

Property Data Review External customer findings report

Version 1

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Executive summary

In mid-2022 Toitū Te Whenua conducted a review of property data. The objective of this review was to provide insights and evidence for the formation of a Toitū Te Whenua Data Strategy that would in turn provide direction for an organisational change programme. It is important to note that this review represents a snapshot in time and concurrent projects have already delivered improvements in some key areas.

The project was split into two parts – internal and external research. This report covers the external research, which involved interviews with 50 partners, stakeholders and customers, and a survey that was answered by about 1,800 people.

The objectives of this research were to:

- understand what property data is sourced, from where, for what purposes
- assess the quality of property data provided by Toitū Te Whenua and others
- identify gaps where data doesn't exist or doesn't meet requirements
- understand systemic challenges that are causing difficulties and driving demand
- ask our partners, stakeholders and customers what role they want us to play into the future.

This report provides findings but does not make recommendations – these are in an associated report submitted to LINZ's senior leadership.

Through the course of this research, four key themes emerged:

- New Zealanders' wellbeing
- urban development
- resilience and climate change
- Māori prosperity.

These themes provide critical context in which our partners, stakeholders and customers are working, and their requirements for property data.

The property data available in Aotearoa New Zealand has strong and highly regarded foundations in survey, geodesy and property rights. Landonline delivers data and services that are consistently good, timely, reliable and high quality. Bulk access is a growing requirement.

Beyond these foundational elements, however, property data in New Zealand lacks accessibility, transparency and currency, is poorly connected, has significant gaps and cannot reflect complexities on the ground. This limits the capacity for informed and effective decision-making at all levels, from individuals purchasing property up to national strategic planning.

Property information is much more than buying/selling and ownership. It's the grounding point of reference that is connected (but not in data terms) to everything else that people we spoke to are interested in. Connecting up data is our big challenge and opportunity.

The twin challenges of urban development alongside resilience and climate change are driving huge increases in demand for data. Both these megatrends are adding enormous complexity to land, resource and property management.

Decision-making about land and property is increasingly locally informed and precise, down to individual properties, paddocks or waterways. Regional- and national-level broad brushes are no longer sufficient.

Māori do not have the information and services they need to prosper. As Te Tiriti partners, Māori are entitled to have much more say in the management of data. Land and property information essential for Māori aspirations is relatively inaccessible to hapū and iwi.

Our most deprived communities are going wholly uncared and unsupported due to legacies of misuse and mistrust, a lack of data, and the current architecture of our property data system.

These shortfalls impact the everyday property purchasing decisions of New Zealanders. They add up to substantial missed opportunity costs for productivity, innovation and development across Aotearoa New Zealand. As well as this, they prevent an honourable Treaty partnership and quality outcomes.

Toitū Te Whenua's future role

Respondents held Toitū Te Whenua in very high regard and were incredibly positive about the work we do. While noting gaps and challenges across Aotearoa New Zealand's property information landscape, they acknowledged improvements we have been making to our data and encouraged us to keep this up.

They made a compelling case for taking a 'New Zealand property ecosystem' view that goes beyond those parts regulated and administered by Toitū Te Whenua. People need a fuller, more granular and connected-up picture of land and property, and this needs to reach across past, present and future.

Everyone we spoke to called for Toitū Te Whenua to take a greater leadership role across this broader property ecosystem. We have been given a clear mandate from customers, stakeholders and partners to intervene and influence positive change for the people living and working in Aotearoa New Zealand.

However, it is also clear that our customers and stakeholders can have very different understandings of 'property data' from Toitū Te Whenua. These fundamental differences in perspective need to be addressed as part of forging a future role for Toitū Te Whenua alongside our customers, stakeholders and partners.

People's overarching desire is to have a single authoritative source of all property information. We can and should champion this cause by showing stronger leadership and collaborating across all of government to deliver national outcomes. Toitū Te Whenua needs to grow the relationships and networks we have built with customers, stakeholders and partners, and increase the trust that these are founded on. We can break down the barriers to accessibility and usability of our data and create the optimal conditions for our economy and society to flourish in ways that are productive and sustainable.

Introduction

The property system is an essential ingredient of a well-functioning economy and society. Property data is critical for effective decision-making across all four core wellbeings: environmental, economic, social and cultural.

A transparent property system provides stakeholders with ready access to high-quality data and performance benchmarks. This creates certainty and consistency, and enables rigorously enforced rules and regulations.

Transparent property data helps governments, public bodies and the private sector make smarter decisions about infrastructure. It enables Māori to pursue opportunities to grow environmental, cultural and economic wealth. It also plays a key role in attracting new investment to a city, boosting business efficiency, and raising employee wellbeing and productivity.

This report takes a systemic, customer-led approach with the primary aim of informing the creation of Toitū Te Whenua's first data strategy. It reflects customers' broad views of property data as 'any data applicable to or contingent upon property'. This results in a much broader, customer-led perspective on a New Zealand property *ecosystem* that is not restricted to a Toitū Te Whenua-centric or regulatory definition.

That said, this difference in views between Toitū Te Whenua and our customers raises the fundamental question 'what is property data?', which this report is not equipped to answer. This suggests that the first step in formulating a strategy for property data is to work with our customers, stakeholders and partners to establish common understandings and definitions of different types of property data, and clearly differentiate these from other forms of data that are applied to property.

This report does not provide an exhaustive and weighted list of issues for each property dataset we own or manage. Interview content was wide-ranging, and we were offered solutions as well as hearing problems. Clear identification of essential problems and prioritising these into a solution roadmap requires detailed analysis and project planning backed by a clear strategy.

Purpose of the property data review

This project reviews Toitū Te Whenua's existing data management and provides a recommendation on the people, process and technology changes required to deliver customer and business outcomes.

As displayed in Figure 1 (below) these recommendations were fed into design work for organisational change and are, at the time of publication, being used to inform Toitū Te Whenua's first data strategy.

Toitū Te Whenua is in the process of re-organising internally to be more integrated, more influential and more successful. We recognise the need to continuously evolve to meet the new challenges of a changing world.

Toitū Te Whenua has committed as an organisation to proactively engage on data use with our external customers, stakeholders and partners. Working together with people who use data is the key to success.

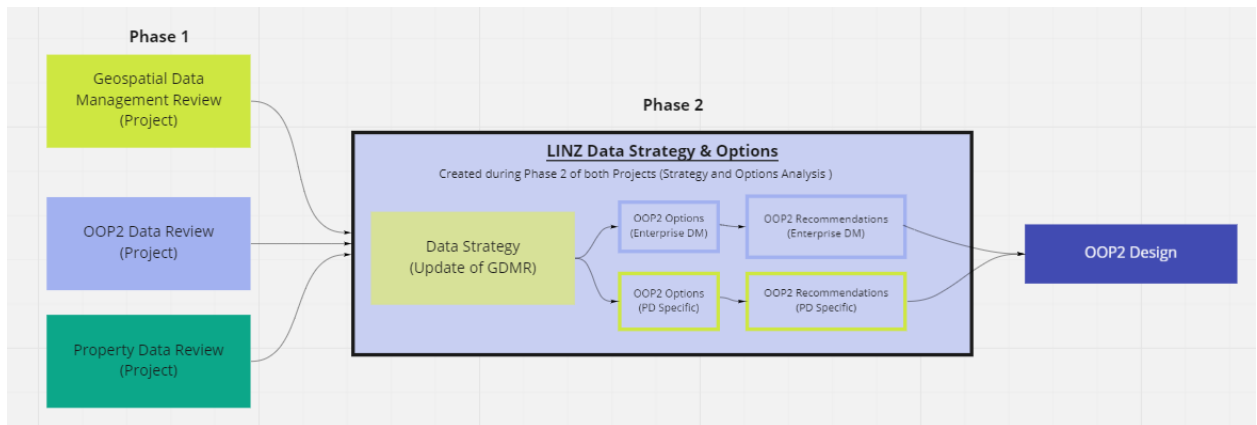


Figure 1: The property data review feeding into Toitū Te Whenua's data strategy and OOP2 design.

Summary of findings

This section summarises customer interview commentary and survey findings into much shortened, bulleted statements. They are not the opinions of the authors or Toitū Te Whenua. The contextual stories from interviewees can be found in the full results section later in this report.

Four key themes

New and more demanding requirements for property data have emerged in recent years in Aotearoa New Zealand. These can be grouped into four key themes.

New Zealanders' wellbeing is essentially linked to land and property, and needs to be supported by open, comprehensive and high-quality property data.

Urban development means building smart and sustainable towns and cities that are much more resource efficient, enhance quality of life and maximise accessibility to opportunities.

Resilience and climate change requires government, society and the economy to mitigate and adapt to the defining challenge of our time.

Māori prosperity means realising and empowering rangatiratanga, kaitiaki whenua, mātauranga and good Treaty partnerships that support the achievement of Māori aspirations and accelerate developments by Māori for Māori.

Sourcing data

Our customers told us that:

Property data across Aotearoa is highly disparate, inaccessible, expensive and untimely, is of inconsistent quality, or simply does not exist.

- Most property data is sourced from Toitū Te Whenua, but customers are still reliant on a few local and international commercial providers to provide some essential New Zealand property data.
- Substantial sums are spent annually across the public and private sectors on sourcing and integrating data.
- Sourcing and integrating data is more time consuming, error prone, expensive and technically challenging than it needs to be.
- With no single authoritative source of property data, users have to build up and blend data from different sources to get a picture that's as accurate as possible.
- It was claimed there is significant data duplication across government, with complex rules around access and sharing that require memoranda of understanding (MOUs) around control and risk management.

The availability of public data through Toitū Te Whenua and the LINZ Data Service (LDS) are far better than many equivalent services overseas, but there is room for improvement.

- Research participants were positive about the work Toitū Te Whenua does to continuously improve our data, and encouraged us to keep this up.
- Customers can struggle to find the property data they need, both within LDS and across the data ecosystem.
- We heard that it takes significant time and effort to learn what data is available from where.
- While Toitū Te Whenua data is free at source, customers still face significant costs for processing, storage, and ensuring local data is regularly updated (or, conversely, dealing with the inevitable issues that arise when it isn't).
- Customers increasingly want to ingest services and livestream data through APIs, ideally from a single source like Toitū Te Whenua, in more readily usable formats for different GIS applications, and in pre-packaged models for specific end-user groups.

There is significant opportunity to improve geospatial productivity and reduce costs associated with evidence-based decision-making.

- Data integration and usability is a key challenge. Customers need to be able to quickly and effectively turn data into relevant geospatial intelligence for decision-making.
- Local government has highly variable geospatial capacity and capability to deal with large property data issues.
- We heard that an overall lack of data causes significant amounts of additional and unnecessary processing. People need to put in a lot of effort combining the information that is available to allow analysis by inference.
- Combining property datasets also takes a lot of time and creates the potential for errors.
- Many people called for an increase in central coordination from Toitū Te Whenua, so that councils do more work the same way. For example, it was suggested there are about 25 different legal description formats in use within district valuation rolls (DVR) around the country.
- Problems with geospatial data mean that decisions are being made based on incomplete information. This has impacts at all levels across the country.

Property sales and valuation data systems need to be reformed so the market can flourish, critical business and government decision-making is empowered, and property system risks are removed.

These nationally critical economic data are currently captured by a few private interests with limited competition. This is a serious barrier to innovation and impacts the public good.

- These data are very expensive to acquire from commercial sources, are inconsistent, and are of questionable quality for the cost. Use of the data is also limited by restrictive contractual conditions.
- The New Zealand government relies on private companies to publish national economic performance data and indices on the property market.
- Sales data is very slow to reach the market, its accessibility varies from vendor to vendor, and it has significant gaps. Rural sales are especially poorly reported. This creates risks to confidence in the property market and obscures the picture of wealth in Aotearoa.

People buying and selling property need more accessible and transparent property and property market information, both to protect the integrity of the property system and increase the wellbeing of New Zealanders.

- It is difficult (if not impossible) to purchase property with complete knowledge and due diligence.
- Agents and prospective buyers have to seek out, purchase and make sense of limited, mismatched, inaccurate and imprecise information from multiple sources.

- Market information available to the public is unreliable because it's not authoritative, transparent or up to date, especially in more dynamic market conditions, when property prices are changing more rapidly and there is less certainty.
- 'Natural perils' information (environmental hazard and risk information relating to property, especially forward-looking with respect to climate change) and the associated financial considerations are not easily available from authoritative sources.
- Property and market information needs to be connected up at a single authoritative source so that it doesn't have to be sought out.
- Our customers clearly signalled that Toitū Te Whenua should lead as stewards of the property system to ensure that purchasing decisions in Aotearoa New Zealand can be made in the fullest knowledge possible.

Property data systemic improvements

The data in this section was highlighted by research participants as either needing improvement or representing a gap in Aotearoa New Zealand's property ecosystem information.

Some of these are probably not for Toitū Te Whenua to supply, but they are all contingent on one or more aspects of core property data and would be valuable for New Zealand Inc. For this reason, respondents called on Toitū Te Whenua as stewards of the property system to lead as much as possible and otherwise support improvements across the property ecosystem.

Our customers told us that:

Many believe that the valuation system needs reform to improve the quality of valuation data.

- The district valuation roll (DVR) includes many attributes essential to informing decision-making across government and business.
- Many councils aren't resourced well enough, and maintaining the DVR is a burden.
- Many councils have primarily utilised their DVR as a revenue source, rather than as a property information database.
- Special rating areas and Crown land can be omitted from the DVR, rather than having their information included with a ratings value of \$0. This omission creates gaps in increasingly important land information.
- The valuation system largely relies on the ad-hoc occurrence of property sales to provide information updates (which are of variable quality) for individual properties across the country.
- Errors introduced by valuation service providers (VSPs) can have an enormous impact on the property market's integrity. It appears that we've been lucky to avoid market-wide disruptions, and it can take up to 10 years to cleanse the data completely.

- DVR data is widely used beyond its immediate purpose. These other applications can be nationally important but lack purpose-made data and standards.
- Establishing additional data and standards and connecting these up to DVR would be mutually reinforcing for both those other applications and the DVR.

Comprehensive national datasets and standards are needed for identifying and spatially locating property and property-related assets.

- This would have a raft of benefits across most (if not all) sectors.
- Address is relied upon as a proxy for other spatial location data, which is problematic as it cannot provide the degrees of comprehensiveness, accuracy and precision increasingly required for all kinds of property and assets.
- Toitū Te Whenua’s work to improve our addressing data is acknowledged and appreciated, but address data lacks a clear single authority and source.
- Localities and suburbs data lacks authority and consistency.
- There is no national system of property identification or building identification.
- There are no common standards for precisely identifying and locating specific assets, utilities and attributes within properties and buildings.
- Address standards do not accommodate multiple address points for a single property, which may be needed for different functional requirements.
- Our most vulnerable populations, such as the homeless or people with no fixed address, are going uncounted and unaided because a lot of the statistics that government agencies collect rely on property addresses – a system that doesn’t consider hardship realities on the ground.

Connected property data could transform resource and building consenting.

- The consenting system cannot accommodate the increasing scale and complexity of land development in Aotearoa New Zealand.
- If consenting authorities could create and assign nationally unique property and building IDs up-front and connect these to property and building information on common schemas, this would transform consenting management and eliminate massive volumes of rework and correcting of property records as builds progress.
- National data standards don’t yet exist for building information models, but they could bring incredible productivity benefits across multiple sectors.

Spatial planning, land use and resource management data need to be more comprehensive and connected-up with common standards.

- Lack of national authoritative data and standards hinder joined-up land use planning and development, impacting liveability and wellbeing in our towns and cities, and inter-regional integration.
- At the most basic level, not all land in Aotearoa New Zealand has a title, a parcel and an owner (and where applicable, a manager and occupancy).

Parcel strata is particularly problematic and a lot of IP is required to obtain the data close to reality.

- The following datasets have no single authoritative public source or common standards:
 - nationwide planning zoning
 - land use
 - resource and building consents
 - pending new subdivisions / properties
 - roading and pathways
 - utilities and services
 - reserves and Crown land.
- Customers, stakeholders and partners ranging across the public and private sectors want Toitū Te Whenua to take a much more active role in the property ecosystem and enabling New Zealand Inc.
- Open data is a good start, and we were encouraged to explore offering 'value-add on top with cost recovery'.

"nobody's saying LINZ has to do everything for free." (geospatial consultant).

Aotearoa New Zealand's resilience and climate change challenges would greatly benefit from new and improved property data.

- Banks, insurers, and central and local government need to work together to introduce climate risk indicators to the property market.
- The natural hazards data that councils use for decision-making around land development is of variable quality and format.
- Climate modelling on aspects like sea level rise, rainfall and changing geophysical conditions is incredibly complex and difficult for non-experts to understand and use accurately for long-term decision making.

The private sector is currently building data modelling tools that draw from local and international climate data and will be used by banks and insurers.

- These tools have portfolio-management application in the sector, but we heard banking and local government stakeholders conveyed hesitance to apply them to individual property decisions – nobody wants to be first to negatively impact property values for individuals and communities.
- Different tenure types carry different risk ratings, and it is difficult to identify the volumes of different types at a portfolio level (for example, by a bank or an insurer after a natural event).

Spatialising rural and agricultural property data is critical for confronting climate change challenges.

- Agriculture is a key frontline for climate change mitigation and adaptation in Aotearoa.
- A lot more can be done to provide farming communities with the data they need for environmental planning and management to be an integral part of their business, livelihoods and wellbeing.

It is difficult to define a farm, and there is no common model that accommodates the changing nature and shape of farms.

- Monitoring and reporting needs to be accurate and precise down to individual paddocks and waterways.
- Live synced data is needed to manage stock, paddocks, water, irrigation, nutrients, carbon and methane across farm properties and businesses.
- Data will need to be this granular and spatially defined, however, to allow reporting for local and international requirements.

The Crown estate needs much more complete and comprehensive data if it is to be well managed, understood, cared for and enhanced.

- There is no complete register of Crown land, including details of managers, occupants, covenants, protections, accessibility, hazards, land use, historic gazettes and imagery, and sites of significance (natural, historic or cultural).
- Councils are not incentivised to adequately map and maintain data on reserves and other Crown lands within their boundaries as they cannot extract rates revenue from them.
- There is no single source for protected areas status at local government levels, so interested parties need to request information from individual councils.
- Iwi partners expressed to us that Crown land permits are not transparent or geographically precise enough, and local iwi are not notified as kaitiaki whenua partners with the Crown when permits are issued.

Un-surveyed parcels are a major challenge for stakeholders like the Department of Conservation and inhibit their ability to do critical work.

By partnering, sharing knowledge and working together, we can contribute to better outcomes for Māori and iwi.

- Māori prosperity is being held back by a lack of property data.
- Māori lack access and empowerment with regard to data, which is a taonga essential for realising their aspirations.
- The property data ecosystem does not accurately count some population cohorts, which means that national statistics and the socio-economic interventions they inform often underestimate community needs.
- Māori and Crown land data are incomplete and poorly integrated with land title records, making it impossible to get a complete picture of land and property owners and managers.

- Lack of data stalls restoration of rangatiratanga and prevents both Māori and the Crown from fulfilling their mutual commitments under Te Tiriti as kaitiaki whenua partners.
- Historic survey, ownership and land use data lacks a single authoritative source, and archives are often incomplete (in terms of digital scans), difficult to access, paywalled, and lack georeferencing.
- Incomplete data means that rights of first refusal processes can be compromised, repeating the disempowerment and dispossession of Māori, and creating new layers of trauma and alienation.

Toitū Te Whenua's future role

Our customers told us that:

There is a clear mandate from Toitū Te Whenua's customers, stakeholders and partners for us to play a leading role across a greater property system assemblage.

- Our work to improve the quality of existing data was acknowledged and applauded, and we were encouraged to keep going.
- Councils appreciate our efforts to collaborate with them, and councils see potential for more collaboration in the future.
- We heard widespread calls for a 'single authoritative source of truth' for property data in Aotearoa, and for Toitū Te Whenua to take on a greater leadership role.
- Our customers, stakeholders and partners have a broad definition of New Zealand's property system, and said that New Zealand Inc would be better served by Toitū Te Whenua taking a more expansive, ecosystem view.
- Respondents encouraged Toitū Te Whenua to take a leadership role in solving all the property-related issues noted above.
- As the nation's lead spatial agency, people are looking to Toitū Te Whenua to lift external engagement, set spatial standards, and lift geospatial capability across the country.

Placing the Property Data Review in context

This section has two parts. The first is an overview of Toitū Te Whenua’s previous explorations of aspects of geospatial and property data management. This is followed by a summary of current various related works in progress. The timeline below shows our work in chronological order.

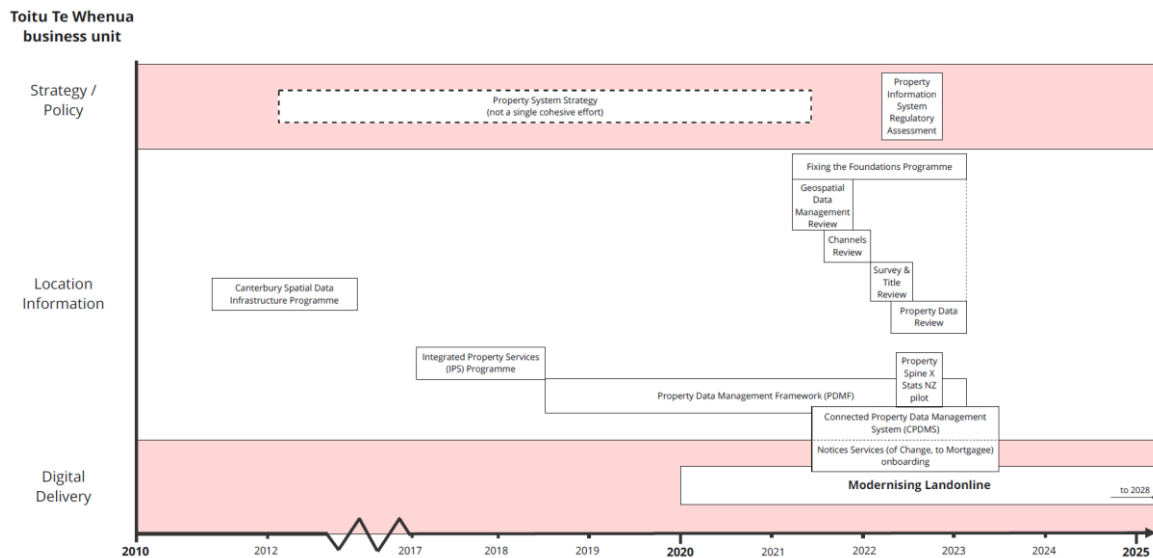


Figure 2 Timeline of Toitū Te Whenua property information projects.

Building on previous work

Over the past 10 years, Toitū Te Whenua has undertaken many assessments and reviews into property data, the property system, and the data we hold.

This section will touch on the following projects, summarising their aims and relevance to this review:

- Property System Strategy
- Location Information’s Integrated Property Services (IPS) Programme
- Location Information’s Fixing the Foundations Programme:
 - Geospatial Data Management Review
 - Channels Review
 - Survey and Title Review
- Property Information Regulatory System Assessment.

Building a Property System Strategy

Toitū Te Whenua worked throughout the 2010s to produce a Property System Strategy that sought to clearly identify the agency’s role in the New Zealand property system. This was most recently interrupted in 2021 by a combination of people movement, associated loss of institutional knowledge, and the COVID-19 pandemic, and has not yet been restarted.

The intention was to work with partners across government to create a bold and aspirational long-term vision for the New Zealand property system, and clearly identify Toitū Te Whenua’s role in the system through 5- and 10-year horizons.

A series of internal workshops identified six focus areas for New Zealand’s property system to remain world leading. These focus areas are displayed in Table 1. A relational diagram was also produced showing the New Zealand property system managed by Toitū Te Whenua as the core part of a greater assemblage of systems and participants. This diagram is shown in Figure 3.

The project was interrupted most recently in mid-2021¹ at the point where Toitū Te Whenua’s Chief Executive (CE) was about to embark on high-level inter-agency engagements. These were a precursor to agencies’ participation in a series of strategy-forming workshops. The briefing pack for those engagements supplies potential touch points to explore across a collection of 13 central government agencies.

Table 1: Six focus areas for the New Zealand property system.

LINZ can support	Focus #1: The property system helps solve major property-related challenges
	Focus #2: Land development processes across government are connected
	Focus #3: Core property-related data is integrated and available
LINZ can lead	Focus #4: Ongoing development of the property system is ‘customer-centric’
	Focus #5: We exercise greater control over the development of the technology platform
	Focus #6: We capture benefits of automated processes and tasks

¹ The imposition of an alert level 4 / red traffic light lockdown in Auckland on 17 August 2021 that ultimately extended to December, and heightened alert levels nationwide remaining in place for over a year, in reaction to community transmission of the Delta variant of COVID-19.

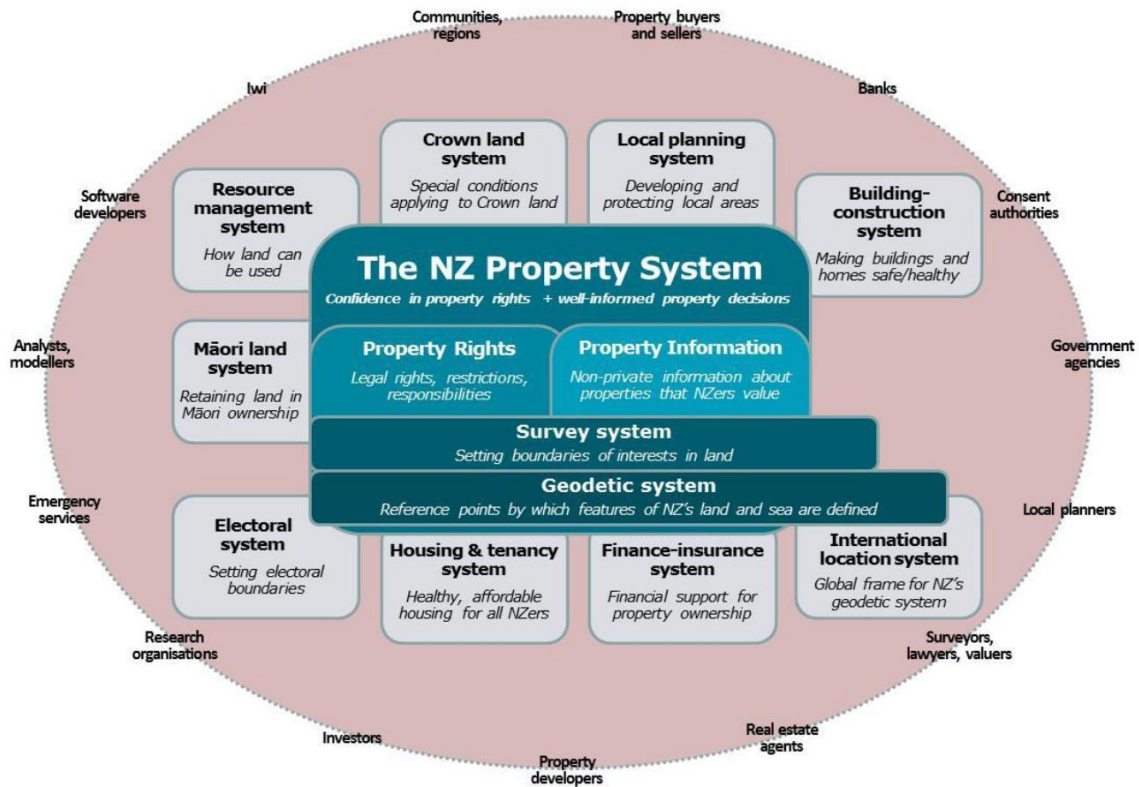


Figure 3: Diagram of the New Zealand property system positioned among other New Zealand administrative systems and participants.

Location Information's Integrated Property Services (IPS) Programme

Strategic assessment

In January 2017, Location Information established a team to conduct a strategic assessment. Delivered in July 2017, the strategic assessment outlined the case for change to unlock the value of property by increasing the quality, accessibility and connectedness of property information to support better-informed property related decisions.

The strategic assessment used an evidence-based approach across two streams of work:

- a technical exercise to test the feasibility of linking property data
- engagement with users of property information and territorial authorities to gain an understanding of how they create, manage and share property data and the property information value chain.

Over 160 individuals across more than 40 organisations were interviewed. Four key interventions were identified:

- open access to all core property data and raise awareness
- improve data quality (including currency, consistency and completeness)
- enable a full digital view of property
- create leadership and a shared vision.

Business case

The strategic assessment was followed in 2018 with a programme business case. Over 80 individuals from 50 entities and agencies were interviewed, representing a broad spectrum of property data providers and users including central government, local government, property owners, property developers, insurers, financiers, commercial information providers, and utilities.

Further technical research to test and prototype potential technical solution concepts was also conducted.

The issues identified in the business case were broken down into four fundamental problems:

- Data is not always accessible.
- Data quality is variable.
- Assembling information is costly and takes effort.
- The supply chain is not well positioned for the future.

Two investment objectives were identified to solve these problems:

- Improve access to property data, that is accurate and up to date.
- Enable data about an individual property to be consistent and linked.

The following outcomes were identified:

- Improved transparency and completeness of information for all end users.
- Improved trust and confidence in property data across the supply chain.
- Improved access, availability, timeliness and quality of data to inform decisions.
- Reduced effort and cost to assemble and prepare property data and information.
- Government has better access to data to support policy and planning.

Definition of property

While conducting the strategic assessment it was identified that while the word 'property' was commonly used, there was no clear or shared understanding of what this word meant. This was the case both within Toitū Te Whenua, and among external participants of this assessment. As a result, a project was initiated in 2018 to try to establish a definition of 'property' for Toitū Te Whenua. The three-stage project comprised:

- a literature search of legislation and regulations either for or containing the word 'property', plus a dictionary search

- interviewing at least one person from most areas of Toitū Te Whenua staff to find out what they think a 'property' is
- analysing the results of phase one and two, with the aim of determining a shared definition of property that could be adopted across Toitū Te Whenua.

It became clear as the interviews progressed that there were multiple views about property, and that it would not be possible to consolidate these views into a single definition. However, when removed from the technical language of property data, commonality was found when property was described in human-centric terms, particularly 'my home'. From this, Toitū Te Whenua developed the concept of 'property perspectives'.

This concept was subsequently carried into the development of a conceptual model called the [Property Data Management Framework \(PDMF\)](#). This in turn provides the foundation for Toitū Te Whenua's Property Spine project outlined with other work in progress below.

Location Information's Fixing the Foundations Programme

Geospatial Data Management Review (GDMR)

The GDMR project was a key pillar of the Location Information group's Fixing the Foundations Programme. It sought to review Toitū Te Whenua's geospatial data management systems and processes, as well as publishing channels, and identify potential improvements and investments. It also sought to create new principles and guidance to help decision-making for the management and publishing of geospatial data.

The project worked through two phases: a Data Management Review and a Channels Review. The Channels Review engaged external customers and stakeholders and, as such, provided a blueprint for this project. This point is expanded upon in the 'methodology' section.

Channels Review

The Channels Review project ran in the first half of 2021. The project reviewed Toitū Te Whenua's geospatial open data publishing channels. It recommended preferred defaults or capabilities for investment given customer need and Toitū Te Whenua business requirements.

The project team conducted a desktop analysis, an online survey and a series of external interviews. The key positive findings were that customers are highly satisfied, Toitū Te Whenua data is highly important for business needs, and Toitū Te Whenua's more targeted channels ([Basemaps](#) and [Esri REST Key Datasets for Resilience](#)) were growing quickly after launch.

However, the team also found that Toitū Te Whenua's customer classification model is overly simplistic, and the number of channels operating is excessive and cost more to operate than expected. The discoverability and findability of channels and datasets could

be improved and, most pressingly, many government customers do not find Toitū Te Whenua data fit for their purpose.

The report gave a selection of 'immediately actionable' and 'future state' recommendations based on these findings.

Survey and Title Review

This project was started in the first half of 2021 to evaluate Toitū Te Whenua's various survey and title datasets and make recommendations on the people, process and technology changes needed to deliver customer and business requirements. This project was halted before moving to the external research phase, and later the motivations for it fed into this Property Data Review, with an expanded scope.

This review was motivated by:

- Toitū Te Whenua having multiple survey and title (now broader 'property data') activities split across the multiple parts of the agency
- these activities relying on disparate internal and external sources of information (such as addresses from territorial authorities)
- downstream roles and responsibilities, systems, processes and outcomes having grown haphazardly into siloed solutions to specific needs and lacking overall coordination and leadership.

Property Information Regulatory System (PIRS) Assessment

In 2021, Toitū Te Whenua's Policy team conducted a Property Information Regulatory System (PIRS) Assessment. The assessment took a similar approach to this property data review, conducting interviews with a wide range of external stakeholders across the property system, with a focus on regulation of property information or property data. The PIRS Assessment reported findings but did not make any formal recommendations.

Figure 4 was originally produced by the project team but not included in the final report. We have updated the diagram to reflect that Toitū Te Whenua now provides localities data², rather than Fire and Emergency New Zealand (FENZ). This diagram is a useful attempt to illustrate how elements of the property information system are dispersed among multiple regulatory authorities, as well as across multiple levels of government, and the nature of connections between them. The diagram doesn't convey how this dispersal is further compounded by the existence of 67 councils nationwide, with no single authoritative public source for their data. For DVR as well, the diagram is perhaps overly-simplified as it does not show the role of Valuation Service Providers (VSPs), and

² <https://data.linz.govt.nz/layer/113764-nz-suburbs-and-localities/>

QV in particular as a state owned enterprise, who are holding past and present DVR data in their service provision role for Councils.

The assessment found that while the PIRS is broadly achieving its aims, there are opportunities for improvement. First, there is a lack of cohesion and system leadership. Second, financial cost and lack of knowledge present severe hurdles to data accessibility. Third, and stemming from the previous two points, data quality, consistency and reusability is highly variable.

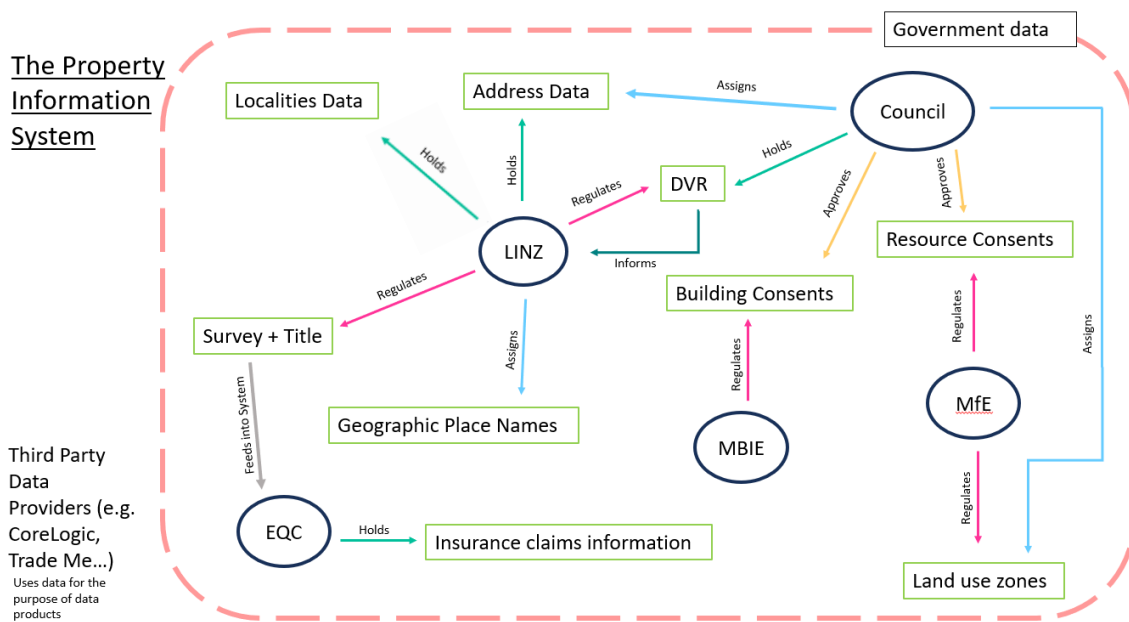


Figure 4: Property Information System diagram

Toitū Te Whenua work in progress

This section looks ahead. There are several projects running concurrently, and one beginning imminently, that are shaping the future of the Aotearoa property information system. These are:

- Survey and Title Enhancement Programme (STEP), or Modernising Landonline
- Notice of Change of Ownership (NoC) and Notice to Mortgagee (NtM)
- Property Spine
- Valuation Rules Review.

Survey and Title Enhancement Programme (STEP)

STEP, or 'Modernising Landonline' for our external customers, is a multi-year programme of work to rebuild Aotearoa New Zealand's core survey and title system. The Legacy

Landonline system is 20 years old, and as such is increasingly difficult to use, maintain and keep secure. STEP began in 2019 and Horizon 1 (H1), largely replacing the old Landonline capabilities like-for-like, is expected to run through to the first half of 2025. The Notices and Web Search are both new services delivered in this first horizon.

Among its key deliverables are:

- Notices (live) – expanded upon below
- Web Search³ (live) – a web-based application for the general public and property services professionals to be able to search and purchase survey and title documents for any property in the country
- Dealings application – where solicitors can execute a range of property instruments and transactions through the land registry on behalf of their clients
- Survey application + 3D cadastre – where cadastral surveyors can upload, complete and submit survey plans for review and approval.

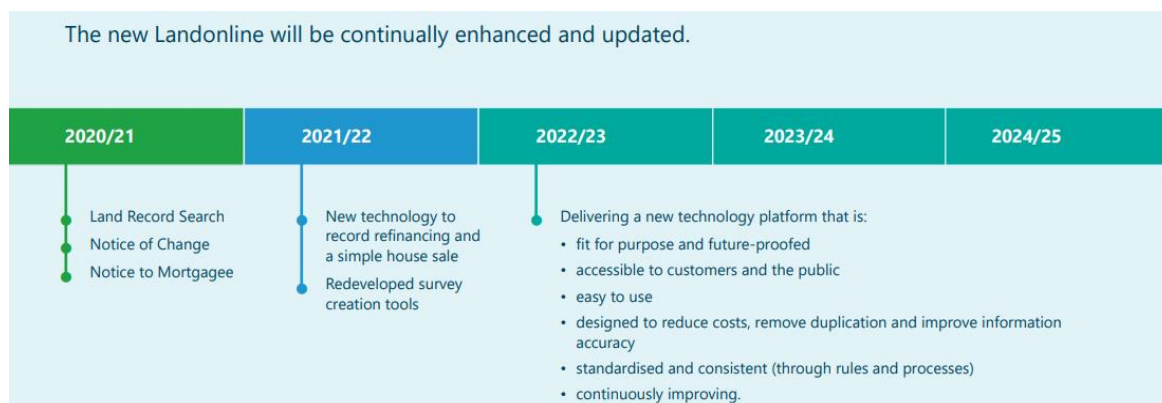


Figure 5: Modernising Landonline programme timeline to Horizon 1 (H1)

The Modernising Landonline programme is planned to continue until January 2028. Horizon 1 (H1) of the programme will replace all the current functions and shut down Legacy Landonline by the first quarter of 2025.

The roadmap for Horizon 2, projected to carry through until mid-2026, moves on to building new capabilities that formed part of the original business case. Transformational high-priority initiatives planned within Horizon 2 include establishing the technical infrastructure for APIs, a business rules engine on a rules repository to support APIs, a new survey software interface and titles subdivision enhancements.

Post-Horizon 2 through to January 2028 will involve further potential improvement initiatives for survey and title, the details of which are still to be decided.

³ Links to [information webpage](#), and [web-app](#).

Notice of Change of Ownership (NoC) and Notice to Mortgagee (NtM)

Early in the STEP programme it was found that local territorial authorities (TAs), conveyancers and financial institutions would benefit from automation of data transfers when there was a change of property ownership or a mortgage instrument assigned to a property. Toitū Te Whenua collaborated with these stakeholders to set up two 'Notices' services – [Notice of Change of Ownership \(NoC\)](#), and [Notice to Mortgagee \(NtM\)](#).

NtM lets lending institutions (banks) receive mortgage registration information automatically from Landonline when a mortgage is registered.

NoC creates sales notices within Landonline to notify TAs of title ownership changes so they can immediately and accurately update their ratings valuation records for the purpose of issuing rates bills to the correct property owners.

Three parts of Toitū Te Whenua worked closely together to deliver the NoC project: STEP, the Office of the Valuer General, and the Connected Property Data team.

The Connected Property Data (CPD) team had already commenced testing a national DVR dataset as part of the Property Spine (see the CPD section below). The NoC project built on this work and deepened the collaborative approach between Toitū Te Whenua and TAs, co-designing and implementing a win-win solution that provides a great example for future projects.

At time of publication, the Office of the Valuer General (OVG) within Toitū Te Whenua is in the process of exploring regulatory amendments to make NoC mandatory for all changes of property ownership. This work reflects calls for such from our customers and stakeholders, and began after external interviews for this review had been completed.

Property Spine

In early 2017, the Integrated Property Services team (the predecessor of the current CPD team) developed a proof-of-concept property spine built primarily on district valuation roll (DVR) data. The proof of concept used a variety of disparate datasets to test the Property Data Management Framework (PDMF) model for connecting property.

Establishing the NoC service provided the means to move from proof-of-concept to implementation, assembling a nationwide valuation dataset for the first time since valuations were decentralised in 1997.

Besides concern for the state of the property data market in Aotearoa, the theoretical underpinnings for this work go back to managing the aftermath of the Canterbury earthquakes in 2011 and 2012.

The earthquake emergency response highlighted the need for well-defined, reliable and accurate property data relationships. In the immediate context this need was met by the [Canterbury Spatial Data Infrastructure \(SDI\) Programme](#). One of the Canterbury SDI projects was the development of a model (the PDMF) that would allow property data to be connected based on that data being part of the same property.

Property Spine involves:

- developing and maintaining a conceptual model (the PDMF) defining the linkages between core property data
- creating a national and publicly available property ID
- matching DVR to relevant titles and parcels
- cleansing the data for TAs
- establishing a national [NZ Properties](#) dataset that includes a national DVR dataset
- collaborating with Stats NZ, for admin census.

Further applications indicated in this research include MPI for farm ID application, and IR for tax purposes.

Valuation Rules Review

Within Toitū Te Whenua, the Office of the Valuer General (OVG) has embarked on a review of ratings valuations rules, a fundamental component of the ratings valuations system.

This review takes place more than a generation since significant reform in 1998–99 that brought administrative decentralisation to local councils. It occurs in the context of increasing challenges for the OVG in regulating and supporting the quality of ratings valuations.

As described in the previous section, the quality and robustness of property valuation data bears systemic issues that increasingly mean the accuracy of rating valuations are compromised.

Customers expressed two primary areas of interest for the rules review: improving existing data collection processes, and expanding the types of data collected.

“Land use classifications used by VG office are unusual. I would love to have input into those rules and classifications next time they’re reviewed.” Central government stakeholder

At time of publication, this review is in the process of reviewing draft rules with key system stakeholders, and it will require a further two years to complete and implement new rules. Scoping work in 2023 consisted of external engagement and requirements gathering with valuation industry stakeholders and local territorial authorities.

Methodology

This section outlines the intended scope and conduct of external research for this review.

Scope

The following datasets were assessed to be in or out of scope for this review.

Table 2: Datasets in and out of scope.

Datasets in scope	Datasets out of scope
Cadastre	Road centrelines
Titles	Building/Building outlines
Address	Other non-rating unit definitions of property including schools, universities, farms, or hospitals
District valuation roll (DVR)	Property consents
Property sales	Overseas Investment Office applications
Māori land	NZ Post address
State (Crown) land	
NZ properties	

Customer engagement

Engagement with external customers, stakeholders and partners used a two-pronged approach. A mass survey was sent to our LINZ Data Service customers, and this was followed by a series of interviews with key parties.

LINZ Data Service customer survey

While planning the survey, we extracted a report of property data views and downloads over the previous 12 months. This gave us a list of 'active' users to send the survey to.

Through the survey we wanted to find out the following about property data:

- What industry segments do our customers belong to, and how are they using our data?
- What types of roles are accessing our data?
- What property datasets are customers typically accessing, how is it accessed, and how often?
- Are customers satisfied with Toitū Te Whenua data?

- What is the goal or purpose that customers are using our property data to achieve?
- Where else is property data sourced from, besides Toitū Te Whenua?
- How is Toitū Te Whenua data combined with data from other sources?
- Are customers satisfied with data from other sources?
- What value are customers getting out of property data?

To inform the format and phrasing of questions we drew from both the Channels Review and the (incomplete) Survey and Title Review. The former had conducted customer surveys of their own, and the latter drafted (but not sent) customer surveys, and both had been aimed at roughly the same customers.

We tried to avoid repeating research already done through the Channels Review, which had given great insight into the current and preferred methods of data acquisition by customers. We built on that work as we interrogated the state of property data itself.

The survey that resulted was comprehensive, and because feedback was sought for each dataset a customer used, this meant that customers who used more datasets were faced with a long survey. However, we considered that the importance of drilling down into the details outweighed the risks of a poor completion rate, and we weren't sure when we'd be able to canvas customers in a similar way again.

Research interviews

Along with the survey, we looked to conduct in-depth interviews with a smaller cohort of 'high value' customers, stakeholders and partners. 'High value' was defined as organisations that are making significant contribution to New Zealand Inc. These actors enable efficiency gains and better decision-making, have products and services with large customer bases, or are high-volume data users in important industries that have a large customer base.

These interviews followed a semi-structured approach and typically ranged from 60 to 90 minutes in length. Open-ended questions were prepared in advance to give direction to the conversation.

Through the interviews we sought deeper understanding of organisations' applications for property data, their workflows, key challenges and opportunities, and general experiences so Toitū Te Whenua could provide more effective solutions for them in the future. We were also keen to understand what role Toitū Te Whenua and government should play in managing and providing New Zealand property data.

We aimed to cover as many different public and industry sectors as possible. As well as it being good practice to make the cohort as representative as possible, we were also conscious that Toitū Te Whenua's customer knowledge is particularly lacking outside of a few core areas (geospatial, valuation, legal and survey).

The resulting cohort of interviewees is shown in Table 3. Interviews were recorded, transcribed, and the notes sent back to the relevant interviewees for review.

Table 3: Overview of external stakeholders interviewed and their areas of interest/expertise.

Stakeholder type	Areas of interest / expertise
Private sector x15	Data aggregation Geospatial consulting Cadastral survey Engineering Land development Finance Real estate industry Proptech Valuation industry
Central government x11	Social services Network infrastructure Natural resources Emergency and resilience
Local government x21	6x regional councils 5x district councils 7x city councils 2x unitary authorities 1x water services provider
State-owned enterprises x2	Property information Environment Land use
Iwi partner x1	Te Tiriti partnership Environmental management Cultural heritage
<hr/>	
Total = 50	
<hr/>	

Analysing our findings

This segment details how the customer engagement findings from surveys and interviews were collated and analysed.

Quantitative analysis

Survey

The survey received approximately 300 complete responses and a further 1,500 partial responses.

- 1,977 private sector responses were received from 28 industries (see Figure 7).
- 199 public sector responses were received from:
 - 22 central government agencies
 - 5 (of 7) Crown Research Institutes
 - 11 (of 11) regional councils
 - 46 (of 67) territorial authorities.
- People responded from a range of 39 different roles (see Figure 8).

Due to the length of the survey, the completion rate of later questions did decrease. This meant we had to take extra care interpreting the results of some questions.

The data was cleaned, which involved reviewing the text responses submitted by participants who selected the 'other' or 'create own' options in the survey. Where relevant, these text responses were added to the tallies of selectable options for the corresponding question. New text responses which were given several times by different participants were also totalled and added to our analysis.

The relative proportions of responses were then graphed for each question.

Interviews

The interview transcripts were mined for 122 keywords that were then compiled into a matrix. The transcripts were all saved in a single SharePoint folder allowing us to filter the interviews by keyword.

A matrix was generated to show every interview in which each keyword was mentioned, and a count of the total number of interviews including each keyword was calculated. A preview of the resulting matrix is displayed in Figure 8 The full matrix is in Appendix B.

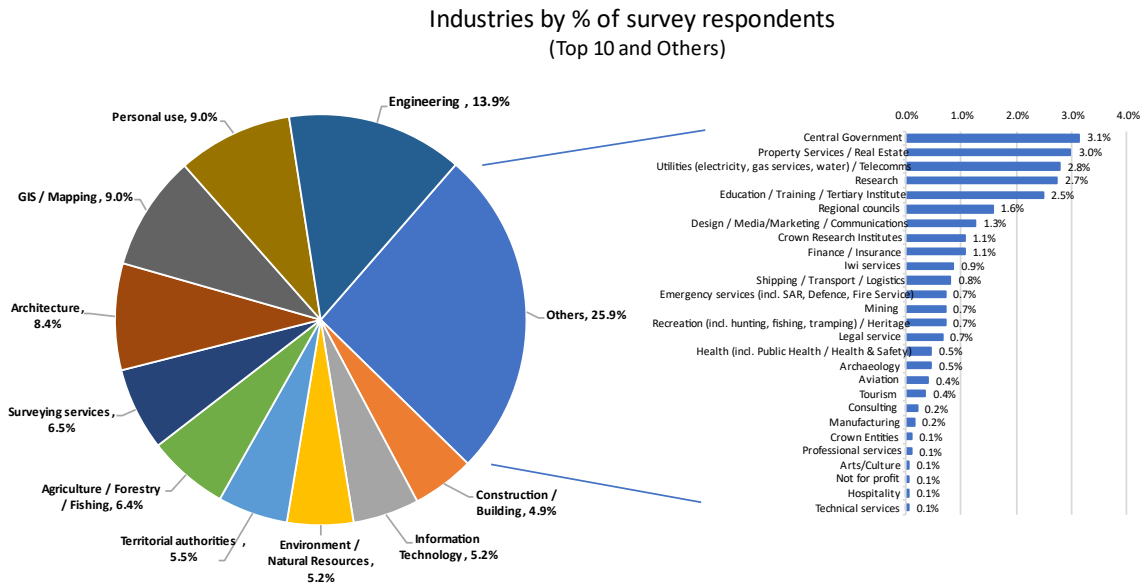


Figure 6: Percentages of survey respondents by industry (including government and Crown Research Institutes).

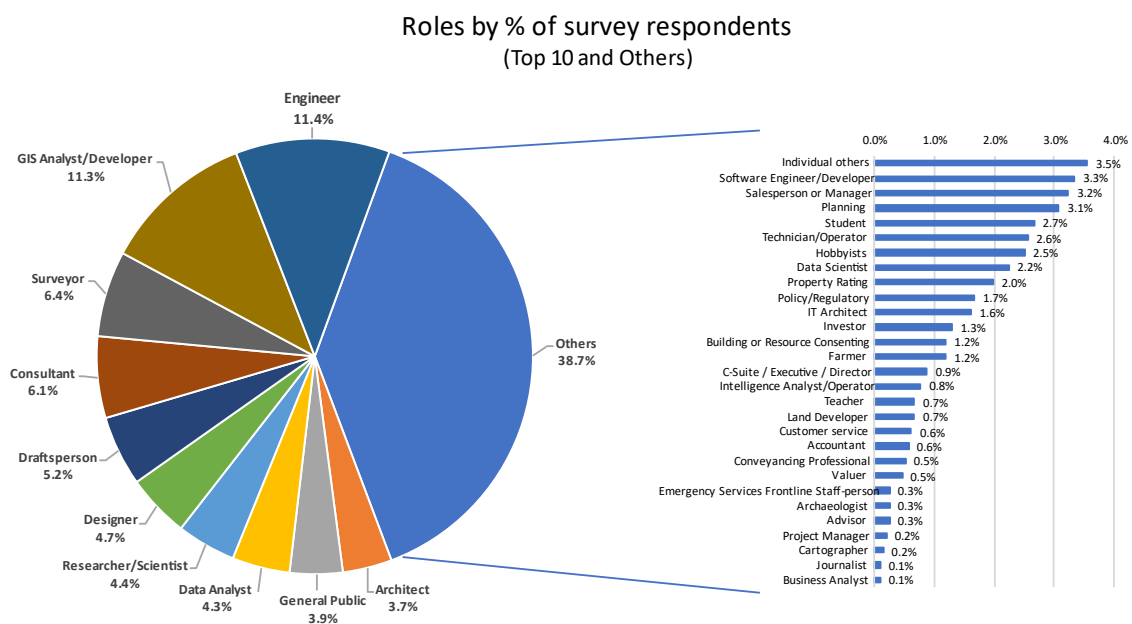


Figure 7: Percentages of survey respondents by roles.

Tooltip: Users can either filter by keyword(s) to see which interviewees mentioned those keywords. Or, filter out the blanks under a particular customer or stakeholder to see what topics were discussed in their interview.

Keyword	Customer/Stakeholder 1	Customer/Stakeholder 2	Customer/Stakeholder 3	Customer/Stakeholder 4	Customer/Stakeholder 5	Customer/Stakeholder 6	Customer/Stakeholder 7	Customer/Stakeholder 8	Customer/Stakeholder 9	Customer/Stakeholder 10	Customer/Stakeholder 11	Customer/Stakeholder 12	Customer/Stakeholder 13	Customer/Stakeholder 14	Customer/Stakeholder 15	Customer/Stakeholder 16	Customer/Stakeholder 17	Customer/Stakeholder 18	Customer/Stakeholder 19	Customer/Stakeholder 20	Customer/Stakeholder 21	Customer/Stakeholder 22	Customer/Stakeholder 23	Customer/Stakeholder 24	Customer/Stakeholder 25	Customer/Stakeholder 26	Customer/Stakeholder 27	Customer/Stakeholder 28	Customer/Stakeholder 29	Customer/Stakeholder 30	Customer/Stakeholder 31	Customer/Stakeholder 32	Customer/Stakeholder 33	Customer/Stakeholder 34	Counts	
Sales	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	25	
Ownership	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	24
Crown	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	21
Owners	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	21
Value	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20
Māori Land	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20
Corelogic	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20
DVR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	19
Survey	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	18
Aerial	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
Standards	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
Road	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
Historic	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
Quality	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
API	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	16
Esri	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	16
Geospatial	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	16
Landonline	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	16

Figure 8: Interview keywords matrix and counts.

Qualitative analysis

Survey comments

The customer survey gave many opportunities for participants to add comments. Most commonly this was to supply context for ratings given. Respondents were asked to rate datasets sourced from the LINZ Data Service, from third parties, how these met their business needs, their compatibility with other data, and so on.

The survey ended with an open-text question as an opportunity for respondents to provide broader feedback about property data or anything they felt we'd missed in the survey.

Interviews

The interview transcripts were reviewed, and key problem / opportunity statements were drawn in an affinity diagram. The diagram was organised by dataset and themes on a virtual whiteboard (see Figure 10).

Like the keywords matrix, the affinity diagram is based on the principle of topics mentioned. The relative sizes of each dataset and theme are therefore complementary, but the affinity diagram adds detail by capturing longer phrases and statements.

Following the interview discussions themselves, this exercise wasn't restricted to the 'in-scope' property datasets specified above, but also included a number of others that stakeholders and customers raised with us as fundamentally relating to property and therefore needing attention (in their view) from Toitū Te Whenua.

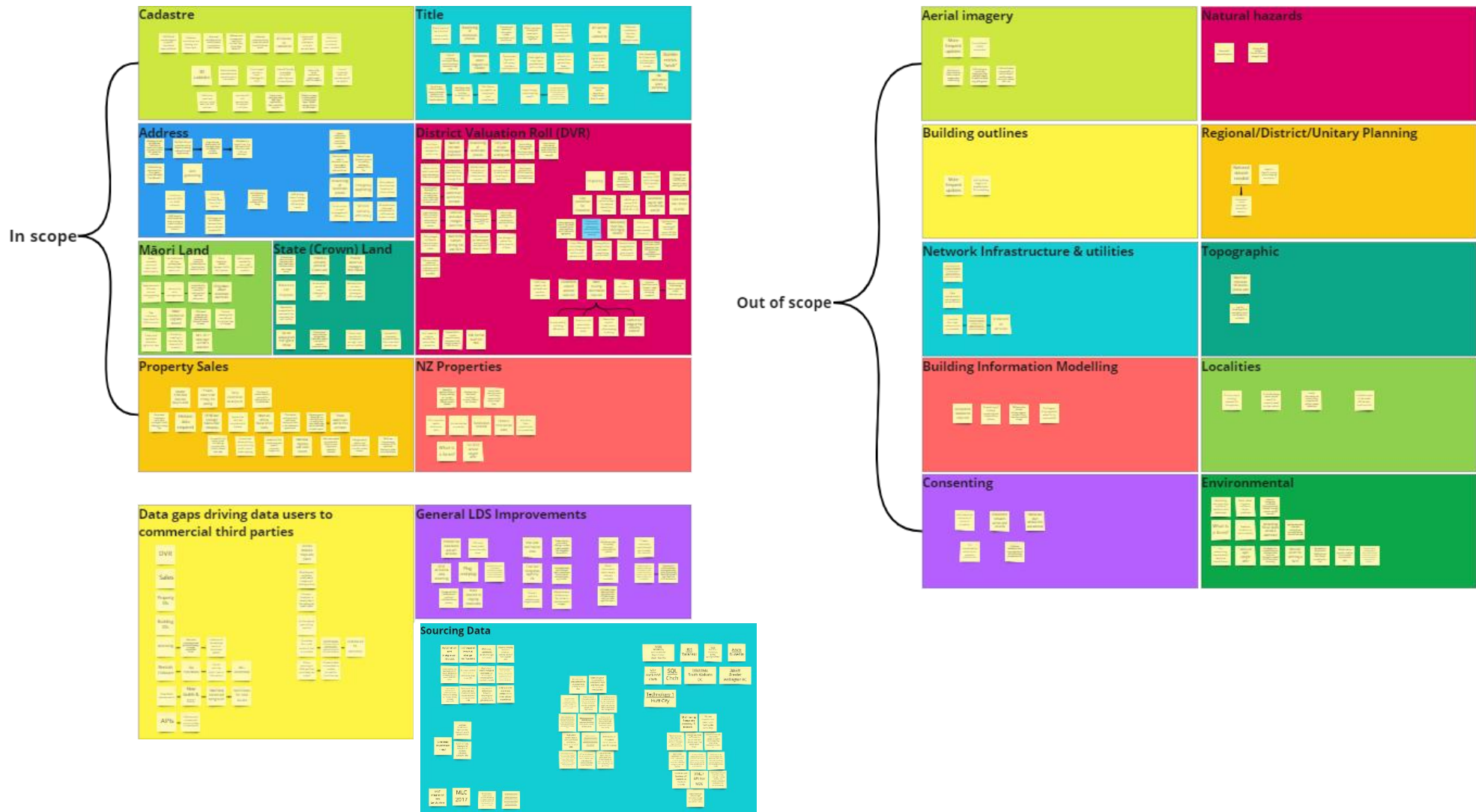


Figure 9: Qualitative analysis of research interviews, showing comments sorted into datasets and themes.

Findings

External feedback through the survey and interviews indicates that Toitū Te Whenua and our data is overall highly used and valued. However, it also made clear that Aotearoa New Zealand's property data falls short of requirements in key areas.

Our interviews with iwi partners and public and private stakeholders highlighted that effective use of property data for the benefit of New Zealanders is being held back by multiple, interwoven systemic issues.

Interview respondents were at pains to point out that their requirements are only growing more urgent and technically demanding. Local and global environmental, social and economic challenges are contributing to a rapidly evolving regulatory landscape.

Broad regional impressions are no longer sufficient to meet these challenges. Decision-making is becoming increasingly localised and the data and models enabling this need to follow suit.

This findings section is divided into four sub-sections:

- **Four systemic themes** talks to New Zealanders' wellbeing, urban development, resilience and climate change, and Māori prosperity as common themes and contexts that stood out across the research interviews.
- **Sourcing data** highlights the lengths customers go to source and integrate data, and what they'd like improved.
- **Systemic issues** flags where property data in Aotearoa is not up to requirements and in a lot of cases simply doesn't exist yet.
- **Toitū Te Whenua's future role** casts our customers' aspirations for Toitū Te Whenua to take up a greater leadership role.

Four systemic themes

Our research identified four systemic themes:

- New Zealanders' wellbeing
- urban development
- resilience and climate change
- Māori prosperity.

These themes are deeply interconnected, with two megatrends that have highly localised expressions and challenges.

New Zealanders' wellbeing

Shelter is critical for wellbeing and is a human right. Aotearoa's system of land and property rights are an integral pillar of our society and economy. We need an efficient, transparent and consistent property information ecosystem to support the wellbeing of the people and economy of Aotearoa. Having open, comprehensive, and high-quality property data is essential.

We heard that data is too expensive, incomplete, disparate, and of poor quality. Nationally indispensable property data – sales and valuation – is trapped in a state of limited competition, in which the market is shared by a small number of producers or sellers. This market oligopoly⁴ is the result of gaps left by government.

Statistical data is poorly connected to place. Our ability to fully measure and report on deprivation, housing needs, wealth and inequality is inadequate. Other data is available from multiple sources with no common format, standards or authority. This speaks to a lack of system leadership for geospatial and property information in Aotearoa.

On a day-to-day level, purchasing a home is the biggest and most significant investment most people make in their lives. Prospective buyers are confronted with an expensive, confusing and time-consuming due diligence process. It is highly questionable whether many people buying property in Aotearoa New Zealand have the information that they should.

At a national and strategic level, this leads to several different people having to or trying to match and join in all the data, with multiple versions of the same thing happening across different organisations. This means resources are wasted, productivity and innovation are held back, and opportunities to improve the lives of New Zealanders are lost. It also means that the evidence basis for decision-making, at all levels, is often underpinned by inference rather than intelligence.

Urban development

Populations across the world are becoming increasingly urbanised. Aotearoa is no different, with population growth and urbanisation driven chiefly by immigration. This concentration of people into urban areas represents both a challenge and an opportunity.

The challenge is to provide high-quality urban development that accommodates greater density and improves quality of living, and the opportunity is to realise the benefits of increased resource efficiency and resilience. Aotearoa New Zealand especially needs to

⁴ Multiple interviewees referred to a data 'monopoly', which accurately conveys the sentiment of a restricted market but is inaccurate on the point that the market is not dominated by a single producer or seller. 'Oligopoly' is the appropriate term as it slightly broadens the definition to a market that is restricted to a small number of producers or sellers.

address our chronic housing and infrastructure deficits built up over many decades of under-investment, and do so in ways that are truly sustainable and resilient.

Industry observers note the increasing uptake of 'proptech', technology platforms and data-driven solutions tailored specifically for property. We heard from industry participants that the property ecosystem is in the early but constrained phase of digital transformation. We were told that central and local government need to invest collaboratively in modern interoperable systems and common data standards to allow these digital innovations to flourish.

Further afield, countries that Aotearoa typically compares itself with are forging ahead with technological change. Computer aided design and drafting (CADD) and building information models (BIMs) are two technologies being combined with geospatial references to streamline planning and development of construction projects. There is also growing discussion and experimentation with 'smart cities' and 'digital twins'.

Across all stages of land development and property lifecycles there are enormous benefits on offer through better data capture and utilisation. A fully digitised property ecosystem would have enormous impacts on evidence-based decision-making at all levels from individuals' home purchases up to long-term strategic planning.

Resilience and climate change

Climate change is an existential challenge for humankind. It exceeds the other themes in scale and complexity, and underpins the viability of everything else.

Resource management system reform is setting up the legal frameworks⁵ by which Aotearoa New Zealand's approaches to climate change and resilience, urban development, and New Zealanders' wellbeing will primarily be defined for a generation.

With natural forces becoming more intense and storms becoming more frequent over time, societal resilience requires coordinated interventions across multiple fronts. While climate change is global in scale the effects are localised to people's homes and livelihoods.

Natural events, climate change impacts and pollution affect both buildings and properties. So do our efforts to counter, mitigate, manage risk and adapt. Understanding the social and personal economic impacts of these things is critical for fair, transparent and effective decision-making.

⁵ The Climate Change Response (Zero Carbon) Amendment Act in 2019. Additionally repealing the Resource Management Act (RMA) 1991 and replacing with the Natural and Built Environment Bill (NBA), Spatial Planning Bill (SPA), and Climate Adaptation Act (CAA - to be introduced).

“Political questions then come into play, ministers want to know the impacts of new environmental policies on specific localities, farms, individuals. Impacts on Māori is becoming increasingly questioned.

The Ministry is increasingly being challenged on the actors in the system and the intricacies of rights, responsibilities, and impacts of policy changes.” Central government stakeholder

Once in place both mitigation and adaptation strategies require new and much more detailed measurements and reporting to track progress, especially in areas where Aotearoa has made binding international commitments.

Māori prosperity

Māori prosperity encapsulates the essential challenges of living up to Te Tiriti o Waitangi, righting the wrongs perpetrated since its signing, and enabling Māori to pursue opportunities to grow environmental, cultural and economic wealth.

Early surveying and mapping of Aotearoa by Pākehā was integral to the breaking up and selling of Māori land. Toitū Te Whenua has inherited this colonial legacy and bears extra responsibility for ensuring redress of land, property and prosperity where we have the power to do so.

From our research and further meetings after the interviews, Māori and iwi have said they want more say in the stewardship and management of data. This would further their goals of fulfilling their role as kaitiaki whenua, having improved land sovereignty, and greater lived connections with cultural beliefs and genealogy/whakapapa.

Land and property information is integral to hapū/iwi self-determination, to eliminating social and economic deprivation and to Māori prosperity.

It is important to note that we were only able to speak with a single iwi for this research, whose rohe lies in a rural region of Aotearoa. Iwi in other regions and urban settings will likely have additional perspectives.

Kaitiaki whenua

The Crown has reached a Waitangi Tribunal settlement with some iwi, and is yet to reach a suitable settlement with others. With a Treaty settlement, iwi reclaim their mandate as kaitiaki whenua land management partners with the Crown.

Any environmental management must work across the property system that has been imposed on top of natural ecosystems. Land and ownership/management information is critical to iwi being able to work effectively in this role and we were told there is not enough information available, and it is not in enough detail. Gaps in data or poor visibility of data contributes to gaps in processes.

Poor property data is a handbrake on Māori prosperity

Stats NZ is undertaking a census transformation programme. This will see Aotearoa New Zealand move from in-person, labour-intensive census surveys every five years to a more regular, accurate and comprehensive collection of census-type information that is linked to administrative data already collected and held across government.

However, one respondent raised a concern that this approach contains a class-based flaw. The most deprived communities have little or no interaction with government systems. They are at risk of being missed because data infrastructure and technology at the time of our conversations didn't yet allow a full enough account for the realities of hardships on the ground.

For example, we heard that people living in hardship are disproportionately Māori. Stakeholders noted there are numerous underlying hurdles to simply calculate the size of this cohort.

- Many people are not interacting with the system. A lot of Māori youth leave school with no paperwork other than their record of birth and any childhood vaccinations.
- Significant numbers live in high deprivation areas. They may not have email, and may be transient, reside in unregistered dwellings, or live in communal dwellings on Māori land that is not subdivided.
- The hardest people to reach are living on 'land-locked' Māori land blocks, where administrative oversight has never established rights of way and, as a result, there's no address.⁶

Underlying all of this and further compounding issues is a distrust of government, stemming from a legacy of historic wrongs. The outcome is that marginalised people can't access support and services, and the demand for these is underestimated and mislocated.

"The vaccination roll-out showed that population estimates used by MoH were consistently underestimating the actual population in socio-economically deprived areas. This experience highlighted a lot of issues with the idea of an admin-data-led census." Central government stakeholder

People can be reached by forging relationships, but this is difficult when one doesn't know where to find them.

Drawing together feedback from the range of interviews, it seems that the property data system could address these challenges through two main avenues:

⁶ Which, as will be expanded on further below, is made even more important by the absence of other national property data.

- **Improvements to existing data** such as building linkages between the two Landonline systems, collaborating to refine the Māori Land Court and 'Māori land flag' records, extending rural coverage of high-resolution aerial surveying and building outlining, and ensuring all land is surveyed and has a parcel, a title and an owner (and manager where relevant).
- **Implementing new datasets** such as property IDs, building IDs, and a tenancy database. These would facilitate property and building identification without an address, and provide additional data reference points for connecting people to property.

Sourcing and integrating data

Both our survey and research interviews focused heavily on how property data is sourced and where the data comes from. This contrasts with the Channels Review which focused purely on how LINZ Data Service (LDS) data is accessed by our own customers and stakeholders, and broadens the scope to be system-wide.

This section has two parts:

Survey response – this steps through the survey responses to relevant questions about sourcing data, illustrated with graphs.

Data oligopoly – focuses on data market constraints in Aotearoa New Zealand, based on qualitative findings from interviews, supported by additional survey data.

Survey response

With regards to obtaining property information, survey respondents provided information on:

- how often New Zealand property data is being sourced
- the types of New Zealand property data being used
- where New Zealand property data is obtained
- the types of property data in use from the LINZ Data Service
- how Toitū Te Whenua property data sources are accessed
- the goals or purposes that New Zealand property data are typically being used for
- barriers to using New Zealand property data
- time spent on individual tasks in data projects.

How often New Zealand property data is being sourced

Figure 10 shows the largest proportion of survey respondents (41%) said they sourced New Zealand property data monthly. This was closely followed by weekly, on 34%. Yearly and daily frequencies both scored 15%, which were notably high proportions at each end of the spectrum.

Also fairly high is 'less than once a year', with 8% of respondents possibly only using property data for one-off projects that happened to fall within the 12 months prior to the survey.

Two percent of those who responded said that they never source New Zealand property data. These people may have created an LDS account within the past 12 months, had a browse, but haven't done anything further.

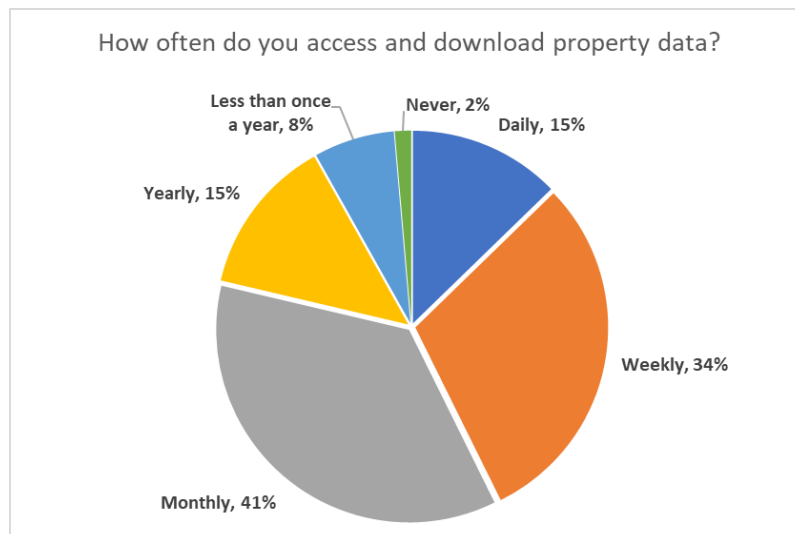


Figure 10: Frequencies that property data are accessed and downloaded by survey respondents.

Types of New Zealand property data being used

Parcel data is the most-used data at 16.8% of responses, shown in Figure 11, and memorials and railway data jointly the least-used at <0.1% of respondents. Improvements to the top 10 datasets would have the biggest impact for data users.

Consenting, valuation and sales data are notable for their high rate of use (places 8 to 10 respectively), despite having no central public source.

Similarly, Crown land and Māori data stand out for their high rate of use in the face of quality challenges. Some severe limitations were described by interview respondents for the latter, which are expanded upon later.

Otherwise it might be the case that lack of availability and completeness may be holding other property data back from more frequent use – in particular, aerial, LiDAR, ownership and historic information.

Types of NZ property data used by survey respondents
(Top 10 and Others)

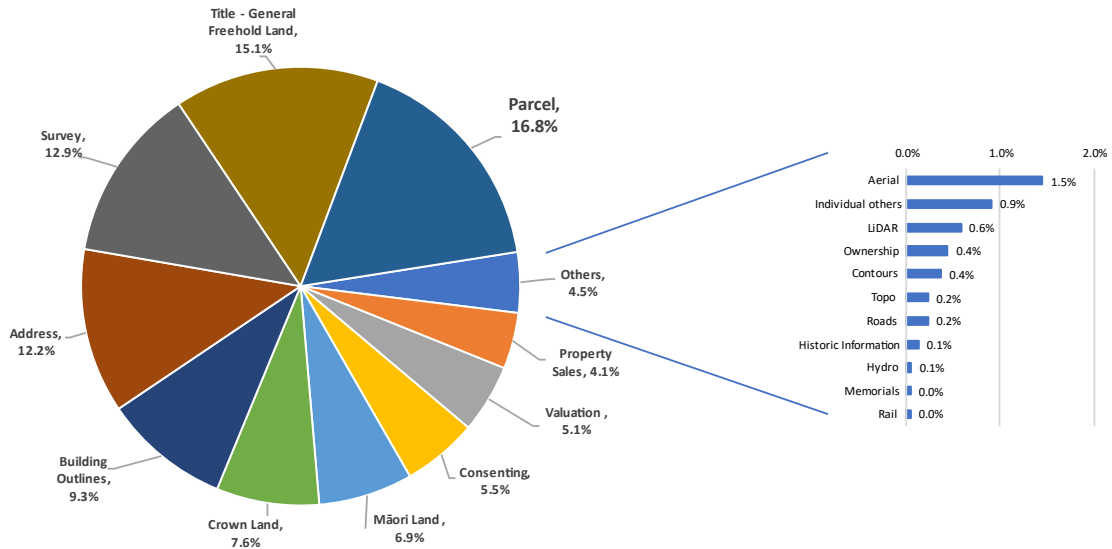


Figure 11: Survey responses about types of New Zealand property data used by respondents.

Where New Zealand property data is obtained from

Per Figure 12 below, Toitū Te Whenua owns the two most popular sources of New Zealand property data with 52% of responses split between LDS (35.8%) and Landonline (16.3%). These were followed by territorial authorities (Tas) on 11.7%. The most popular private sector provider is Koordinates (7.2%).

Where respondents' organisations are obtaining NZ property data from
(Top 10 and Others)

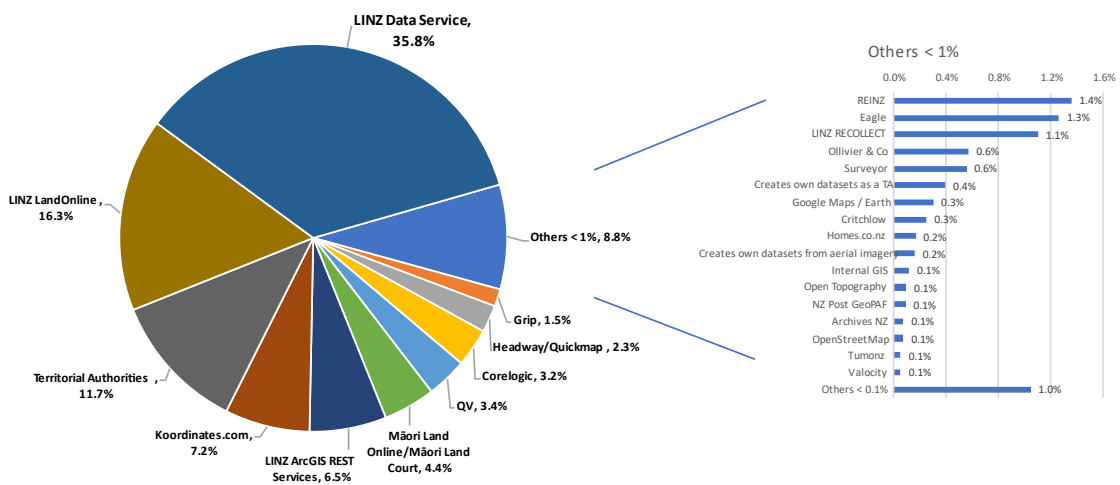


Figure 12: Where respondent's organisations are obtaining New Zealand property data.

It is worth noting that Toitū Te Whenua makes another entry in the top 10 (so three Toitū Te Whenua sources in total) with ArcGIS REST Services in fifth place on 6.5%. Another notable supplier is GRIP, in tenth place with 1.5%. This wasn't included as one of the 13 selectable options in the survey, and is a bigger data source than we were anticipating.

Property data in use from the LINZ Data Service

Of the eight Toitū Te Whenua property datasets to choose from, Figure 13 shows the majority of responses (31.8%) indicated use of the Simplified Property Ownership and Boundaries Dataset.

NZ Street Address (20.5%) is by some margin the most utilised of our three address datasets, with Aims Street Address and NZ Addresses (Pilot) taking the bottom two spots with 4.0% and 0.8%, respectively. We'll see later that this same ordering is reflected in users' satisfaction ratings of these datasets.

Otherwise the ordering of results roughly correlates to the broader question above around types of New Zealand property data in use. However, 12.8% indicate they are using the Full Landonline Dataset.

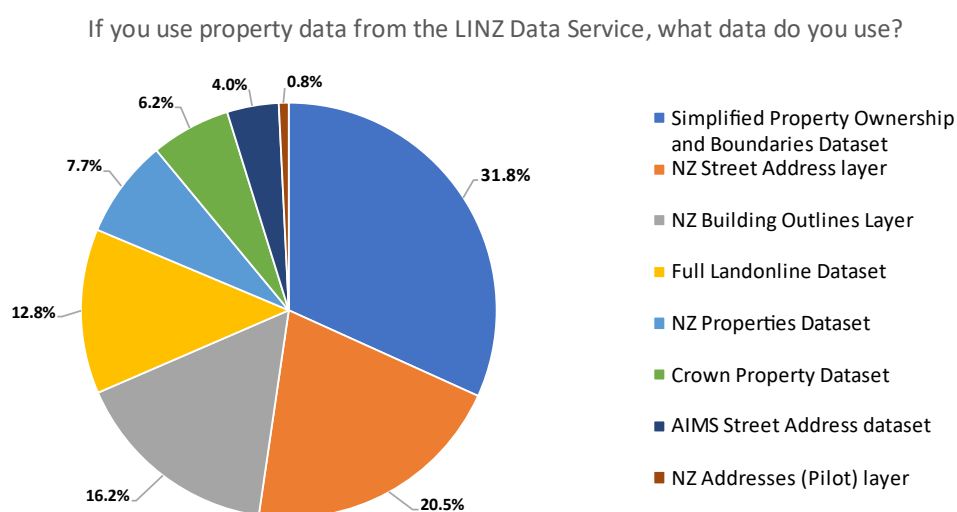


Figure 13 Property data used from LINZ Data Service.

How Toitū Te Whenua property data sources are accessed

The largest proportion of users (45%) indicated that they are downloading data files from Toitū Te Whenua sources, as shown in Figure 14 below. This was closely followed by those viewing data online, at 42%. Numbers maintaining/downloading through API/web services was 12%. Only 1% are still receiving data physically by USB or hard drive.

These results make an interesting comparison to the Channels Review, where only 16% of respondents indicated 'I view data', but a very similar 13% indicated they 'maintain a connection via API/web services'.

Statements that best describe how survey respondents access LINZ data sources

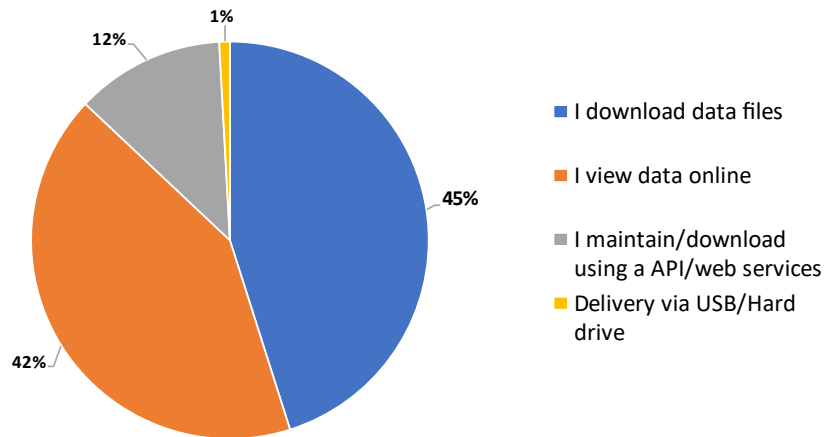


Figure 14: How survey respondents stated they access Toitū Te Whenua data sources.

The goal or purpose that Toitū Te Whenua property data is typically being used for

Four physical and closely related activities dominated the top responses: land planning (17.4%), land development (16.6%), environment land management (12.6%), and surveying (11.5%). See Figure 15 below.

Most of the remaining top 10 activities are taken up with basic property industry activities: asset management (8.5%), buying/selling land (5.9%), property valuations (5.6%), and real estate (3.1%).

A few unanticipated uses that were registered through comments were genealogy (1.61%), fraud detection (0.62%), and acoustic engineering (0.04%).

What goal or purpose are survey respondents typically using NZ property data for? (Top 10 and Others)

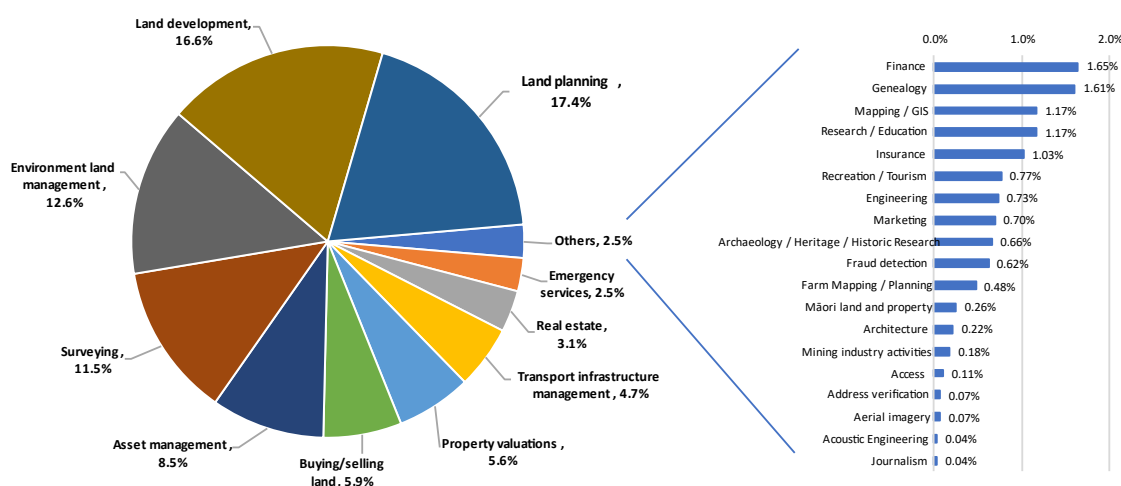


Figure 15: What New Zealand property data is typically being used for.

Barriers to using New Zealand property data

In Figure 16, we can see that accessibility (12.74%) was flagged as the biggest barrier to using New Zealand property data, and only 1.74% of respondents felt they had no issues using data.

The proportions of respondents facing accessibility (12.7%), understandability (12.6%), completeness (12.6%), and integration with other data (12.2%) barriers are essentially the same.

Respondents who noted size of data as a barrier (10.3%) are likely referring to the limited ability to pre-filter data (such as looking only at a particular territorial authority area) and significant time required to download.

Lack of people and technological capabilities, while relatively low-ranked, are nevertheless significant factors at 5.4% and 6.5%, respectively.

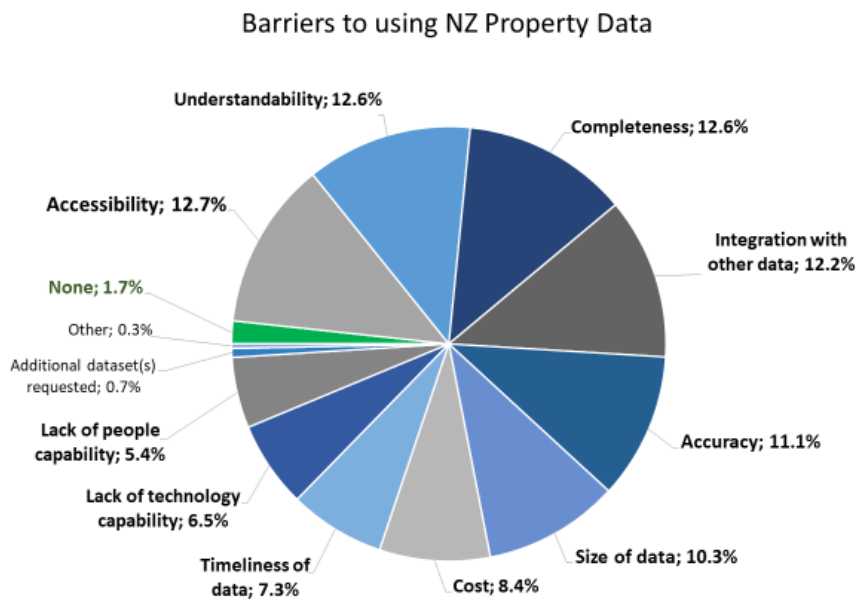


Figure 16: Ranking of barriers to using New Zealand property data.

Time spent on individual tasks in data projects

Following from the above, this question attempted to quantify the day-to-day impact that these barriers have on people using New Zealand property data.

Responses visualised in Figure 17 indicate that only 26% of the respondents' time is spent putting data to productive uses. Conversely, 74% of time is spent unproductively across a variety of tasks to do with obtaining and manipulating data.

This becomes more concerning when combined with findings above about a lack of people and technology capabilities. These results appear to show that GIS skills are in short supply and too much time is spent unproductively acquiring and then manipulating data to work together.

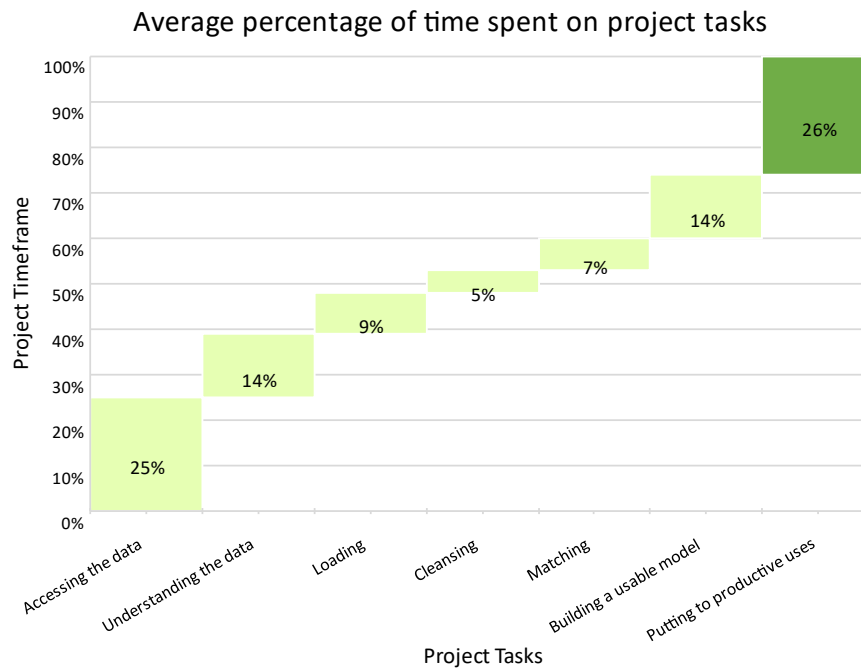


Figure 17: Waterfall graph showing time spent on data project tasks.

Interview insights

Acquiring property data from Toitū Te Whenua

Broadly speaking, interview participants were positive about Toitū Te Whenua and our provision of data for public consumption. Stakeholders with international experience said that Toitū Te Whenua and the LDS stand out compared to overseas equivalents. Our Amazon Web Services (AWS) S3 buckets available through LDS received strong positive feedback.

That said, there is also room for improvement. With such large volumes of data available we heard it is hard to find datasets unless users know what they are looking for. It seems that Toitū Te Whenua can do better when it comes to data change/update notifications for customers, and for advertising our various products and channels.

Customers told us they want to livestream data and ingest services, rather than have to download and hold data. While the LINZ Data Service makes data freely available at source, current access options can create significant cost burdens associated with managing data downloads, storage and interoperability.

One customer told us that their monthly download from LDS takes 11 hours, setting up a Web Feature Service (WFS) changeset proved too unreliable, and they hadn't been aware

of API options from LDS. Another commented on what must be enormous sums spent across the country purchasing hard drive storage for data downloads.

In terms of cost, time, productivity, sustainability, data currency, and security risks, current methods appear problematic.

Resource constraints

Resource pressures on local government mean that their capability for dealing with large property data issues varies hugely. Councils have traditionally relied on a few key geospatial data providers to cover this gap. Central government and the private sector are similarly reliant on a few commercial providers of bundled property and other data up to national scale, at great recurring expense.

"[There's] nowhere that you can get full and complete property data, always have to go to multiple sources, and even then it's never complete. So this compels a lot of thinking about integrity of the data and whether it can be trusted for decision making." Central government stakeholder

Our conversations with local and central government stakeholders repeatedly highlighted the similarities of goals and purposes across the landscape, and in equal measure the differences in process. Everyone's using the same data to do very similar things in different ways, creating what was described to us as, 'incredible amounts of data duplication across government with tricky rules around access and sharing, MOUs, control, and risk management.'

Further to this, we were told lack of data causes huge waste across the geospatial industry with superfluous processing. Stakeholders from a central government agency told us their Intelligence team would become redundant if more, and more useful, property data products were available.

In other words, these roles exist to make up for gaps and shortfalls across the property information system. With no single authoritative source of property data, users have to build up and blend data from different sources to get as accurate a picture as possible. This is time-consuming, error-prone, expensive and more technically challenging than it needs to be.

Substantial sums are being spent across the industry to obtain data and then integrate this into the receiving GIS system. The private sector seems more experienced at forming reciprocal 'data partnerships' to increase access and also improve data quality. This is something Toitū Te Whenua is also successfully pursuing, forming agreements with local councils to share their DVR data in return for the NOC service, data quality improvements, and making new national datasets available to the public sector.

Both local and central government stakeholders expressed desire for more pre-packaged property data services. Comparing notes from across the industry, it does seem that there

is potential for new data channels and packages tailored to specific sectors and end-uses. These might include bundles of property data layers most frequently used by the target sector, in formats more readily usable within their GIS systems.

Respondents also encouraged Toitū Te Whenua to be a more proactive and collaborative spatial leader for Aotearoa New Zealand and New Zealand Inc. Returning to the opening points of this section, this seems to be nowhere more needed than across government. Both local and central government are experiencing severe resource constraints and mounting expectations.

Toitū Te Whenua is highly regarded, and we seem to be in a good position to build on existing relationships across government. There is an opportunity to work together to relieve some of the data burdens we face by delivering improvements across the property information system.

Data oligopoly

We heard from customers that Aotearoa New Zealand’s property data market does not have the optimal conditions required to flourish. This is especially the case with regards to property sales and valuation data. This data is of national importance given the size of our property economy and its associated challenges.

We heard that this data is not easily available for a wide range of stakeholders conducting research, creating policy and making decisions that will impact the public good and New Zealanders’ wellbeing. There is also significant unrealised potential for innovation and benefits for New Zealand Inc that are being blocked by lack of public national data.

Sales and valuation data stood out as being particularly problematic at the time of these conversations. At that time there were no publicly available national dataset for either, leaving third parties to partially and inconsistently fill the data gaps left by government, for significant cost, to the detriment of innovation and the public good.

Toitū Te Whenua has since made national DVR data available to central and local government, enabled by implementing data sharing agreements with all 67 local territorial authorities. Sales data remains in a relatively inaccessible state at time of publication.

This is a salient issue across the public and private sectors. These datasets were among the most discussed in interviews, ranked first and fifth, respectively. Survey responses reinforced this with sales and valuation ranked poorest with regards to fulfilling business needs (see Figure 20). Interviewees were unanimous in calling for Toitū Te Whenua to make both publicly available.

Tooltip: Users can either filter by keyword(s) to see which interviewees mentioned those keywords. Or, filter out the blanks under a particular customer or stakeholder to see what topics were discussed in their interview.

Keyword	Customer/Stakeholder 1	Customer/Stakeholder 2	Customer/Stakeholder 3	Customer/Stakeholder 4	Customer/Stakeholder 5	Customer/Stakeholder 6	Customer/Stakeholder 7	Customer/Stakeholder 8	Customer/Stakeholder 9	Customer/Stakeholder 10	Customer/Stakeholder 11	Customer/Stakeholder 12	Customer/Stakeholder 13	Customer/Stakeholder 14	Customer/Stakeholder 15	Customer/Stakeholder 16	Customer/Stakeholder 17	Customer/Stakeholder 18	Customer/Stakeholder 19	Customer/Stakeholder 20	Customer/Stakeholder 21	Customer/Stakeholder 22	Customer/Stakeholder 23	Customer/Stakeholder 24	Customer/Stakeholder 25	Customer/Stakeholder 26	Customer/Stakeholder 27	Customer/Stakeholder 28	Customer/Stakeholder 29	Customer/Stakeholder 30	Customer/Stakeholder 31	Customer/Stakeholder 32	Customer/Stakeholder 33	Customer/Stakeholder 34	Counts	
Sales	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	25	
Ownership	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	24
Crown	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	21
Owners	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	21
Value	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20
Māori Land	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20

Figure 18: Interview keyword matrix with 'sales' and 'value' highlighted

Sales data

New Zealand's economy has been characterised as an oversized property market with other bits stuck on. Authoritative sales data is therefore highly sought after by anyone interested in New Zealand economic analysis.

With no public data or official property price indices, government and the market rely on sales data provided by commercial parties – principally aggregators such as Quotable Value (QV), CoreLogic, and the Real Estate Institute of New Zealand (REINZ). The relevant statistics from our survey responses are visualised in Figure 20.

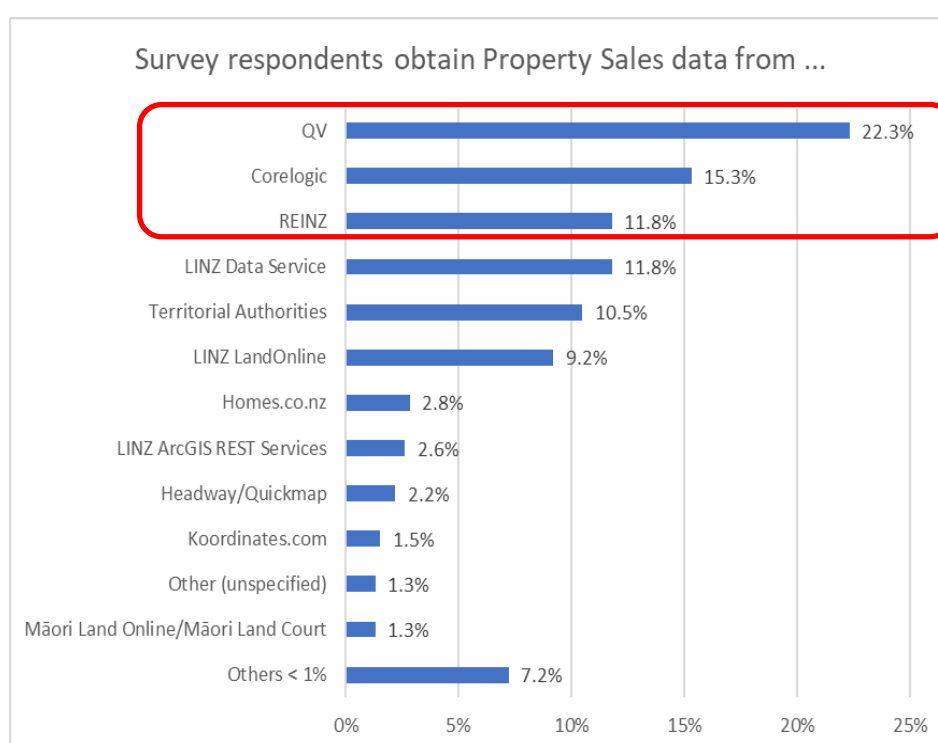


Figure 19: Where survey respondents obtain property sales data.

It seems likely that QV was helped to this position by two factors:

1. A significant proportion of respondents work for local territorial authorities (TAs). TAs nationwide contract QV to maintain their district valuation rolls (DVR), for which sales values are a key component.
2. QV's 'SalesDirect' product, decommissioned in mid-2023, allowed solicitors to provide unconditional sales information to QV. However this may have been viewed as double-handling, and we cannot verify how many solicitors did in fact provide information prior to settlement.

QV's position may have changed since this survey was completed in May 2022, when only 60% of TAs were receiving sales updates via Toitū Te Whenua's Notice of Change of Ownership (NOC) service. At the time of publishing this has increased to 100% of TAs, rendering SalesDirect redundant and so shut down by QV. However, as Toitū Te Whenua neither stores nor publicly releases sales data transmitted via NOC, a reduced position for QV would seem to only serve to strengthen the market position of REINZ. It would be insightful to reassess market conditions with a repeated survey.

REINZ certainly still benefits from advanced notice of unconditional sales. We heard that real estate agents are required to provide this information as a condition of their membership. This data is then used for market statistics and commentary, and is sold to the market.

As far as we can tell, CoreLogic does not enjoy the same early notification of unconditional sales information. Its high market position seems to be a result of how the sales data it provides can be bundled with many other property (and other) datasets that CoreLogic works to obtain from a wide array of sources.

Sales data does not meet needs

Figure 21 shows that survey respondents do not believe that property sales and valuation data fully meet their business needs. It was suggested by interviewees that it would be enormously beneficial if Toitū Te Whenua could collect sales value data, make this publicly available, and establish an official New Zealand property value index.

The Ministry of Housing and Urban Development (HUD), for example, needs to be able to report to government where cohorts such as investors and first-home buyers are more or less active, what they are spending (and borrowing), on what types of property, and so on. This data is critical for setting price caps that become public policy and part of government obligations, but the data is incomplete so they need to make assumptions.

Another major government need for sales data is accurately calculating tax obligations, and ongoing work to build a more complete picture of wealth in Aotearoa. This task becomes more complex as property tax rules themselves become more complex, for example the bright line test and incentives for new builds. The data needed to build a complete picture of New Zealanders' relationships with property is therefore becoming much more multifaceted, with full sales history needed as the linchpin.

It is especially important to be able to model and explain how and why these dynamics are changing over time. Consistent long-term data allows impacts analysis of policy changes such as special housing areas, tax rules, lending rules, urban development rules or infrastructure funding.

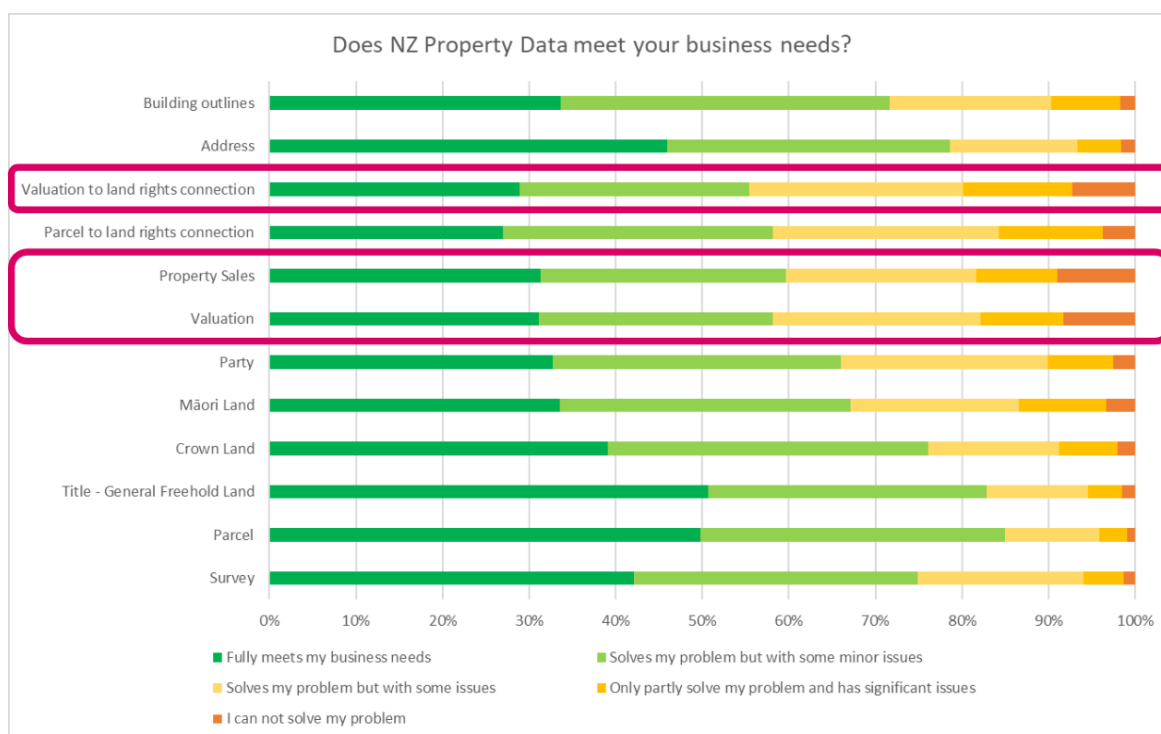


Figure 20: Results for the question 'Does NZ Property Data meet your business needs?'

Sales data is very slow to market

Poor timeliness of sales data was reported to be a significant, market-wide problem. We heard that data needs to be fed into the market as quickly as possible. It was stressed that data made available months after the fact isn't just late, it's wrong.

The industry experts we spoke with estimated that making data publicly available on the date of settlement, as soon as the transfer of title and change of ownership is received by Toitū Te Whenua, would bring forward the currency of data in market by about two or three weeks. Further to that, Toitū Te Whenua was also encouraged to investigate whether data can be made available when sales go unconditional, and with individual privacy protected, rather than waiting a month or until the end of a farming season for sales to settle.

One valuation firm provided a broad list of benefits from making public sales data available earlier:

- Central and local government, especially the Treasury and the Reserve Bank, could increase the accuracy of market information with reduced latency.
- Ratings valuations could provide more complete information to the market in a much fairer and more efficient way.

- Data used for banking and lending industries would benefit from improved data feeds that are vital for automated valuation tools and models, saving them and their customers time and money.
- Market insights and analysis, especially in more dynamic property markets, would be improved by early analysis of sales data that would ensure market movement and trends are accounted for.
- Professional service industries, primarily the valuation profession for whom this data provides essential evidence, could provide better service, which would have significant benefits for their clients and the public.

Valuation data

Sourcing valuation data is expensive and fraught with difficulty

"Most expensive public data in the world." Proptech company

Respondents expressed their views that DVR data is nationally critical, yet highly disparate, of widely varying quality, and expensive. Broadly speaking, customers for this data have two sourcing options⁷ in a market oligopoly:

1. **Forging relationships with up to 67 local territorial authorities (TAs)**

We heard that the total cost of data purchased was approximately \$800,000 per annum, and it takes many months to contact and secure agreements from all 67 TAs. Respondents said that considerable time is then spent reconciling format variations between TAs' data, correcting errors, and matching with Toitū Te Whenua title and survey data.

While some are grouped, such as Waikato Local Authority Shared Services (WLASS, rebranded as 'Co-LAB') and Bay of Plenty Local Authority Shared Services (BOPLASS), this only slightly reduces the total number of negotiating parties for little benefit.

We heard that WLASS, for example, charge three times more than other TAs for data of no better quality and with strict limitations on end use. One third-party aggregator stated that they have at times resorted to omitting WLASS from otherwise 'national' valuation datasets provided to their own customers, having found them simply too expensive and difficult to deal with.

⁷ From the point of view of the general public and commercial data users. As noted earlier, local and central government customers and stakeholders have access to Toitū Te Whenua's restricted access NZ Properties dataset, which is an output of the NoC and Property Spine projects. However, this does not yet fully replace the need for some to purchase DVR from commercial sources.

In addition to contracting TAs for the DVR data, customers then also have to contract QV to actually supply the data, paying twice for the same data.

2. **Contracting to a commercial third-party data aggregator**

Using a third-party aggregator has the benefit of providing a single source of data nationwide, saving time compared to option 1. However, it comes at significant recurring cost, estimated to start at around \$1.2m to \$1.5m per annum. Again, end users felt this has little benefit in terms of data quality and interoperability, and has hooks attached for its use.

We heard that commercial data suppliers can restrict how clients use the data provided. Any new use case that strayed from those specified in the supply contract would require renegotiation at significant time and expense.

Government stakeholders in particular expressed dismay at not being able to share data with other government departments. One stakeholder told us about a situation where two agencies were collaborating on a project and both had to buy the same dataset from a third party supplier.

This means that the Crown is paying multiple times for the same data, the creation of which is publicly funded in the first place. In some situations smaller and 'public good' projects have had to be abandoned on cost grounds.

"[It] truly offends me to have to go to CoreLogic and buy that valuation data." Central government stakeholder

Whether sourcing from TAs or third-party providers, respondents felt the cost of DVR data does not reflect its quality and is highly prohibitive for innovation.

"...but it's too expensive for some Vic Uni maths whizz to put together a better model and sell it. No innovation. High prices. We get what we get." Central government stakeholder

End customers we spoke to felt that uncertainty about who owns additional data attributes maintained by councils, and metadata (such as the date the ratings assessment was created, and the history), causes sticking points for contract negotiations. If the metadata isn't available then creating historical snapshots in particular becomes much harder.

What's more, we heard that errors introduced by individual valuation service providers can cause major market disruption. Providers may come and go, leaving gaps and issues that we were told can take up to a decade to resolve.

One of the third-party data aggregators we spoke with expressed their strong support for Toitū Te Whenua making the data publicly available, despite the impact this would have on their business, because it is simply that nationally important to do so.

“It is very expensive to buy data in New Zealand, and it takes a lot of work to make it usable. This makes entry to market extremely difficult and makes locally-focused enterprises unviable – it’s all of New Zealand or bust.

Contrast to New South Wales (NSW) in Australia where data is made freely available, there is lots of innovation churning through and companies usually start out in NSW before expanding into other states.”
Property data industry stakeholder

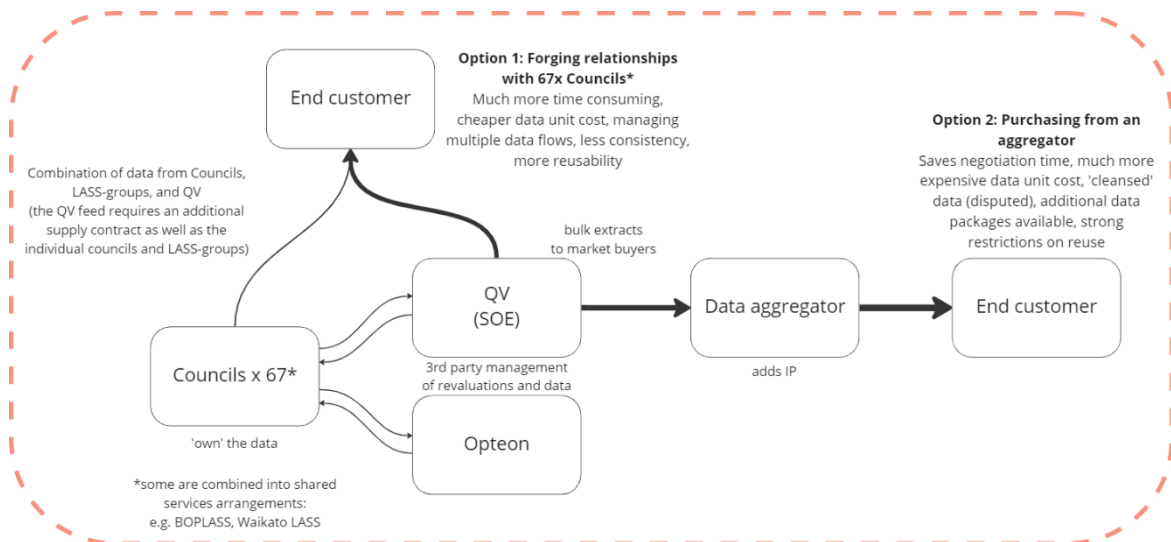


Figure 21: Data flows across the DVR market (excluding Toitū Te Whenua and the Treasury regulatory aspects). (Source: author's own)

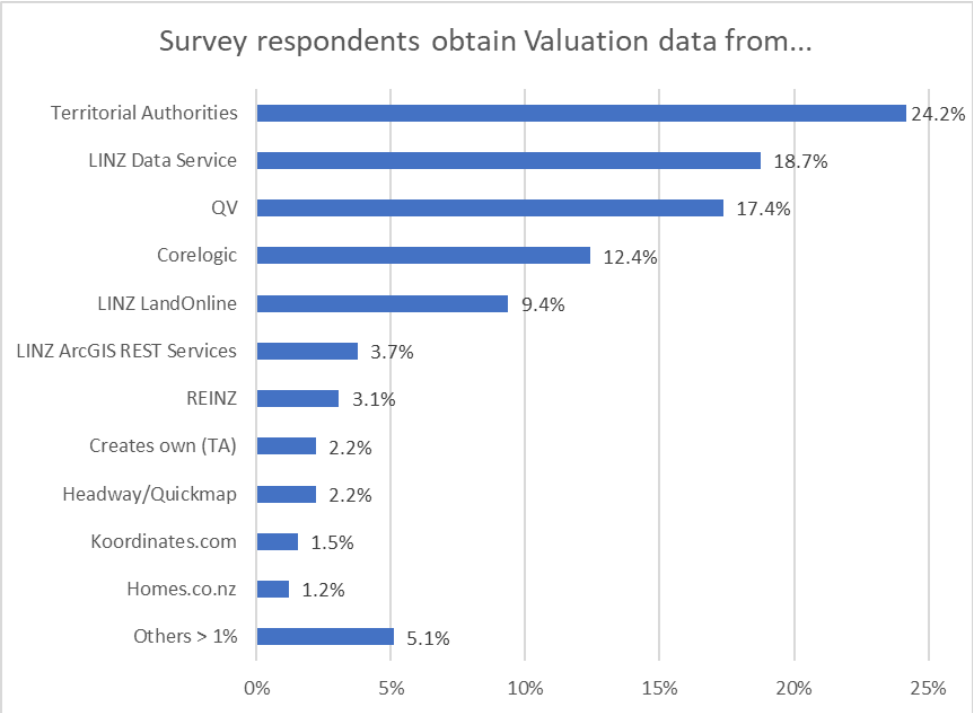


Figure 22: Where survey respondents are obtaining property valuation data.

Systemic improvements – data stories

Many datasets mentioned were not in the original Toitū Te Whenua-centric scope for this review. Respondents made the case that these data are all property data because they are all essentially connected to and contingent upon property – a property ecosystem approach – and Toitū Te Whenua is the best placed and logical agency to lead work in these areas.

[LINZ should place greater focus on] “property, not just land” ... “and everything that connects to property” Geospatial consultant

These improvements are labelled ‘systemic’ because issues with these data create significant barriers for public good, government transparency, informed decision-making at all levels, and innovation. All the following datasets would benefit a range of sectors in different ways.

The collective research interviews illustrate the transformative potential of property data for Aotearoa New Zealand. Each new and improved dataset brings immediate benefits in itself, and often to multiple stakeholders, while also enabling powerful new opportunities when connected up to other data.

DVR papering over gaps elsewhere

The range of data captured within DVR is also fundamental for a host of other activities, beyond its original design intentions. The land use data, for example, is critical for economic and policy analysis across many sectors. Another growing use is climate change adaptation, where understanding who lives where and what they’re doing with land is vital to being able to plan and support managed retreat.

“The valuation data [...] has all kinds of things that [we] can't get any other way. Specifically, land uses, council zones, land value, improvement value and the nature of those improvements, which are really useful for characterising land resources, particularly in rural areas.” Environmental researcher

Respondents working in these other areas highlighted shortfalls in the DVR for their uses. However, this raises the question of whether DVR should be so relied on for broader uses beyond its mandated purpose, and whether valuers can and should realistically provide data to the increasing level of detail and currency demanded.

As DVR is being used because other, more targeted datasets don’t (yet) exist or aren’t in a nationally complete or accessible format, it may make better sense to create or improve these more targeted datasets by other means such as building information modelling (BIM) and farm plans.

This would both provide fit-for-purpose data, and benefit DVR as the added data points could be interlinked (for example, through Property Spine) and employed co-constructively to reinforce and update the quality and accuracy of valuations.

Locating property

Locating property is fundamental to modelling and fully understanding it. However, our abilities are currently limited by lack of data, so address is used as a proxy. This is highly problematic as addressing data itself needs improvement and on its own simply cannot provide a single, consistent data framework to identify, locate and connect property.

Here our customers make a case for additional property identification data, property IDs and building IDs, to complement and unburden address.

Optimism for 'NZ Properties' – connecting data to place

At some point the data employed for almost any kind of policy and decision-making will need to be tied back to property as the first and foremost way of defining place. Stakeholders described the work Toitū Te Whenua is doing to bring together DVR as being incredibly important.

We consistently heard from interviewees that significant effort is required to match up intersecting datasets before any valuable use can be gained. A source from one government agency said they simply couldn't afford to hire GIS specialists who would spend most of their time manipulating data to make it useful.

Since late 2023, local and central government stakeholders can now access a national DVR dataset from Toitū Te Whenua – the 'NZ Properties' restricted dataset. This had been long sought after, and work is ongoing to continually improve this data to reduce reliance on commercial third party sources. Additional derivative datasets are also being made available under open access creative commons licencing.

This was not fully available at the time of conversations for this review. At that time, three separate agencies said they had hoped this national dataset would be available sooner to allow use on then-current projects. Some had urgently purchased updated data from a commercial provider at considerable (and ongoing) cost.

Toitū Te Whenua was encouraged to add to this dataset by acquiring the historic DVR data from QV. This data is valuable for exploring changes to land use and value over time. For example, HUD wants to look back to before the 2008 Global Financial Crisis and take in substantial policy changes such as the creation of Special Housing Areas.

Acquiring this data was estimated by one respondent to be equivalent in transformative impact to scanning all the historic survey and title information into Landonline.

Addressing

There is no reliable, authoritative source of truth for addressing data in New Zealand to meet essential requirements. There are many datasets in play both in the government and private sector, with different levels of quality and completeness.

This means agencies or companies must aggregate and compile address datasets, and set up matching processes of their own or buy these from third parties. This causes system-wide inefficiencies and interoperability barriers.

Addressing was among both the best and worst ranked of Toitū Te Whenua's property datasets surveyed (see Figure 23 below).

NZ Street Address ranked the best of three datasets, and had the strongest agreement rating of all our datasets at around 80%.

NZ Addresses (Pilot) was rated the worst of all our datasets polled, with positive feedback around 50% to 55%.

This result seems odd because, at face value, NZ Addresses is a more complete dataset. One obvious factor is that was still in pilot with very limited use at the time of survey. Further engagement with customers would be needed to understand this seeming anomaly.

Middle-ranked AIMS Street Address had average positive feedback and was notable for having zero 'strongly disagree' responses for availability and understandability.

Across all three datasets, accuracy and completeness ranked the poorest out of six functionality categories.

Besides Toitū Te Whenua, it was noted that address datasets are variously available from NZ Post, here.com, TomTom, Fire and Emergency New Zealand, and some councils. This data has varying levels of quality and completeness, differing formats, cost, and so on.

Generally, our work to improve address data was widely acknowledged and appreciated, in particular in relation to the timeliness of new address creation with councils. We heard that coupling new address data with sales values would be very helpful to those who monitor market trends and tax.

Respondents encouraged Toitū Te Whenua to take greater leadership in setting and enforcing addressing standards. We were asked to work more closely with councils to reform and improve the address-designation process, including educating developers, so this was done correctly more often.

To further aid this it was suggested that Toitū Te Whenua work to establish a national 'proposed properties' dataset, the thought being that a joined-up central and local government approach to spatial planning would enable greater transparency across the property ecosystem. Third parties are bridging this gap by forging data partnerships with

utilities companies who, for their own business planning requirements, have knowledge ahead of the market on where new developments are taking place.

Local government discussed the merits of implementing a more comprehensive and inherently spatial system, looking to European models as examples. Central government stakeholders also noted several systemic gaps in high deprivation areas and on Māori land blocks, which is expanded on later.

Local government respondents from larger metropolitan areas noted that single buildings can have multiple addresses, a single address can have multiple buildings, and a single property can have multiple buildings and multiple addresses. It was felt that comprehensive addressing in combination with property IDs and building IDs would accommodate properties having multiple access points for various functions.

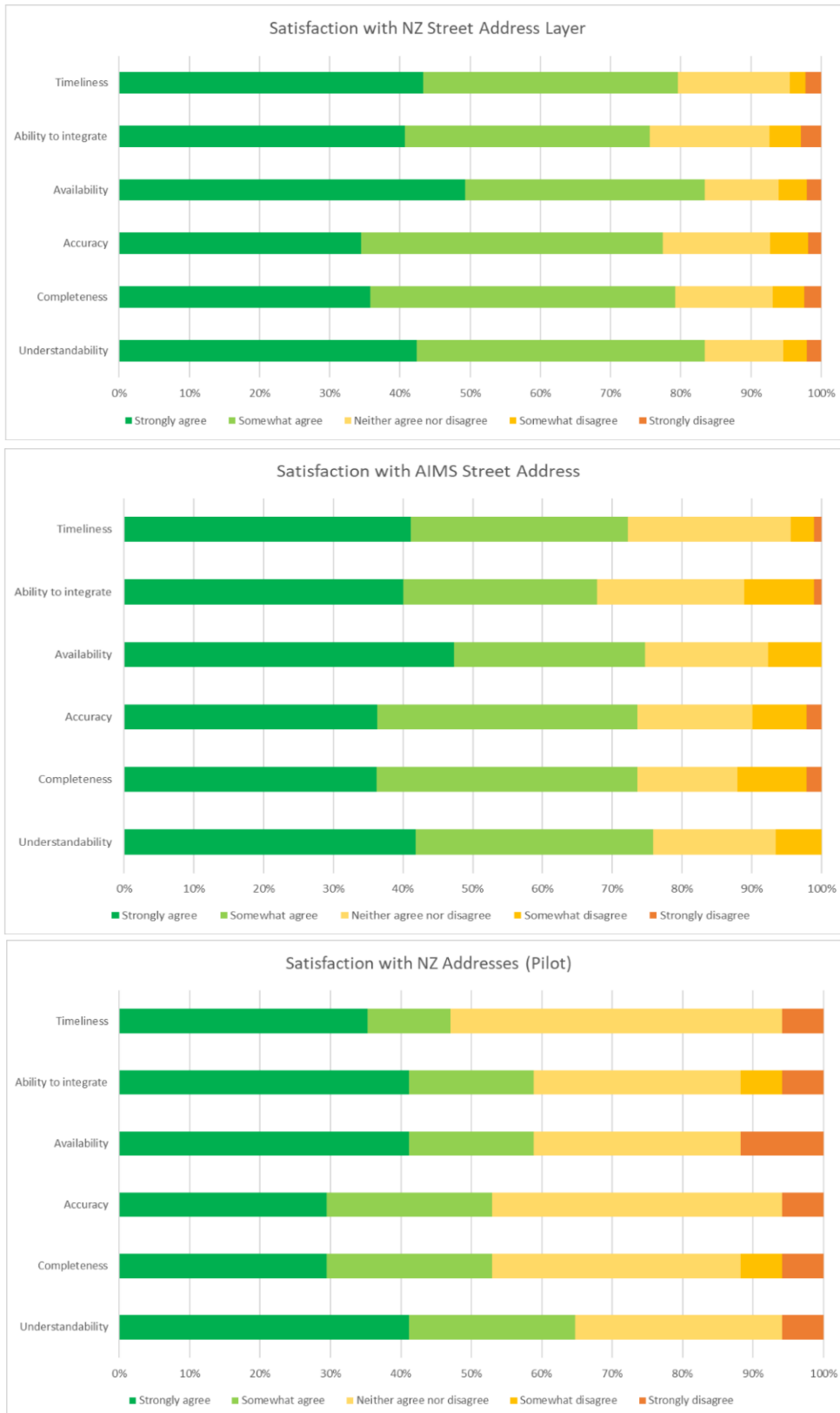


Figure 23: Survey results showing satisfaction with Toitū Te Whenua's addressing datasets - AIMS Street Address, NZ Street Address, and NZ Addresses (Pilot).

Property IDs

At the time of these customer conversations, there was no national property identification system in Aotearoa. Property ID datasets weren't originally 'in scope' for this project because they don't exist yet, but they are included now based on the strong customer feedback received.

"Currently, addresses are used as a fallback key to a property because no nationwide standard for Property IDs exists." Geospatial consultant

In another public data vacuum, various third parties such as QV, Valocity, and CoreLogic have created their own property ID systems – for example, QV have QPID (QV Property ID). As with other third-party datasets, we heard that these have questionable coverage and accuracy. This makes them difficult to combine with other data and calls into question the validity of official data that doesn't match purchased data.

We heard that property IDs would be helpful for:

- replacing street address as a unique and linkable identifier of property
- enabling tracking changes to land and property over time, for:
 - consenting
 - tax – taking a cohesive property view (we heard that IR spends a lot of time trying to match up assemblages of individual titles changing ownership)
 - land use
 - fragmentation of land and property through repeated subdivisions
 - urbanisation of land and the peri-urban fringe
 - ownership trends (such as owner-occupied, investments, or Māori).

Building IDs

It was expressed to us that a national building ID dataset implemented in a parent-child hierarchy with property IDs would allow anyone to distinguish between multiple buildings on a single property.

There are many scenarios where this could be employed, ranging from a dwelling with separate garage up to universities, apartment complexes, retirement villages, industrial sites, farms or ports. These properties can have multiple buildings, places and entrances all at the same address.

More significant gains could be had in enabling a digital transformation for land development. We heard from some local government stakeholders that building consents and work are allowed to begin before the subdivision is fully resource-consented⁸.

"[Section 223] is a major problem for all councils. There is a disconnect between action and records. When a new section is approved, it can be [building] consented and works start before the title(s) and address(es) are issued. Councils either have a 'to-be-named' road if they use roading IDs, or make up a name and use the lot numbers, or 'there's a red flag on the gate' in the description." Geospatial consultant

Establishing national property and building IDs are critical for improving the fraught Section 223 subdivision application process. It needs something much more robust and less error-prone that allows a digital-first approach to streamlining consenting and property development.

A national property and building ID dataset would also unlock innovation as a critical enabler for developing further property and building-related datasets and models. These are elaborated on below.

For the time being, workarounds have been implemented to try to smooth the scale and complexity of their consenting workload. Faced with town-sized projects, a template approach is taken where a single consent can be duplicated across multiple (up to hundreds of) identical buildings or units in a development.

Of course, many issues can arise through the construction process, leading to significant volumes of consenting records needing to be reconciled and reworked. The first challenge is to accurately identify which building/consent is affected.

For new residents caught up in an administrative quagmire this can be incredibly frustrating, preventing deliveries and access to public services. We heard from one stakeholder that their daughter in a new-built Hobsonville dwelling still didn't have an official address two years after completion.

"Council haven't issued the official address because Auckland Transport are in dispute with developer about driveways. Told her to go to NZ Post [and tell them], 'got a new letterbox and this is my address', NZ Post entered the new letterbox address in their system and then Chorus installed the fibre."

⁸ Resource consents are split into a land-use consent and a subdivision consent, done in parallel. The land-use gets approved on the assumption that the subdivision consent will go through and allows developers to start building. The land-use consent contains all the permissions, and the subdivision consent contains all the compliance activities around electricity, pipes, etc., but once the land-use consent is given that's the go-ahead to build.

This introduces potential for conflicting address data problems, undermining the accuracy, confidence in and usability of public data. If every building could be given an ID at the consent stage this would keep everything connected.

Missing pieces

There are big gaps in property data available for Aotearoa New Zealand. A lot of property data is simply not available. A lot of data is not publicly available, either not at all or not from a centralised source.

Data customers are compelled to purchase data from third-party providers that have filled some of the gaps left by government.

Building information models and database

There is no centralised building information database, and the only source of building information is the DVR. This information is partial, incomplete, and in many cases out of date. Creation of a national building ID dataset mentioned above, along with common geospatial standards, would be key enablers for the uptake of standardised building information models (BIMs) and the creation of a national database.

We were told that the University of Auckland and four large metropolitan councils (Auckland, Christchurch, Wellington and Dunedin) are studying this issue with a focus on meeting regulatory requirements so that BIMs can be used in the consenting process.

Two of these councils said that BIMs are already in common use by larger engineering and construction firms, who have taken up these technological innovations before there is any national direction on their use. This lack of coordination creates challenges for individual councils in deciding what new technological capabilities and skills are required to be able to accept and process these models.

These challenges will increase when extended to smaller businesses and councils as planning and consenting processes are digitised, and BIMs become standard practice. Nationally consistent standards will help this digital transition, and Toitū Te Whenua was encouraged to lead the establishment of geospatial standards relating to BIMs.

Multiple uses for these were flagged through our research.

- Councils, MBIE and the construction sector could streamline consenting processes. This requires the implementation of construction regulations and geospatial data standards into BIMs already widely used across industry.
- Fire and Emergency New Zealand would gain valuable intelligence from understanding the materials used in a building (the 'fuel mix'). Floor maps would help in evacuation and rescue, swimming pools are a possible water source, while retaining walls and brick chimneys are earthquake hazards.

- For health and wellbeing, the quality of housing stock, factors like building materials, insulation or glazing have a profound impact on New Zealanders' lives. Relatively cheap and targeted interventions enabled by data can have hugely positive returns on investment. Aspects like ventilation and air quality have become especially vital and will remain a widely applicable issue for the long term in light of the COVID-19 pandemic.
- For parties working in climate change, building information is critical for calculating building efficiency, and housing is a big contributor to emissions. Stakeholders are seeking more and better property information about embodied and operational footprints.
- For the insurance and finance industries, better data would inform the cost of building replacement, enable calculation of risks to their respective portfolios presented by climate change, and guide individual insurability and lending decisions.
- BIMs would help in environmental monitoring and interventions. For example, stormwater management is an increasingly salient issue with the growing frequency and intensity of climate change-amplified rainfall and flooding events.
- In terms of runoff, knowing the roofing materials and conditions of properties within a catchment area can also be useful. As a geospatial consultant we spoke with noted, it can be cheaper for council to pay for a roof to be repainted than to treat the water downstream.
- For Police, building heights would be useful for operational intelligence and planning. For tactical responses and public event security, building heights and 3D outlines dictate lines-of-sight, and it is not always possible or safe to confirm these 'on the ground'.

Resource and building consents, and council code of compliance

There are no centralised databases for either resource or building consents, and we have been told that national building consent data is only available from a single private source, based in Australia.

Unsurprisingly, this data is expensive and this is a significant barrier to access and use. Engineering/infrastructure sector respondents' projects often cross multiple properties and TA boundaries. Their ideal state would be to have resource consents linked to property boundaries, and a full consenting history subsequently publicly available for any property. This would save having to source very mixed quality information from multiple TAs.

With the move to a 3D cadastre within the next two years, it will be important to have resource consents and histories linked to these 3D property parcels. If there are resource consents relating to a number of floors on a property then it will be enormously useful to be able to visualise this and the impact of a project.

A public national consenting information database should also extend through the inspection stages and ultimately council code of compliance (CCC). One of the data aggregators we spoke to said that this information would have a huge impact across industry. It would be useful to a range of industries and organisations, including:

- valuers who are conducting 'as-planned' and 'as-built' valuations of a property
- lenders who are financing the build and then mortgaging the finished property
- insurers who are covering both the build and finished property
- IR, who use the date a CCC is issued as the key measure for the five-year carve-out from bright line testing for new builds
- HUD, which would be able to report basic house completion statistics to its minister, a task which currently can only be done through inference, if at all
- MfE and MBIE, as the respective regulators, with national monitoring and reporting requirements.

Lack of consistency across councils is seen as the biggest impediment, and an area where Toitū Te Whenua can collaborate with local government to establish common standards compatible with other property data.

It was suggested in the interim that CCC could be included under new valuation rules as a standard piece of information to be collected when new properties are first valued as built.

Network infrastructure and utilities

Property is physically and essentially connected to infrastructure and utilities, directly connected to roads, rail, power, waters and telecoms. In rural areas this extends to agricultural infrastructure like irrigation and effluent disposal. These things exist in large part to service property, enabling liveability and productive uses, and adding value.

"Three waters, electrical, telecoms. Everything that makes up the picture of not just property, but your home and everything that it's connected to. Nobody builds anything without supporting infrastructure." Engineering sector customer

There would be multiple benefits from consistent mapping of infrastructure nationwide, both above and below ground, and making this widely available. It would facilitate:

- cost and time savings with construction projects, particularly with knowing where underground infrastructure is located
- greater visibility of infrastructure threatened by natural hazards and the effects of climate change
- research into:
 - the longevity of different materials and construction methods

- the impact of subsequent construction of overhead or buried infrastructure, based on variables like material, age or depth
- the load impact of new developments on existing infrastructure, and the effect this has on maintenance and replacement costs as well as planning.

We heard this could be a nationally important dataset, and public access would lower barriers for innovation. It would make prospective addressing data available as early as possible at reduced cost.

Local government stakeholders highlighted that this could come to a head soon, too, with Three Waters reforms that were being worked on the time (and since discontinued with change of government in 2023). However these take effect in terms of operating structures and entities, the principle of joining up infrastructure planning will fundamentally require standardised data modelling driven from a national level to resolve inconsistencies across council boundaries.

“It’s kind of moot whether the data is held by each council or the national body, as long as the data structure is the same. And there has to be a minimum model, and extras can be added if they want but don’t necessarily have to be brought across.” Local government stakeholder

Interview respondents from across local government, engineering and the geospatial consulting sectors said that it makes sense for Toitū Te Whenua to be the lead agency to standardise location data capture and national mapping for infrastructure and utilities.

Environmental risks and hazards

As the world warms, buildings and property face increasing risk of flood, fire, coastal inundation and drought. Land use change is required, both for mitigation and adaptation. However, we heard that there is a real lack of data available to decision-makers in this area.

Banks and insurers will have to work very closely with councils to progress climate adaptation policies that will inevitably have an adverse impact on property values across entire communities.

Three organisations interviewed, from across the data sector, are building climate change impact modelling tools to aid the financial sector, and others are actively exploring this space. Incredible amounts of data are needed from an array of sources, ultimately all relying on DVR to funnel it down to an individual property. Again, DVR’s lack of availability is a limiting factor.

A lot of what would be enormously helpful data simply doesn’t exist or isn’t systematically collected and made available. What are the ground-clearances for buildings on pile foundations? How does this compare to flood risk for that area? What building materials

are present? How combustible in a wildfire are those materials, or how prone to flood damage? What geological activity is likely for a particular property?

Again, we heard that lack of common standards and geospatial capabilities is an issue, particularly across local government. Interview respondents across the board stressed how much effort goes into aggregating local council datasets and providing some consistency to make it useful against property.

Land use

We heard that some regional councils have worked with data science firms to produce land use classifications for their region and published these for reuse through Arc GIS Online (AGOL). There is of course regional variation in the number and types of classifications used.

Protected areas status seems to be a separate endeavour, and we have heard that those interested in this information have to approach individual councils, with mixed results.

Government stakeholders indicated that MfE and Stats NZ are collaborating on how to build a land use information system for Aotearoa. Again, the precision being called for is a step-change in capability.

These and other agencies are working towards environmental reporting and land use optimisation, as well as better use of certain landscapes, at national, regional, catchment, and increasingly down to property and paddock scale, sometimes to the scale of sub-property, paddock-by-paddock land and property information. In practice this will need to sync in real or near-real time because paddock boundaries are becoming flexible with new management technologies and techniques (see SouthPAN).

For the Emissions Reduction Plan, the government needs to send carbon inventories to the UN. Stakeholders foresee agencies monitoring progress and impacts by undertaking more analysis by region, TA, sector (such as dairy farms), or tenure (such as Māori land). They will need much better information on who owns what, and where.

Businesses, not least financial institutions with mortgages held on farms, will increasingly also need to account for carbon sequestration across their portfolios in annual reports.

“Lack of data and lack of [joined-up] data has been an issue. Ideally all spatial data should be standardised perfectly, and with minimal error between. We should at least know who the landowners are, how lands are managed, what kind of dwellings have been built or what buildings are used for, what pollution has affected the land and what remedial work has taken/is taking place, and what statutory management they might be under. There are a lot of things that [we] just don't know yet.” Central government stakeholder

Property ownership, management and occupancy

'Ownership' was the second most frequently mentioned topic across all interview stakeholders (see Figure 24). This had three broad reasons:

- 1) Requests for Toitū Te Whenua's Property Owners dataset as an Esri REST Service (which has subsequently been delivered).
- 2) Challenges knowing whether property has Māori ownership, and mapping Māori land locally, regionally or nationally.
- 3) Multiple agencies and partners struggling to know who to contact to request access to carry out their work, such as:
 - land management
 - approaching landowners for access (for example, for biosecurity, pest management, notifying all adjacent land owners/managers of 1080 drops on Crown land blocks, environmental inspections, or measuring forest plots for carbon monitoring)
 - public transport purposes (such as notifying adjacent landowners when a bus stop is moved)
 - emergency management
 - strategic planning for development or climate change
 - consenting
 - parks and reserves, understanding ownership and management for climate change, fire management, and maintenance.

Stakeholders stressed they often need to know not just the owner to get access for required work, but also the property manager and occupants. We heard from multiple stakeholders that significant time is being spent finding this information.

For occupancy/tenancies, there are at time of publication two data sources available: MBIE's rental bond data, and a private database that is generated with input from real estate companies. Many respondents expressed their desire for additional public and authoritative tenancy data, which would be useful for:

- HUD, to measure housing supply and occupancy rates
- Corrections, to understand whether the address that someone is being bonded to is stable
- Stats NZ for the Census, to know whether a dwelling is occupied, and ideally to distinguish between individual buildings and units within a single property
- the Māori Land Court, to give greater visibility of land occupation information
- emergency services, such as helping frontline staff know who and what to expect at properties they are called to
- environmental agencies requesting site access to perform science and management activities, and understanding ownership/rental dynamics of properties and people impacted by environmental policy changes

- local and regional councils for a wide range of activities including biosecurity and pest management
- the Ministry of Health, to help measure and model service requirements and provision within individual localities or meshblocks
- the Ministry of Education, to understand the mix of stable and more transitory student populations, and provide more support for transitory students
- the Ministry of Social Development, to have greater visibility of overcrowded accommodation and people requiring greater social services support.

Tooltip: Users can either filter by keyword(s) to see which interviewees mentioned those keywords. Or, filter out the blanks under a particular customer or stakeholder to see what topics were discussed in their interview.

Keyword	Customer/Stakeholder 1	Customer/Stakeholder 2	Customer/Stakeholder 3	Customer/Stakeholder 4	Customer/Stakeholder 5	Customer/Stakeholder 6	Customer/Stakeholder 7	Customer/Stakeholder 8	Customer/Stakeholder 9	Customer/Stakeholder 10	Customer/Stakeholder 11	Customer/Stakeholder 12	Customer/Stakeholder 13	Customer/Stakeholder 14	Customer/Stakeholder 15	Customer/Stakeholder 16	Customer/Stakeholder 17	Customer/Stakeholder 18	Customer/Stakeholder 19	Customer/Stakeholder 20	Customer/Stakeholder 21	Customer/Stakeholder 22	Customer/Stakeholder 23	Customer/Stakeholder 24	Customer/Stakeholder 25	Customer/Stakeholder 26	Customer/Stakeholder 27	Customer/Stakeholder 28	Customer/Stakeholder 29	Customer/Stakeholder 30	Customer/Stakeholder 31	Customer/Stakeholder 32	Customer/Stakeholder 33	Customer/Stakeholder 34	Counts		
Sales	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	25		
Ownership	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	24	
Crown	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	21	
Owners	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	21	
Value	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20
Māori Land	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	20

Figure 24: Snapshot of interview keywords matrix with the 'owners' line highlighted.

Farms

Farmers are increasingly obliged to measure, monitor and minimise the negative environmental outputs from on-farm activities. This places new financial and time burdens on their operation, which can also have significant mental health impacts. Farmers need to be empowered by tools to help them plan and manage their environments, and these tools need good, detailed data.

Mitigation and adaptation also require highly detailed planning, not just at the farm level. It is required at sub-property levels down to the square or cubic meterage of individual paddocks, fields, forestry or bush-planted parcels, and waterways.

“There are times that you're looking at farm scale, for instance to understand what kind of activities are there, what's the ownership and if you put in a freshwater policy that says you can't leach more than a certain amount of nitrogen, who does that put out of business?” Central government stakeholder

Spatially defining 'a farm' is very difficult to do, but increasingly necessary. Toitū Te Whenua is already familiar with the risk and resilience needs for rural property definition, to enable timely and effective civil defence responses to natural events.

However, farms are a case study in complexity, and 'a farm' is inherently shapeshifting in nature:

"So if you're defining a farm for a freshwater plan, that's organised through the Regional Council and goes through the resource consenting process. The mechanism is valuations and titles linked to the cadastral parcels because that's how RCs administer consents.

If you're accounting for carbon emissions that your farm puts out, then it's your farm business that does the accounting. So you're describing the operational farm business and you do include that land that you're leasing, and you don't include the land that you're leasing out to somebody else.

If you're OSPRI and you're looking after NATE and you're interested in where cattle or deer are, then you have a different definition again, because actually if the cattle and deer are on two separate non-contiguous areas of land but they are managed together and they move back-and-forth between them, well that's just one farm."
Agribusiness consultant

The current farm definition and mapping landscape is therefore disparate and incomplete. Climate change is driving an increase in the need to map farms to include additional risks and hazards from natural events such as fires, drought, flooding and sea level rise.

Beyond that, international commitments (such as UNFCCC⁹ and trade agreements), new regulations and reporting requirements (both for government and business), and consumer-market drivers are all adding to the urgency for this gap to be closed. Our research informed us that:

- [MPI's Farms Online](#) is intended for biosecurity use but received early push-back from Federated Farmers, limiting its scope and ability to capture farm areas, and farmer contributions are voluntary
- AsureQuality has its own farms spatial database called [AgriBase](#)
- corporates such as Fonterra and Silver Fern Farms are partnering with data science companies to produce their own farm environmental planning tools where farmers capture their own farm areas and activities.

One stakeholder working in this area said that Toitū Te Whenua's Property Data Management Framework (PDMF) will be key to defining common data standards, lexicons, and ontologies around land use classifications (not just farms). Certainly in the agricultural context the PDMF may be able to provide a common data linkage for all the commercial farm management tools, and link this into a centralised farm ID system. This would see Toitū Te Whenua working with the agricultural and climate sectors to empower

⁹ [United Nations Framework Convention on Climate Change](#)

farmers with data-based tools to optimise land use, manage their business and improve their environments.

Historic records

Historical records are enormously significant taonga to all iwi. They form the evidence basis for Treaty settlements, and are critical for identifying culturally important areas, environmental features, and landscape changes over time. Councils want this data to feed into district plans, and look to iwi as kaitiaki whenua to provide the information.

Beyond Māori needs, several stakeholders we spoke to expressed their need for historic parcel, land use, ownership and valuation data. Used together, this data allows land-use change modelling to understand the fragmentation of land, its changing uses and corresponding values in the context of the regulatory environment, and how this might continue into the future.

This exercise is incredibly useful and informative for decision-making across both the government and private sectors. The various records were described as being 'really, really messy'. Some are not digitised and those that have been are not easily accessible for customers, and Toitū Te Whenua was criticised for adding to this difficulty with a paywall.

- Survey plans, field books and maps are difficult to obtain for various reasons. Not all records are digitised, and some data and records are paywalled by Toitū Te Whenua. Other data can be recombined from LDS but geospatial capability is needed to do this.
- When querying the New Zealand Geographic Board (NZGB) about place and feature names, we were told it can take three to four months to get a response, and the response might be 'we don't know'.
- Land ownership and sales information would help iwi to trace the subdivisions and sales of their original land holdings.
- Valuation data contains a rich set of attributes, including land use.
- Aerial imagery provides a visual reference which is useful for many different purposes.

We heard that historic valuation and land use data is often purchased from third parties for specific projects. However, this data becomes less helpful at earlier dates because the land parcel layer does not align with valuation data. The opportunity to back-match valuation and parcel records through Toitū Te Whenua's property data management system (PDMS) might deliver high-value benefits to a range of applications if we were to acquire historic DVR data archives.

Toitū Te Whenua was encouraged to acquire and make available the historic archives of land and property information held by various parties across the country. People also noted that time is running out to capture rich contextual knowledge from various people who were involved in historic projects.

The state of Māori property data

Figure 25 shows that we heard from many of our partners, stakeholders, and customers on this topic. The consensus was that data in this area is broadly lacking. Māori property data also scored the poorest of all data polled in our survey (Figure 26).

There is no coherent Māori land mapping, no indicators for tribal affiliations of land, and no mapping to illustrate this. Through interviews we heard from all parties working with Māori land that the most recent complete Māori Landonline dataset dates from 2017.

Stakeholders told us they're patching over this data in their own systems with localised updates when these become known. Customary land is particularly hard to figure out and requires a lot of manual effort.

Interviewees said that the Māori Land Flags data, for example, require a lot of manual work to even approach the true situation. Even when taking a very cautious approach one can still regularly see errors. Ultimately, having to file an application with the Māori Land Court (MLC) and ask the court to determine the Māori ownership status of a piece of land is onerous and expensive.

Survey respondents scored property data sourced from Māori Landonline the lowest of all datasets surveyed (see Figure 26). Understandability of the data was rated the highest of the six functionality categories, and was the only one to score above 50% positive feedback. Completeness was rated the worst.

Since talking to MLC they have moved to a new Māori Landonline system, changing from MLIS (Māori Land Information system) to the new 'Pātaka Whenua'.

We heard that connection between Toitū Te Whenua's Landonline and Pātaka Whenua 'would absolutely make sense 100%'. This new system coming in parallel to our own Modernising Landonline programme is a great opportunity, and stakeholders encouraged Toitū Te Whenua to pursue this with the MLC.

"Would like to see LINZ stepping into and taking a lead in the Māori land space, don't think any other organisation has the skills or expertise to do that properly." Central government stakeholder

Demand for data is increasing

As mentioned in the previous section, policy impacts on Māori are increasingly being questioned by government. Stakeholders informed us that climate change, housing and child poverty reduction are all drawing attention regarding Māori demographics.

We heard of stakeholders' embarrassment at having to report to ministers that they can't tell from existing data where Māori land is, nor the living situations of Māori. They also don't know where that data exists or who takes responsibility for it.

People working in government told us they have huge challenges identifying Māori:

- businesses and trusts
- land management
- conservation for environmental reasons as opposed to covenants for traditional and significant relationships
- sites of significance
- primary sector interests, and disaggregating these by region.

Compounding this is that the data which is available can have restrictions on sharing, out of concerns for Māori data sovereignty and associated risk of making data available online. Toitū Te Whenua was encouraged to participate in high-level discussions across government to form a strategy for greater data sharing.

“We [...] would like to release [data] publicly but discussions with Te Arawhiti have repeatedly flagged pitfalls. We are increasingly asked by other stakeholders for this data but have to run it past Te Arawhiti each time.” Crown research stakeholder

The following information challenges were called out by iwi partners:

- Māori Land Court data, expanded on below.
- Right of first refusal. Partners we spoke with likened it to having land stolen from under them again when this is not followed. This is enormously distressing for the affected hapū/iwi.
- Crown land information is generally incomplete. We also heard this from a number of other stakeholders.
- Crown land permits. We heard that iwi are not always informed when there is an application within their rohe.
- Lack of precision with Crown land permit locations within what can be huge parcel areas, which makes monitoring of these permitted activities very difficult.
- Mapping of reserve names, with data not available centrally or from many local or regional councils.
- Ownership of marginal land, which is often assumed to be Crown land (but this is not always certain or true).
- Property ownership and management information for requesting access to land containing important sites, or checking where land is thought to contain sites.

Tooltip: Users can either filter by keyword(s) to see which interviewees mentioned those keywords. Or, filter out the blanks under a particular customer or stakeholder to see what topics were discussed in their interview.

Keyword	Customer/Stakeholder 1	Customer/Stakeholder 2	Customer/Stakeholder 3	Customer/Stakeholder 4	Customer/Stakeholder 5	Customer/Stakeholder 6	Customer/Stakeholder 7	Customer/Stakeholder 8	Customer/Stakeholder 9	Customer/Stakeholder 10	Customer/Stakeholder 11	Customer/Stakeholder 12	Customer/Stakeholder 13	Customer/Stakeholder 14	Customer/Stakeholder 15	Customer/Stakeholder 16	Customer/Stakeholder 17	Customer/Stakeholder 18	Customer/Stakeholder 19	Customer/Stakeholder 20	Customer/Stakeholder 21	Customer/Stakeholder 22	Customer/Stakeholder 23	Customer/Stakeholder 24	Customer/Stakeholder 25	Customer/Stakeholder 26	Customer/Stakeholder 27	Customer/Stakeholder 28	Customer/Stakeholder 29	Customer/Stakeholder 30	Customer/Stakeholder 31	Customer/Stakeholder 32	Customer/Stakeholder 33	Customer/Stakeholder 34	Counts		
Sales																																			25		
Ownership																																				24	
Crown																																				21	
Owners																																				21	
Value																																				20	
Māori Land																																				20	
Corelogic																																				20	
DVR																																					19
Survey																																					18
Aerial																																					17
Standards																																					17
Road																																					17
Historic																																					17
Quality																																					17

Figure 25: Snapshot of our interview keywords matrix with Māori land and Historic keywords highlighted.

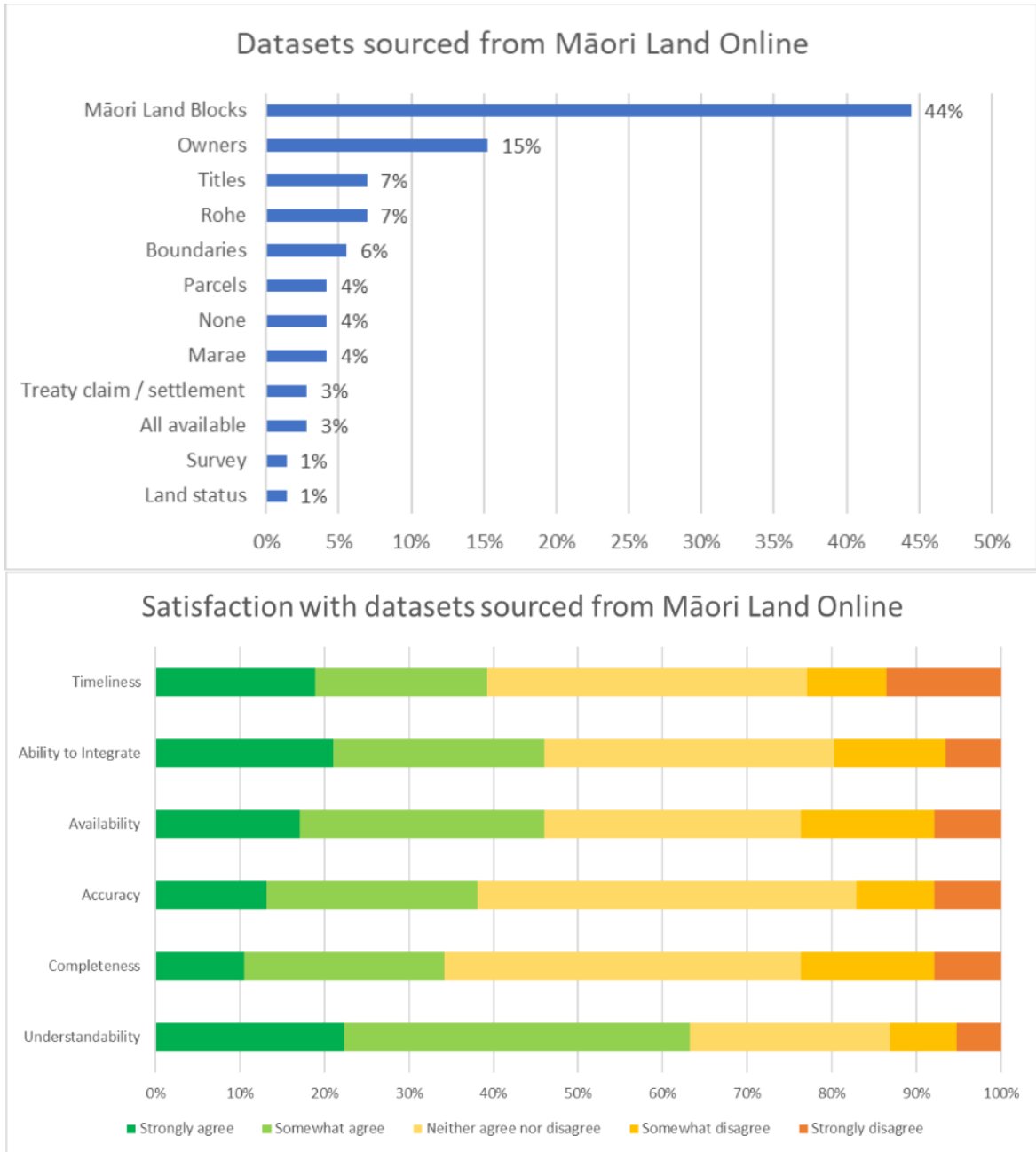


Figure 26: Satisfaction with datasets sourced from Māori Landonline (top), and overall satisfaction ratings (bottom).

Toitū Te Whenua’s future role

This section begins with our partners’, stakeholders’, and customers’ aspirations for Toitū Te Whenua as expressed in our research interviews. We then summarise future Toitū Te Whenua work programmes, including Modernising Landonline post-Horizon 1, Joined-up Land Development, and a national digital twin.

What role do you want Toitū Te Whenua to play in future?

All external interviews concluded with the question, ‘What role do you want LINZ to play in the future?’

The responses were condensed into a set of eight simple themes, displayed in Figure 28. All but two of these themes call for Toitū Te Whenua to demonstrate leadership in various ways.



Figure 27: Ranking of interview responses to the question of Toitū Te Whenua's future role.

Single source of truth

Most people and organisations we talked to called for a single, authoritative source of property information in Aotearoa New Zealand, and see Toitū Te Whenua as the logical leader for this.

Importantly, people said that a complete picture of property is needed. This means having more focus on property, not just land – so taking in the things that go hand-in-hand with property, like infrastructure, and sources of risk for property, like natural perils. It was suggested that this should include DVR, sales, resource management, planning zoning and infrastructure. We were encouraged to collect and curate data from councils and help them with resource and technical expertise.

This does not mean Toitū Te Whenua should own and do everything. Rather, we can lead, coordinate, advocate and support in different areas. The ultimate goal would be assembling property information by various means into a single authoritative source of truth.

Ecosystem leadership and innovation

As the national geospatial agency and property system regulator, our customers, stakeholders and partners expect greater and more visible leadership from Toitū Te Whenua. They would like us to raise Toitū Te Whenua's profile and understanding of the role we can play in informing government policy.

Our iwi partners expressed their desire for Toitū Te Whenua to take on greater stewardship of both current and historic land information. Access (and lack of access) to these are directly tied to their wellbeing.

Māori land information was a common topic across many interviews, and there is clearly a broad need for more and better information. We heard requests for Toitū Te Whenua to step in and lead in the Māori land space, with many believing that no other agency has the skills or expertise to do it properly.

LiDAR was another area specifically called out for Toitū Te Whenua leadership to continue to build a national elevation service. Respondents told us the insights it provides are unparalleled for a wide array of uses, and the current programme should be funded to continue regular scanning with nationwide coverage.

In terms of innovation, the expectation is that Toitū Te Whenua will continue to close gaps between public and commercial data provision. Doing so would encourage greater innovation across the ecosystem by lifting the baseline of property data that is trustworthy, reliable, freely available and well used.

Further to this, respondents encouraged Toitū Te Whenua to consider a more mature tiered-value approach to data provision. For example, a geospatial consultant suggested

that Toitū Te Whenua could offer ‘value-add on top with cost recovery – nobody’s saying LINZ has to do everything for free.’

More engagement and collaboration

All of this future activity requires Toitū Te Whenua to be outward-facing and customer-led with a critical focus on delivery of tangible outcomes. We received praise for initiatives like Notice of Change and Connected Property Data that had been built on previous rounds of engagement, and the more recent [Aotearoa Property Data Network](#). We also heard strong endorsement to take our engagement efforts further.

Suggestions included things like more targeted newsletters and channels, YouTube ‘how-to’ videos, networking, and communities of practice across local and central government. Respondents said that there is a need for more communication and discussion about property data, to build knowledge and capability across the spatial industry.

Local government seems an area with significant needs, as we’ve explored in previous sections. Stakeholders from councils echoed the need for Toitū Te Whenua to partner with local government. Groups such as Local Government Geospatial Alliance (LGGA) and Geospatial Special Interest Group (G-SIG) are well placed to extend Toitū Te Whenua’s reach to councils across the country (and vice versa).

Among central government, closer integration was encouraged with other data-providing agencies such as Stats NZ to ensure more data is spatially referenced. There are opportunities to recoup the costs from net savings of Toitū Te Whenua housing additional data and making it publicly available. Multiple agency stakeholders said that they would much rather help fund Toitū Te Whenua for a fraction of the taxpayer money currently paid to commercial aggregators. This seems to be an obvious win-win.

Increase accessibility

Our customers, stakeholders and partners want Toitū Te Whenua to take a lead role in centralising and improving the transparency, consistency and availability of public property data.

Technologically, this means:

- moving with industry towards live data feeds and APIs
- providing data that is open by design
- more plug-and-play
- ready formats across multiple channels and platforms (such as OGC and Esri).

There was a particular focus on sales, valuation, Māori land and historic data. There is demand for us to open up and make the sales and valuation data landscape more transparent. Stakeholders want us to champion data accessibility for Māori and open up

Māori land data. They also want us to collect, curate, and reduce paywalls for historical imagery, surveys, valuations and other property information.

We heard that greater access to land use information would be beneficial for New Zealand, and Toitū Te Whenua should provide as much property data as possible in an open source and easily accessible way.

Enabling New Zealand Inc

A key role of government is setting the right conditions for markets and innovation to flourish, enabling New Zealand Inc. Interview discussions highlighted several levers that Toitū Te Whenua could pull.

Sales and especially valuation data were repeatedly cited as important for Toitū Te Whenua to bring together and make publicly available, for reasons explored in detail earlier in this report. The current oligopoly around these data appears to be a severe throttle on informed decision-making, innovation and public-good outcomes.

Toitū Te Whenua was encouraged to take a lead role for New Zealand Inc through a combination of standards-setting, greater ownership and centralising of data. Stakeholders asked us to help raise standards and levels of consumer trust in external data providers (such as councils) as much as possible, and centralise data where this is not possible.

A concurrent example to the production of this report would be integration of historic imagery into LINZ Basemaps. The immediate benefactor is MPI for whom this is critical data in measuring progress for their 1 Billion Trees programme. Further to that we heard from interviews that historic imagery is incredibly helpful for our customers', stakeholders' and partners' ability to analyse and understand how the property system has developed over time, both nationally and in localised contexts, and to suggest how it may continue to evolve with new interventions.

Following on from the accessibility topic, it seems that industry savings and productivity could be enhanced by increased uptake of data feeds and APIs. These save geospatial operators valuable time and labour, and reduce duplicate investment in storage and processing.

We heard that integration, automation and standardisation are all key to Aotearoa New Zealand maintaining a world-leading role in property data and technology. It would be useful to extend this right across the property lifecycle.

Continuous improvement

Toitū Te Whenua was praised for doing a good job of improving our data, and told to keep incrementally improving data quality while making data as easy as possible to consume.

Specifically, we were asked to:

- work towards a complete picture of who owns what, where it is, and what they're doing with it
- provide 100% coverage of land with titles and guarantees on titles
- maintain steady growth over time in attribution and coverage of Toitū Te Whenua data
- keep improving cadastral data quality and accuracy so customers can get on with productive work
- complete the Crown Land Register
- improve roading classifications
- continue centralising and improving resilience data
- pursue more granularity of data.

Setting common standards and models

The setting of common data standards and models was identified as a key goal of increased engagement and collaboration across industries and sectors. Our customers, stakeholders and partners want to see standardisation of data modelling driven from a national level, with this helping resolve things like inconsistencies across council boundaries.

Council stakeholders asked that Toitū Te Whenua facilitate communities of practice among councils and take a leading role in setting national data standards. As we explored in a previous section, there is a lot of scope to create pre-packed and standardised datasets to streamline the data-sourcing experience for specific purposes and end-user groups.

Increased interoperability of data is also critical to reducing the time spent by geospatial practitioners manipulating different datasets to work together. As new technologies come to the fore, such as building information models (BIMs), we heard that Toitū Te Whenua should be stepping up as the national geospatial agency to ensure common geospatial data standards are taken up across industries.

Further afield, respondents appreciated Toitū Te Whenua representing Aotearoa in the International Organisation for Standardisation (ISO) and Open Geospatial Consortium (OGC) groups. We heard that this work gives confidence to business, and as standards increase internationally it's important that best practice approaches are taken to maintain or improve data transparency.

Capability, training and education

This topic was an undercurrent through many research conversations. While much can be done to make geospatial work simpler through improvements to data and accessibility, there's also a desire for Toitū Te Whenua to lift awareness of our capability-building work, and to do more of it.

Perhaps the simplest thing we can do is direct more people to our existing learning content on YouTube, which we heard is very highly regarded by those who know about it. We also heard requests for Toitū Te Whenua to take the lead in keeping geospatial customers across technology changes and providing training and education across the spatial industry.

Again, more communication and discussion around property data is wanted, through networks and communities of practice, to build knowledge and capability across the spatial industry.

A few interviewees noted that some very experienced people are beginning to retire, taking their knowledge with them. They encouraged Toitū Te Whenua to work to preserve as much valuable contextual knowledge as possible before it's lost forever. Examples include the people involved in projects such as the original Digital Cadastral Database (DCDB) capture, or those who remember the history of forestry access easements on the West Coast (which we were told are a total mess).

Conclusion

Unpacking practical feedback from this review

As indicated at the start of this report, this review takes a systemic, customer-led approach. This report does not go into detailed validation and analysis of the huge amount of problem (and 'solutions') feedback received through both the customer survey and interviews.

This needs to be included in a follow-up project to clearly identify customer needs and deliverables, prioritise these, and produce a more robust product and engagement roadmap.

The content of customer feedback in this report highlights that there remains broad ranging understandings of 'property' and associated views of what is classified as 'property data'. It is essential that property ecosystem stakeholders reach common understandings that clearly differentiate between different types of property data and other data that are applicable to property.

Customers are calling for a single authoritative source of property information. Even bringing together all the data listed on our Toitū Te Whenua's website as being included in the [property information system](#) would be a great improvement on the current state and require new collaborations.

Of course, individual customers and stakeholders will always want other data included to fulfil their own application. Further discussion and thought leadership is required to decide whether and where it is appropriate to extend the remit of a single authoritative source.

It is critical that Toitū Te Whenua decides what role we wish to play before embarking on this detailed planning work. If we choose to be a system leader, the workplans that result should include extensive collaboration and seek to leverage a broader resource base.

Potential for further investigation

The biggest shortcoming of this project is the fact that we weren't able to speak with anyone from the insurance industry for this research. Climate change and resilience were a recurring theme, and the insurance industry is a key participant while the changing realities of insurability are a key driver of change.

We expect that actuarial analysts are making deep and interesting use of property data, and would be able to provide substantial insights and feedback with clear quantifiable impacts.

For the production of this report itself, we were only able to do surface-level analysis of the data collected by such a large and complex survey which we received a lot of

responses to. Future investigations might, for one example, utilise Power BI to further analyse the survey data.

A couple of interesting threads to explore would be:

- Industry-by-industry analysis, aiming to identify industry-specific trends. This would help Toitū Te Whenua create customer segmentation and determine where we should direct our resources to engage with customers more effectively.
- Focusing on purchased data, to see which organisations are purchasing data from third parties, which third parties are engaged, and what data is being purchased. If this could be linked to spending estimates, this would provide a valuable market analysis.

There are also some clear avenues noted through the report that would let us continue conversations with certain stakeholder groups, to increase our understanding of issues they face and potentially form working groups focused on particular issues.

Appendix A – Property data definitions

Table 4: Definitions of datasets in scope of this review.

Dataset	Description
Cadastre	A collection of cadastral survey datasets (CSD) providing an authoritative source of information as to where a boundary is located, where a parcel of land is located, and the attributes of that parcel and boundary. This information enables the correct and unambiguous allocation and management of land rights and the correct re-establishment of the boundaries in the future.
Titles	<p>Register of titles providing the ownership of land and the rights and restrictions that apply to the land as governed by the Land Transfer Act. Contains the instruments relating to the transfer of, or other dealing with land.</p> <p>Includes the following estate types:</p> <ul style="list-style-type: none"> • freehold • leasehold • unit • composite • cross lease • life estate • timeshare • Gazette notice • interest. <p>Titles spatial definitions is provided by a relationship to one or more primary parcels. Note: Includes both current and historic titles.</p>
Address	Provides in-use and allocated addresses as allocated by territorial authorities under the Local Government Act 1974 (section 319). Contains the core components of an address, including number, road name, suburb/locality, and city/town name.
District valuation roll (DVR)	Each territorial authority's DVR (67 of them) provides rating valuation information for all rating units within that territorial authority's area as governed by the Rating Valuations Act and Rating Valuations Rules. It contains individual property details including values (capital, land and value of improvements) and provides property owners and ratepayers confidence that rating valuations on the DVR provide a fair basis for determining rates.
Property sales	The price paid for a title or group of titles that have been transferred (notice of sale).

Māori land

Land that falls within the jurisdiction of the Māori Land Court under Te Ture Whenua Māori Act 1993 and other legislation. Includes current ownership, trustee, memorial and block information. This land is primarily Māori customary land and Māori freehold land, but also includes general land owned by Māori, Crown land reserved for Māori and some Treaty settlement reserves, mahingā kai and fishing rights areas. The land spatial definition is generally defined by one or more cadastral primary parcels. Some partitions and reservations may not be defined by cadastral survey.

State (Crown) land

State land is land that is owned and managed by a government department, entities, or authority and include around two million hectares of New Zealand's land area. Can include the following types:

- Crown forest land
- lakebeds and riverbeds
- Crown pastoral land
- recreational land
- roads
- farming
- public housing
- schools
- prisons
- other acquisitions from public works.

The land spatial definition for state land is defined by one or more cadastral primary parcels. A small number of DOC allocation parcels from 1987 are not defined by cadastral survey. Note that state land may have a freehold title, or in many cases has a recorded statutory action against the associated cadastral primary parcel. There are also many cases where it is not managed in any official register.

NZ Properties

NZ Properties are properties constructed via the Connected Property Data Management System based on TA rating units. It includes the national DVR dataset. These are created to enable connecting of records about a given property between different data sources (such as rating unit and titles). These are published to LDS for local and central government to use and are used by STEP to support NoC.

Tooltip: Users can either filter by keyword(s) to see which interviewees mentioned those keywords. Or, filter out the blanks under a particular customer or stakeholder to see what topics were discussed in their interview.

	Stakeholder 1	Stakeholder 2	Stakeholder 3	Stakeholder 4	Stakeholder 5	Stakeholder 6	Stakeholder 7	Stakeholder 8	Stakeholder 9	Stakeholder 10	Stakeholder 11	Stakeholder 12	Stakeholder 13	Stakeholder 14	Stakeholder 15	Stakeholder 16	Stakeholder 17	Stakeholder 18	Stakeholder 19	Stakeholder 20	Stakeholder 21	Stakeholder 22	Stakeholder 23	Stakeholder 24	Stakeholder 25	Stakeholder 26	Stakeholder 27	Stakeholder 28	Stakeholder 29	Stakeholder 30	Stakeholder 31	Stakeholder 32	Stakeholder 33	Stakeholder 34	Counts
Utility																																		6	
Building information																																			6
Building consent																																			6
Resource consent																																			6
Changeset																																			6
machine learning																																			6
Notice of Change (NoC)																																			6
Property ID																																			6
GeoPAF																																			6
Strata																																			6
Diagram																																			6
Out of date																																			6
Carbon																																			5
Topo																																			5
AWS																																			5
One stop																																			5
Metadata																																			5
Cross-lease																																			5
Monopoly, monopolise																																			5
Open source																																			5
NZ Properties																																			4
Zoning																																			4
Bucket																																			4
Azure																																			4
LIM																																			4
SAP																																			4
Hydro																																			4
Opteon																																			4
Innovation																																			4
Rental																																			4
CCC (Code of compliance)																																			4
REINZ																																			4
Resilience																																			3
Meshblock																																			3
bulk data																																			3
Streaming																																			3
QEII																																			3
Conservation																																			3
MBIE																																			3
Marine																																			3
Coast																																			3
Property Spine																																			3
EDE+																																			3
QPID																																			3
W/LASS																																			3
Headway																																			3
Sea level rise																																			2
BIM																																			2
AGOL																																			2
Apache																																			2
Centralise																																			2
Rail																																			2
KiwiRail																																			2
Open street map																																			2
District planning																																			1
data cube																																			1
Atlas																																			1
Proposed properties																																			1
Building ID																																			1
EECA																																			1
Quickmap																																			1
Webinar																																			1