Land Information New Zealand
Toitū te whenua

Introducing the Review of the Rules for Cadastral Survey

Issues and Opportunities

7 August 2017

New Zealand Government

Have your say on the Review of the Rules for Cadastral Survey

The Surveyor-General Mark Dyer is seeking feedback on the issues and opportunities for the Review of the Rules for Cadastral Survey set out in this document and any issues or opportunities that you believe have been missed or inadequately emphasised.

Your feedback

1. Feedback can be provided by.

   (a) Submitting an individual or collective written submission.

   (b) Contributing to a submission from an organisation or professional body.

   (c) Attending and providing verbal feedback at consultation workshops that will be held in locations around New Zealand during September www.linz.govt.nz/sgrulesreview.

2. It would be helpful if feedback:

   (d) refers to the section number in this document where possible.

   (e) includes the reason behind your comments, possibly through citing an example.

3. Email written feedback to: sgrulesreview@linz.govt.nz

Feedback is due by Wednesday 4 October 2017.

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Foreword

I am delighted to launch the review of the Rules for Cadastral Survey 2010 with this Issues and Opportunities paper.

Our original intention was to commence the review in 2015, but our efforts were diverted to dealing with the consequences of the Canterbury earthquakes and the production of the subsequent rules and guidance.

The 2010 Rules used a 'zero-based' assessment methodology and resulted in a set of rules that were significantly different to the historical regulations. Surveyors have made it clear that these Rules are difficult to work with. This review will not be starting afresh, but will consider the current and any future requirements and look to refine and reorganise the current layout so that they are more easily interpreted.

The Rules were amended in 2012 and 2017 primarily to take into account earthquake movement in greater Christchurch. This review will need to consider whether some of those requirements, such as those currently applying only in greater Christchurch, apply at the national level and should be consolidated into the main Rules.

For this review we have developed a comprehensive consultation strategy that is intended to ensure surveyors and other stakeholders have ample opportunity to contribute to the review. This involves three stages, including for the first time this Issues and Opportunities paper to set the scene.

I look forward to working with you on this important work.

Mark Dyer

Surveyor-General / Kairūri Matua

1 The Review Process

1.1 What is the purpose of reviewing the Rules?

The Surveyor-General has a function and duty to determine how the spatial extent (including boundaries) of interests under a tenure system must be defined and described, by setting standards)[1]. This is done by making rules[2].

In line with good regulatory stewardship and practice[3], periodic review helps ensure that the rules are able to be practically applied, and are 'fit-for-purpose' for both the current and future state.

1.2 Overview of the Rules review process

Surveyors and other stakeholders have an important voice in this process. A comprehensive and wide reaching three stage consultation process is being adopted. The consultation approach will include workshops and the opportunity to provide feedback throughout the process. Figure 1 below illustrates the process and indicative timing.

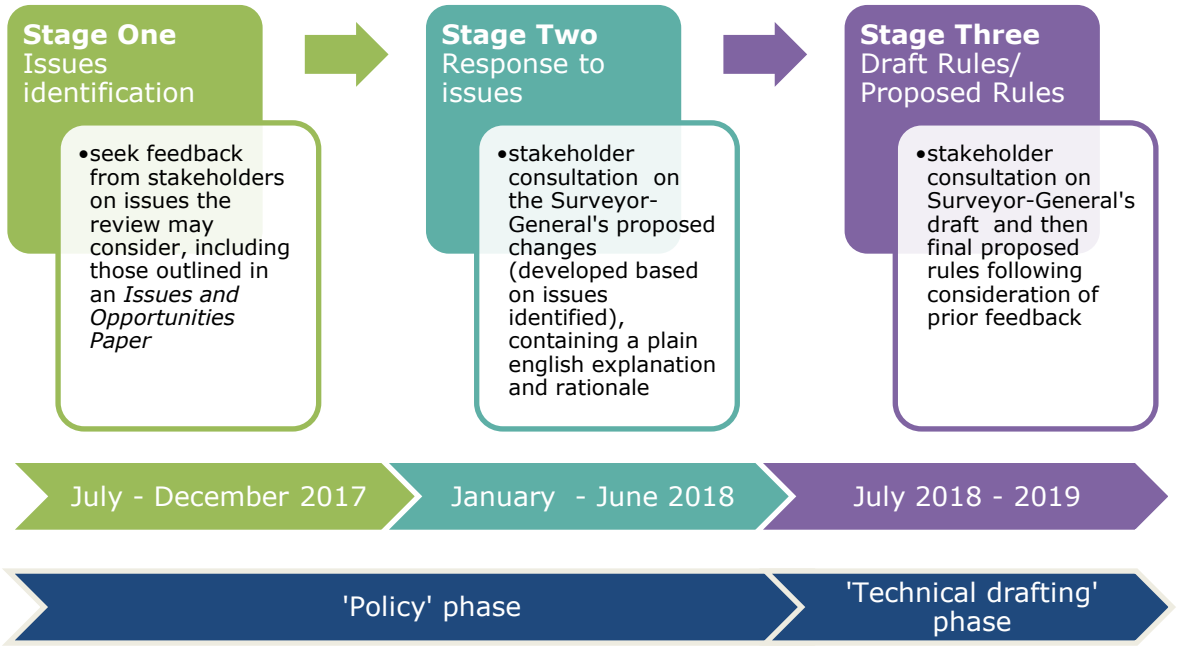

Figure 1: Review consultation process

The review process is expected to take about two years to complete, comprising two broad phases of work. The first phase covers the policy work required to examine the regulatory system and policy settings. Consultation during this phase includes stages One and Two (above). The second phase of work is the technical drafting of the rules themselves (consultation Stage Three). The final timeline will depend on a range of factors, including the scope of the work and is likely to be affected by constraints relating to implementation.

In addition to the consultation approach, the Surveyor-General will also convene a Reference Group. The group will provide expert advice and guidance at key stages, including reviewing and confirming key priority areas for change, feedback on draft Rules, and reviewing the final

[1] S7(1)(c) Cadastral Survey Act 2002.

[2] S49 Cadastral Survey Act 2002.

[3] http://www.treasury.govt.nz/regulation/expectations.

Rules. The terms of reference and membership of the group will be confirmed during stage one. It is anticipated that the membership may change as the review process shifts from the policy phase to the technical drafting phase. Initially the reference is likely to include those with broad knowledge and expertise in matters relating to surveying and the context and regulatory system it takes place in. During the technical drafting phase the Reference Group may include other parties or individuals to support the effective drafting of new of modified rules.

The use of non-rules interventions (e.g., guidance, advisory material) will be also be considered during the review and may be developed where considered appropriate.

The Parliamentary Counsel Office (PCO)[4] is responsible for drafting of the Rules as they constitute a legislative instrument[5]. While the Surveyor-General is responsible for the content of the Rules and can guide the structure and format the PCO is ultimately responsible for the structure, format and publication.

1.3 What's the purpose of this document?

This document supports the first stage of the Rules review, and focuses on identifying issues and opportunities that the review should consider.

The Surveyor-General is seeking stakeholder feedback during this stage to help shape the focus of the review. Based on the issues identified through this process, the Surveyor-General will then identify the focus areas for the Rules review. Proposed interventions in these areas will then be developed and presented for consultation and feedback during stage two.

1.4 Matters to consider

You may wish to consider the following matters when providing your feedback:

1. Do you agree with the key issues and future considerations presented? Are these areas you feel the Rules review should focus on and consider? We would also appreciate your views where you agree with the issues as identified.

2. Do you have any examples of problems caused by any of the issues? Do you have any suggestions on how issues could be addressed?

3. Are there any gaps or challenges in the current Rules that have not been identified in this document?

4. Are the Rules achieving the right balance between compliance (managing risk) and flexibility (achieving the outcomes efficiently and effectively) – particularly considering future technological developments? Specific examples of where the balance has worked well, or where it has performed poorly, including arguments in support of the examples, would be of particular value.

5. To what extent could any issues or opportunities, including those you've identified, be addressed by non-rules methods? These might include guidelines, advisory material, etc.

[4] http://www.pco.govt.nz/

[5] S49(4)(b) Cadastral Survey Act 2002 and Legislation Act 2012.

1.5 Useful links

Further information can be found using the following links:

- Rules for Cadastral Survey 2010
- Rules, Standards and Guidelines for the conduct and processing of cadastral surveys, and for the integration and provision of cadastral survey data
- Cadastre 2034.

2 Rules Review – context and background

2.1 What is the cadastral survey system trying to achieve?

The Cadastral Survey Act 2002 (CSA02) provides the overarching legislation for this review. It defines the purpose of the cadastral survey system as to promote and maintain the accuracy of the cadastre. This is achieved by a number of means, including the requirement that cadastral surveys must be undertaken by competent (licensed) surveyors, and that they are completed in such a way that they meet the standards set by the Surveyor-General.

Ensuring and maintaining the existence of an accurate cadastre contributes to a wide range of benefits (or outcomes), which we all enjoy.

Cadastre 2034[6] is a 10-20 year strategy for the development of the cadastral survey system in New Zealand. It describes a range of potential benefits the cadastre may provide, framed around the 'fundamental' and 'broader' cadastre. The fundamental cadastre is used to describe the repository of Cadastral Survey Datasets lodged with LINZ and integrated into its database under the CSA02. This includes the spatial view and other information provided through Landonline. The broader cadastre includes the rights, restrictions and responsibilities outside this fundamental cadastre.

The Surveyor-General has defined the outcomes and objectives the cadastral system seeks to achieve. These are fully described in *Appendix A: Cadastral outcomes, objectives, and* sub-objectives. The primary elements are:

A. *Holders of rights, restrictions, and responsibilities in land confidently know the boundaries to which they apply so that they can efficiently identify, trade and use their rights.* This requires that:

   i. *sufficient evidence is available for correctly and efficiently locating boundaries on the ground*

   ii. *parcels support the recording of rights and other statutory land administration functions*

   iii. *the records in the cadastre correctly represent the physical evidence on the ground*

B. *The cadastre can be relied on and used efficiently for achieving other government and public good outcomes (e.g. electoral boundary definition, resource management, emergency management, land administration).* This requires that:

   i. *Information integrated into the national cadastre can be easily related to other datasets*

   ii. *Authoritative data from the cadastre is easily found, obtained and interpreted*

2.2 The place of the Rules in the cadastral system

The Cadastral Rules are integral to delivering on the purpose of the Cadastral Survey Act 2002. Their effectiveness requires a number of contributors to work effectively together.

[6] Cadastre 2034. A 10-20 year strategy for developing the cadastral system. LINZ 3 February 2014.

These key contributors are:

1. the Surveyor-General whose functions and duties are set out under s7 CSA02 one of which is to determine how the spatial extent (including boundaries) of interests under a tenure system must be defined and described, by setting standards.

2. the Chief Executive of LINZ whose functions are set out under s9 CSA02 and include responsibility for the facility that receives Cadastral Survey Datasets (CSDs) (Landonline), for verifying CSDs are in terms of the Surveyor-General's requirements and for integrating CSDs into the cadastre.

3. Cadastral Surveyor Licensing Board whose functions and duties are set under s11 CSA02 and who set competency standards for the licensing of cadastral surveyors.

4. Licensed cadastral surveyors, who conduct cadastral surveys, and prepare and certify CSDs, and

5. Professional bodies who represent the interests of their membership (e.g. NZ Institute of Surveyors including their professional cadastral stream, and the Institute of Cadastral Surveying).

The Rules are regulatory 'instruments' informally referred to as secondary legislation. In their formulation the Surveyor-General must consider existing law. Examples of this are the Land Transfer Act 1952, Te Ture Whenua Maori Act 1993 and common law including doctrines reinforced by, and precedents set by, the Courts (e.g. accretion or erosion having the affect of moving a water boundary). The Surveyor-General must also have regard to a number of matters including the extent the Rules promote the purpose of tenure systems[7]. This means the Registrar-General of land, The Maori Land Court and other tenure managers are interested parties to the Rules.

There are also non-regulatory 'instruments' that support the implementation of the Rules. Examples are:

- Guidelines and other LINZ KnowledgeBase material
- Educational material and professional development developed by LINZ or the professional bodies

Landonline is the computer system that is used to manage the cadastre. It includes a number of checks that help ensure that CSDs comply with the Rules.

[7] Refer to s7(2) and 49(3) Cadastral Survey Act 2002 for a full list.

3 Identified issues

The following section outlines in detail, the issues that have been identified to date.

These issues have been drawn from:

- stakeholder feedback provided to date,
- analysis of enforcement and compliance data, such as requisitions, dispensations and audit results,
- discussions with LINZ staff.

3.1 Issues about current rule requirements

This section sets out issues relating to specific rule requirements.

3.1.1 Confusion about water and irregular boundaries

a) There is concern and confusion about the requirements set out in rule 6.7 for water boundaries. The rule was drafted to enable surveyors to deal with the consequences of the law relating to water boundaries. Considerable care was taken not to inadvertently create new law. Unfortunately this has resulted in complex Rules where it is not always obvious how they should be applied in different circumstances. The Rules for water boundaries will need to be reviewed.

b) Rule 6.6 relates to irregular boundaries with 6.6(a) and (b) restricting the creation of new irregular boundaries and in some cases requires the right-lining of existing irregular boundaries. These Rules were drafted to be consistent with the widely held and published view that irregular boundaries that follow the centreline of streams and rivers are fixed in position. Recently following extensive investigations we have found no direction in law as to whether these boundaries are fixed or ambulatory. New rule 20.9 partly addresses this issue for boundaries affected by earthquake movement by enabling the retention of existing water body centreline boundaries but only as it applies to surveys in greater Christchurch. This issue will need to be considered for the rest of the country as well as any implications of past regulation relating to the right lining of such boundaries.

3.1.2 Lack of completeness for non-primary parcels

Feedback indicates the Rules are not comprehensive or consistent enough with regard to non-primary boundaries and parcels. Examples include:

- not allowing the creation of new non-primary irregular boundaries where they coincide with irregular boundaries of primary parcels or marginal strips,
- lack of clarity of accuracy requirements where new boundaries coincide with underlying boundaries for an easement-only survey,
- lack of clarity when defining existing rights that do not have spatial definition,
- having similar but different requirements in Rules 16 (alternative requirements for covenant parcels) and 17 (alternative requirements for non-primary parcels), and
- being too restrictive with regard to walking access easements over extensive rural land.

3.1.3 Lack of completeness for the marine cadastre

There is an increasing demand for land rights to be defined seaward of the historical 'dry land' based cadastre. Examples resulting from the Marine and Coastal Area (Takutai Moana) Act 2011, changes to the Resource Management Act 1991, and the Marine Reserves Act 1971 include:

- on subdivision, private land below Mean High Water Springs (MHWS) becoming part of the common marine and coastal area, which itself has no specific definition,
- the shift of Crown and local Authority land below MHWS into the common marine and coastal area,
- customary marine titles, and
- the creation of marine reserves.

In many cases the Rules do not adequately cater for the unique circumstances associated with these rights. Witness mark requirements are one of the most obvious examples.

3.1.4 Compliance cost for simple boundary redefinitions

The compliance cost of recording in a CSD the marking of a boundary point where there are no survey issues may not be reasonable (rule 11 Monumentation CSD). Simplifying the ability to record this marking without have to provide a 'complete' CSD could be considered.

3.1.5 Other issues

A number of other issues have also been identified for consideration as part of the review:

- Review of 'extensive rural boundary point provisions',
- Merging of permanent reference mark (PRM) and witness mark requirements,
- The applicability of accuracy classes to water boundaries,
- Requiring all reduced levels to be in terms of the NZ Vertical Datum 2016,
- Introducing a requirement for posts to be physically marked where defining a boundary,
- The extent to which CSDs need to include sufficient vectors to verify the accuracy between points (noting that most of the vectors are calculated),
- Whether the creation of new arc boundaries should be permitted,
- Occupation information requirements,
- The CSD recording the date of survey fieldwork.

3.2 Issues about how the Rules are set out

This section sets out issues related to how the Rules deliver the requirements i.e. issues on how well the Rules can be interpreted and applied.

3.2.1 Lack of a clear context

Feedback has suggested that there would be benefit in providing the context and purpose of the Rules to assist in interpreting and understanding their relevancy. This could include an overarching explanation of the purpose of the Rules (i.e. the desired outcomes the Rules are designed to achieve) as well as the reason for each rule. These reasons could be provided as guidance material linked directly to the related rule - the promulgation of the Rules as deemed regulations does not allow for such detail to be included in rules themselves.

3.2.2 Lack of flexibility

Feedback has highlighted some frustration with some of the detail within the Rules.

The Rules were a best attempt to balance prescription with flexibility. Prescriptive rules set out in detail the requirements and expected results in standardised form. Prescription is also required where the law is specific. When such prescription is complied with, a surveyor can be confident their CSD will be approved. Prescription also enables any measurable rule requirements to be automated and enables surveyors and LINZ to automate their methodology and quality assurance processes.

Flexibility, on the other hand, enables surveyors to derive different solutions that achieve the desired outcomes. It also provides for circumstances not anticipated when the Rules were drafted but constrains automation and makes validation and deposit processes more complex and time consuming.

Undertaking a cadastral survey always involves a degree of professional decision-making, analysis and computation guided by and made in conjunction with the Rules. Good regulation must find an appropriate balance between how much of the detail is specified and what should be left to interpretation and decision making. An appropriate balance recognises that the physical reality, the law, human decision-making and measurement are not always consistent or perfect. The Surveyor-General must, amongst many things, have regard to the efficiency and effectiveness of measures to manage risks and the costs and benefits of compliance[8].

Feedback has highlighted that there is at times frustration with complying with the detail in the current Rules suggesting that this balance may not be currently achieved. This is highlighted in the digital operating environment (such as the lodgment process) where Landonline has much less tolerance for non-standardised data and requires 'forced' responses.

3.2.3 Poor structure and cross-referencing

Some surveyors have found the Rules difficult to interpret and apply. The Rules were drafted using precise language to ensure their legal enforceability while minimising ambiguity and repetition. This has resulted in complex sentences and many rules being dependent on other rules. Sometimes the dependencies are cross referenced but other cases there are cascading requirements without any cross referencing. Surveyors are frustrated with having to read and reread rules to understand their meaning and then search through the Rules to ensure they have identified all of the applicable requirements. This has also caused an increased risk of non-compliance.

Feedback has also suggested the Rules should be set out with related items placed together. An example would be having a section dedicated to non-primary parcels.

3.2.4 Unclear terminology

Some of the terminology used in the Rules is considered by surveyors to be unclear. There was a step change in the some of the terms used in the 2010 Rules designed to bring about standardisation in concepts, meanings, and alignment with terms used in modern technology. Surveyors have indicated that the meaning of some of this terminology is unclear and therefore there is confusion as to how the Rules apply. One example is the term 'define by survey' which relates to a method of survey rather than a level of definition.

There is also confusion with similar terminology used in Landonline having different meanings e.g. balance parcel as defined in the Rules and 'balance parcel functionality' in Landonline.

The 2010 Rules were written to be technology independent but as Landonline is the only submission platform there is a question as to whether there is still a need to retain this

[8] S7(2) Cadastral Survey Act 2002.

independence. This has implications for the future Advanced Survey and Title Services system (ASaTS).

3.3 Issues about the applicability of Rules

This section sets out issues relating to the applicability of rules.

3.3.1 Survey Office CSDs to record boundary conflicts

Some surveyors have expressed concern with LINZ allowing a Survey Office (SO) CSD to record the redefinition of a boundary where there is conflict (e.g. where the redefinition survey identifies a difference to that boundary as recorded in the title). The feedback refers particularly to greater Christchurch but they consider the issue applies to all of the country. Their concern is that by only recording the difference in the cadastre, there is potential to undermine public confidence in the cadastre and the secured value of the land. For example, non-survey experts including lawyers, land developers, and architects using the title information could be misled. They believe there should be a requirement for such redefinition CSDs to be recorded on a Land Transfer CSD, so that the title can be updated to record the later survey definition.

3.3.2 Legal structure of the Rules

One set of feedback expresses the view what a surveyor currently certifies as a cadastral survey dataset (CSD) is different from the legal definition of CSD set out in s4 Cadastral Survey Act 2002. It suggests some of the non-spatial components, for example the easement and memorandum schedules, should not be included in the information being certified. This feedback proposes that the Rules should be structured into three separate sections; Cadastral Survey Information, Cadastral Survey related Information, and Integration Information.

3.3.3 Issues with data quality

Analysis of the requisition data shows a number of the requisitions result from incorrect or incomplete data being captured into a CSD rather than an issue with rule requirements. Similar themes have emerged from the LINZ field and office audits of survey firms.

In these cases this may not signal an issue with the Rules but perhaps a wider systems issue. Methods to address this could include a range of interventions which support strengthening quality assurance systems and processes when CSDs are lodged, e.g. the Landonline interface, educational or guidance material.

3.4 Issues just around the corner

The following are issues that will be considered as part of this Rules review.

3.4.1 The need for a CSD plan

Surveyors currently submit and certify a CSD that contains the data components as well as the depiction of that data in the form of plans. One of the innovation ideas under consideration for ASaTS is to remove the requirement for the CSD Plan and rely instead on the data and suitable tools for displaying that data in forms tailored for the particular use. Such an approach would also impact on the requirements for CSDs defining boundaries limited in height, as these are currently only submitted in the form of a plan. Although such a proposal would be unlikely to be put into effect until ASaTS is operational, it could be enabled by suitably worded rules. It is therefore proposed for consideration as part of the review.

3.4.2 3D CSDs

The cadastre and the Rules already support the determination and recording of boundaries limited in height. However the Rules are based on traditional surveying techniques (e.g. rule

6.8 requiring a reduced level for a stratum boundary) and the use of 2D 'plans' to describe those boundaries (eg. plan graphics depicting the cross-sections of units). Those plans can be difficult to interpret and prone to error. There is a growing need for the cadastre to receive and record this 3D information in digital form, following the same path that took '2D' plans into '2D' digital CSDs. How 3D information could be collected and then stored is being evaluated as part of the ASaTS project. Noting that ASaTS is not yet operational it is proposed that as part of the Rules review, consideration be given to suitably enabling rules.

3.4.3 Non-traditional data types and sources

Increasingly geo-referenced photography, and drone and satellite imagery are used to determine the location of objects and/or features in space or record their existence. This evidence, which could help meet the requirement for occupation information, has not been able to be incorporated as part of a CSD or stored in the cadastre to date. The recording of information in its different formats should be considered as part of the review.

3.4.4 Collection, storage, and production of cadastral data

Traditionally, surveyors have collected the spatial elements of a cadastral survey by direct measurements (vectors or levels) to survey marks and positions; with this data being submitted into the cadastre in the form of bearings, distances and reduced levels. The means of collecting information is changing with the use of different technology:

- scanners and associated applications are now used by the wider spatial industry to create point data models and building information models to provide detailed information on the location of property objects.
- GNSS, while not new technology is increasingly being used; 54% of all CSDs now lodged include GNSS collected data whereas in 2010 it was 20%.

How this data could be collected and faithfully represented in a CSD is proposed as part of the review.

3.4.5 Ongoing automation

Automation and smart technology advances will improve the ability of surveyors to complete and quality assure their cadastral surveys with more rigour, efficiency and at reduced cost. This can be assisted by rules that are easily automated. For this to occur, the requirements need to be specified explicitly in the Rules. This is particularly important in how the Rules interact with Landonline (and future ASaTS) and is a consideration for the review.

3.4.6 A changing physical environment

The earth's surface is constantly changing due to deep seated and surface ground movement. The 2011 Christchurch and 2016 Kaikoura earthquakes have shown the need for a resilient and adapting cadastre. In response to the unique movements of land caused by the Christchurch earthquakes the Canterbury Property Boundaries and Related Matters Act 2016 and a set of rules for greater Christchurch were created. Consideration needs to be given to ensure rules adequately cater for land movement throughout the country.

The rules may need to address issues related to sea-level changes. This impacts on MHWS and any other tidal water boundary and therefore the rights and responsibilities for coastal land owners and right holders within the marine areas.

3.4.7 More accurate cadastre

The proliferation of increasingly accurate GNSS enabled and emerging technologies (e.g. mobile phones through attached antennas or Precise Point Positioning together with transformation algorithms) will allow survey accuracy to be achieved by the public.

There is also a significant increase in demand for a better alignment of the integrated spatial record of boundaries (e.g. the parcel fabric view in Landonline) with other geo-referenced information. This demand is particularly evident today in rural locations where survey-accurate data has not been captured or lodged.

One of the many outcomes of Rules 4.1 (horizontal datum - orientation), 4.2 (horizontal datum – connection) and 9.6.14 (boundary dimensions in a Diagram of Survey) is an increasingly accurate survey network and parcel fabric. The Rules amendment of 2012 reduced the requirement to include boundary vectors for large parcels in rural areas by changing rule 6.3 (acceptance of boundaries). It was noted the reduced requirements were counter to the objectives of the cadastre. Consideration needs to be given to these issues.

4 The future environment

A number of issues relating to the cadastre in the foreseeable future have been identified. Many of the future trends are described in Cadastre 2034[9].

4.1 Issues for the future

While the following issues can be anticipated, at this point in time they are too abstract or rely on the actions of other parties and it is anticipated they will not be part of this Rules review.

4.1.1 ASaTS

The ASaTS project, underway at the moment, will deliver a new technology platform and is likely to change the processes around survey capture and plan generation. The need for such changes may drive amendments to the Rules. The specific implications are unknown but ASaTS will be a major change in the cadastral system. This will have significant implications for future rules, but may be able to be facilitated by this review.

4.1.2 A dynamic cadastre

Cadastre 2034 outlines the need for a time sensitive cadastre and promotes a real-time cadastre. Examples of drivers for a time sensitive cadastre are:

- enabling users to view the historic spatial extent of rights that existed at a given time in the past,
- accounting for earth movement,
- accounting for moveable boundaries e.g. water boundaries,
- catering for rights that have temporal limits or are periodic (ie. seasonal access).

This may have implications for Rules in the future, including the possible use of a dynamic datum.

4.1.3 Data use and reuse

Cadastre 2034, the broader Better Public Service outcomes[10], and Central Government's open data declaration and programmes[11] all signal a call for an increased ability for the Government and public to use and reuse public datasets. There is an expectation that information contained in CSDs and information derived from CSDs and the cadastre is made available for use.

[9] Cadastre 2034. A 10-20 year strategy for developing the cadastral system. LINZ 3 February 2014.

[10] http://www.ssc.govt.nz/bps-improving-interaction-government (See outcomes 9 and 10 specifically).

[11] https://www.beehive.govt.nz/release/open-data-will-benefit-public-economy and https://www.ict.govt.nz/guidance-and-resources/open-government/new-zealand-data-and-information-management-principles.

4.1.4 Ability to accommodate legal innovations and the broader cadastre

New types of rights, with or without accurate spatial definition are being created and will continue to be created into the future.[12] These innovations may also include legislative and non-legislative concepts. A historical example of non-legislative legal innovation was the creation of cross-leases. A recent legislative example is the Customary Marine Title the under the Marine and Coastal Area (Takutai Moana) Act 2011. There are also rights being recorded in the broader cadastre which are not required to be defined in a CSD and recorded in LINZ's fundamental cadastre. One example is a mining right recorded by MBIE. A forestry right is an example of a right not required to have accurate spatial definition nor be recorded in the cadastre.

The growing need for interoperability in government data and how readily the broader cadastre can be linked with the fundamental cadastre will need to be considered in the future.

[12] Cadastre 2034. A 10-20 year strategy for developing the cadastral system. LINZ 3 February 2014.

5 Appendix A: Cadastral outcomes, objectives, and sub-objectives

LINZ End Outcomes	End Outcome	Intermediate Outcome	Objective	Sub-Objectives
Integrity of the property rights system maintained to encourage trade, commerce and wellbeing Increase the productive use of location-based information	A. Holders of rights, restrictions, and responsibilities in land confidently know the boundaries to which they apply so that they can efficiently identify, trade and use their rights	A1 Sufficient evidence is available for correctly and efficiently locating boundaries on the ground	A1(a) The accuracy of boundary dimensions and areas is consistent with the expected land use	A1(a)1 The accuracy of horizontal boundary direction is aligned with the landowners need to derive benefit from the land
				A1(a)2 The accuracy of horizontal boundary distances is aligned with the landowners need to derive benefit from the land
				A1(a)3 The accuracy of the heighted boundaries is aligned with the landowners need to derive benefit from the land
				A1(a)4 The accuracy of parcel area is aligned with the landowners need to derive benefit from the land
				A1(a)5 The accuracy of boundary dimensions is able to be increased as land use intensifies
			A1(b) The boundary is accurately, clearly and uniquely located in relation to physical marks or features when surveyed	A1(b)1 Boundary positions are able to be readily located by reference to survey marks or physical features or by reference to other boundary positions
				A1(b)2 Marks or physical features used to demarcate boundaries are not confused with other objects in the field
				A1(b)3 Boundaries or marks are accurately positioned in relation to existing boundaries
				A1(b)4 The positions and descriptions of marks and physical features used to demarcate boundaries are correctly recorded by the surveyor
			A1(c) The original position of a survey mark or boundary is able to be re-established at any time	A1(c)1 The original position of a survey mark and/or boundary is adequately and correctly recorded in a CSD
				A1(c)2 Data from a CSD is correctly integrated into the cadastre
				A1(c)3 Sufficient information about the position of a survey mark and/or boundary is able to be retrieved from the cadastre
				A1(c)4 Sufficient original survey marks or physical evidence of boundary demarcation remains in position after survey
				A1(c)5 There is a known and sufficiently accurate relationship in the cadastre between original survey marks and boundaries, and nearby remaining survey marks

LINZ End Outcomes	End Outcome	Intermediate Outcome	Objective	Sub-Objectives
				A1(c)6 The accuracy tolerances of the survey are known
			A1(d) Interested parties are able to review the evidence relating to the surveyor's determination of the location of a boundary	A1(d)1 Adequate evidence of boundary determination is included in the CSD
				A1(d)2 The information is correctly referenced in and can be easily extracted from the cadastre
Integrity of the property rights system maintained to encourage trade, commerce and wellbeing Increase the productive use of location-based information	*(from above)* A. Holders of rights, restrictions, and responsibilities in land confidently know the boundaries to which they apply so that they can efficiently identify, trade and use their rights	A2 Parcels support the recording of rights and other statutory land administration functions	A2(a) The cadastre enables rights assigned to a parcel to be identified and new rights to be correctly assigned to a parcel	A2(a)1 The information in a CSD meets the requirements of managers of tenure systems for the correct assignment of rights
				A2(a)2 The information in the cadastre meets the requirements of managers of tenure systems for the correct assignment of rights
				A2(a)3 The cadastre correctly reflects the rights assigned by managers of tenure systems
				A2(a)4 Statutory actions and land status are recorded against the correct parcel
				A2(a)5 The quality of parcel definition enables managers of tenure systems to judge which rights are appropriate to assign to it
			A2(b) All land in NZ is recorded in the cadastre, without gaps	A2(b)1 Surveys account for the extent of all underlying parcels
				A2(b)2 All parcels in the cadastre have a survey definition of their boundaries
				A2(b)3 Parcels abutting each other have common boundary positions
				A2(b)4 All parcels are uniquely identified in the cadastre
			A2(c) Parcels with incompatible rights do not overlap	A2(c)1 Parcels abutting each other have common boundary positions (see A2(b)2)
				A2(c)2 The relationship between new parcels and existing and other new parcels is clearly established
				A2(c)3 Parcels available for rights to be assigned are identified in a timely manner
				A2(c)4 Parcels with rights assigned or extinguished are identified in a timely manner
		A3 The records in the cadastre correctly represent the	A3(a) A CSD is correct before it is accepted as being authoritative	A3(a)1 The content of a CSD is sufficient to enable its compliance with the standards to be determined
				A3(a)2 A CSD complies with the standards before it becomes authoritative
				A3(a)3 A CSD complies with the standards before it is submitted for integration into the cadastre

LINZ End Outcomes	End Outcome	Intermediate Outcome	Objective	Sub-Objectives
		physical evidence on the ground		A3(a)4 The integrated cadastre enables a CSD's compliance with the standards to be determined
			A3(b) Data in a CSD is completely and accurately integrated into the cadastre	A3(b)1 A record of all boundary marks placed is submitted for integration into the cadastre
				A3(b)2 Data in a CSD is suitable for integration into the cadastre
				A3(b)3 Data from CSDs is correctly integrated into the cadastre
			A3(c) Data from the cadastre is easily found, obtained and interpreted	A3(c)1 Data in the cadastre is easily found by users
				A3(c)2 Data is easily obtained from the cadastre by users
				A3(c)3 Data from the integrated cadastre is provided in a form that is easily interpreted by users
				A3(c)4 CSDs are submitted in a form that enables A3(c)(3) [i.e. data from the integrated cadastre to be provided in a form that is easily interpreted by users]
			A3(d) Survey records are maintained for their useful life	A3(d)1 Survey records are in a condition that enables them to be used
				A3(d)2 Survey records are retained in a format that ensures continued access and viewability
Integrity of the property rights system maintained to encourage trade, commerce and wellbeing	B. the cadastre can be relied on and used efficiently for achieving other government and public good outcomes (e.g. electoral boundary definition, resource management, emergency	B1 Information integrated into the national cadastre can be easily related to other datasets	B1(a) Parcels of land are integrated into a seamless national cadastre	B1(a)1 A CSD has a defined spatial relationship to existing marks or points in the integrated cadastre
				B1(a)2 Points, boundaries and parcels in a CSD are put in the correct spatial relationship to existing points, boundaries and parcels in the cadastre
				B1(a)3 The cadastre is not artificially divided
			B1(b) All cadastral surveys are coordinated in terms of the official geodetic datum	B1(b)1 All cadastral surveys are orientated in terms of an official geodetic projection
				B1(b)2 All CSDs are connected to the official geodetic datum
				B1(b)3 CSDs containing heights are connected to an official vertical datum
			B1(c) Parcel data from the cadastre facilitates update and management of linked datasets.	
			B1(d) Integrated data is up-to-date	

LINZ End Outcomes	End Outcome	Intermediate Outcome	Objective	Sub-Objectives
Increase the productive use of location-based information	management, land administration, utilities)	B2 Authoritative data from the cadastre is easily found, obtained and interpreted	B2(a) Cadastral data can be easily found	
			B2(b) The latest authoritative data is readily available	
			B2(c) Data is provided in a form that is able to be merged with other datasets	
			B2(d) The quality of the data is identified	
			B2(e) Authoritative data can be easily interpreted	