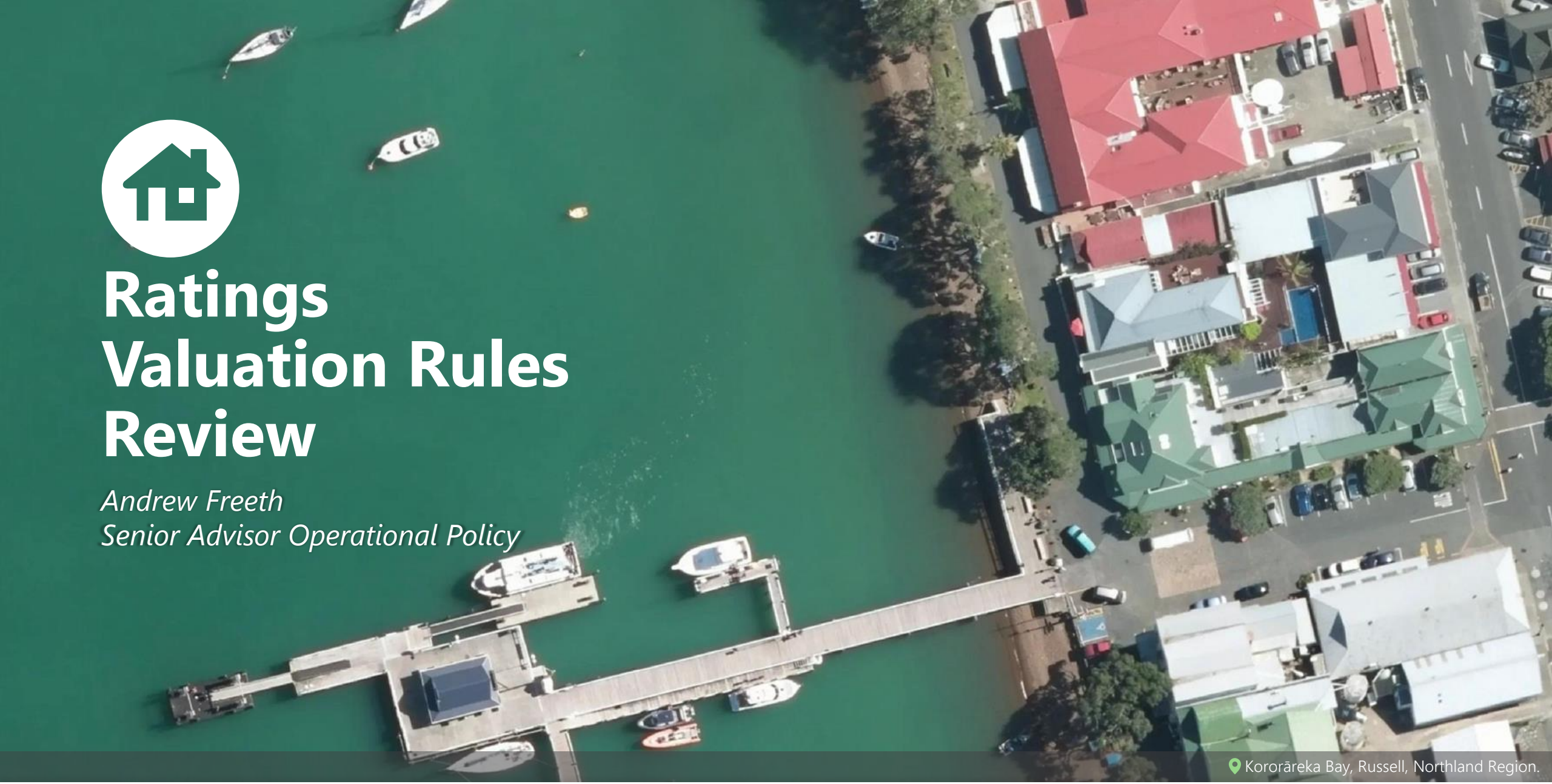


DGGS: great for raster & vector data integration

Questions? Comments?

Ratings Valuation Rules Review

Andrew Freeth
Senior Advisor Operational Policy



Kororāreka Bay, Russell, Northland Region.

Toitū Te Whenua
Land Information New Zealand

Te Kāwanatanga o Aotearoa
New Zealand Government

What are the Rules?

- Made by the Valuer General in consultation with Councils and their valuers for rating valuation.
- Regulates the content of District Valuation Rolls (DVR) and the rating valuation process
- Secondary legislation
- Took effect in 2008

Objectives of the Review

- Enable better use of technology
- Improve data quality
- Enable better connected property data (secondary benefit)

Approach

- Developing proposed amendments topic by topic
- Starting with the District Valuation Roll
- Beginning targeted consultation shortly

Approach

- Then moving on to other topics and undertaking further engagement

- Once complete formal consultation will begin

Questions

Closing karakia

Kua ea te kaupapa	Our work has come to a satisfactory conclusion
Ka rea ngā hua	The fruit is growing (therefore the land and the environment are healthy)
Ka rere ngā arawai	The waterways continue to flow (therefore the waterways are strong and moving forward)
Kua mau te mātauranga	We now have the knowledge
Hei arahina ngā mahi o Toitū Te Whenua	To lead and drive the work of Toitū Te Whenua
Kia tau te rangimarie	May peace settle
Ki runga i a tātou katoa	Upon all of us (includes the wider LINZ whānau and our own whānau)
Haumi ē, hui ē, tāiki ē!	Gather and go forward together

Thank you!