

# **Cadastral Regulation – As Little As Possible, As Much As Necessary**

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**Key words:** Cadastre, Survey Regulation, Intervention, Outcomes, Objectives

## **SUMMARY**

Land Information New Zealand is changing the form of cadastral regulation in New Zealand to allow the efficient operation of cadastral survey markets while ensuring that government outcomes from the cadastre are achieved. This is referred to as “Optimal Regulation” and is also being applied to other areas of the department’s business such as land registration, topographic mapping, hydrographic charting, and valuation. The phrase “as little as possible, as much as necessary” encapsulates this philosophy of optimising the level of intervention and enabling the marketplace to develop the best solutions to meet the regulated requirements.

Government interventions (the most intense forms of which are legislation and government regulations) are primarily targeted at protecting a public interest or government outcome. Lesser forms of intervention such as guidelines, co-regulation or education are also available. In the past, the government outcomes and objectives to be achieved were often not explicitly stated or, where stated, there were no clear connections between them and the low level regulations and standards in place.

A one page document of outcomes and objectives has been developed for each regulatory area. The cadastral outcomes and objectives in this paper are presented in a structured hierarchy and define the “what” of the cadastre – not the “how”. Although developed for New Zealand, the concepts are expected to be broadly applicable to most jurisdictions.

The actual interventions/regulations determined are based on an assessment of the risk of not achieving the outcomes & objectives, and identification of the level of intervention which best manages this risk. In some cases the risks are best managed by allowing surveyors and their clients decide what is required. The “what” of the cadastre should generally be enduring over time (although changes may be required due to changing government priorities) and can be reflected in long lasting cadastral standards that provide certainty and stability. If the standards have been set at the correct level, the “how” delivery aspects of the cadastre can be developed flexibly and efficiently by players in the market, to respond more rapidly to changes in technology, business environments, user expectations, etc.

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## **1. INTRODUCTION**

The regulations that govern the practice of cadastral surveying in New Zealand are being reviewed. The current processes for the “registration” (or “approval”) of cadastral surveys are often tangled in technical compliance issues (cadastral validators are error intolerant), rather than concentrating on the related risks. At the same time, the customer’s businesses are increasingly less tolerant of delays in approval, particularly if this affects the cost of finance, profit margins, etc. Consequently surveyors and developers are increasingly challenging approval decisions and authority.

In recent times society’s perception of the role of government has changed to the extent that government’s “intervention” in the market place requires justification, with an increasingly common view that individuals and the private sector are often better able to take responsibility for the services they request and deliver.

A framework has been developed that commences with asking fundamental questions about the outcomes and objectives that the cadastral surveying system has to achieve to meet the needs of the nation. Rather than starting with the existing regulations, a “zero based” approach is being taken that tests the regulatory “interventions” against the risks of not achieving these fundamental objectives. While many of the resulting Rules for Cadastral Survey (quasi regulations) may be similar to the current ones, the process is also revealing some options that challenge the traditional solutions.

The new regulations, when they are developed, are expected to provide a set of requirements that transparently link to the outcomes and objectives they are designed to achieve. The government sector will be clear on the risks to the cadastre and to the public that it is required to manage – the “what” of the cadastre. And the private sector will be clear on its role and be able to determine the best means of “how” it can meet the requirements. The regulations and the shared cadastral systems link the two sectors.

## **2. THE NEW ZEALAND REGULATORY ENVIRONMENT**

Along with many other countries, New Zealand embarked on a privatisation programme in the 1980’s which challenged the traditional role of government in delivering services and infrastructure. One of the predominant aims was to create an environment in which the “market” (i.e. the private sector) could determine “how” to deliver the services, while the government would, where deemed necessary, determine “what” needed to be delivered, protected, or achieved.

This same ethos is being applied to the cadastral system. The “what” has to be focused on public or government outcomes and objectives, and intervention justified by assessing the risks of not achieving them. Ideally the interventions should enable the private sector to determine how to best manage its methods, technology, resources, business processes, etc. while still achieving the public and government goals.

### 3. THE CADASTRAL SURVEYING ENVIRONMENT IN NEW ZEALAND

All cadastral surveys in New Zealand are undertaken by either private sector or local government surveyors (not central government surveyors). The cadastral surveys are submitted to Land Information New Zealand (LINZ - a central government agency), for approval and integration into the cadastral record. The surveys are assessed against the Rules for Cadastral Survey set by the Surveyor-General, who also works for LINZ. Surveyors take responsibility for the correctness of their survey and compliance with regulations. LINZ takes responsibility for the integrated cadastral record / system.

Only surveyors who hold a License from the Cadastral Surveyors Licensing Board are allowed to undertake cadastral surveys. The Surveyor-General is an ordinary member of the Board and does not sit on the Board during disciplinary hearings.

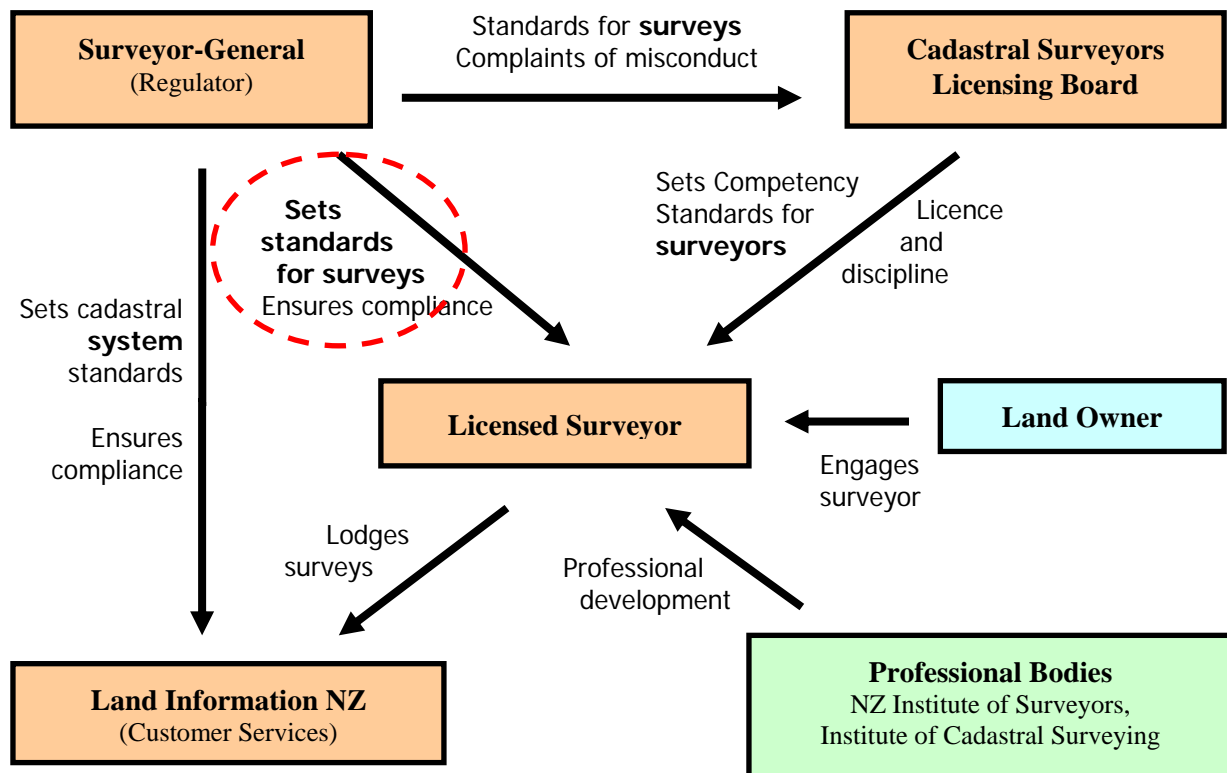


Figure 1 – Overview of NZ Cadastral Industry / Regulatory Environment

The roles of the Board, LINZ, and the Surveyor-General are enshrined in legislation: the Cadastral Survey Act 2002. Figure 1 depicts the key players in the New Zealand cadastral survey system and their key roles and relationships. The topic of this paper – the regulation of cadastral surveys – is circled (“sets standards for surveys”).

#### 4. THE REGULATORY ANALYSIS FRAMEWORK

A regulatory analysis framework has been developed and is being applied to several areas of LINZ’s business (e.g. cadastral surveying; land registration; valuation). The framework has four sequential steps as shown in Figure 2.

The first step is to define as succinctly as possible the Outcomes, Intermediary Outcomes, and the related Objectives. At the highest level are **End Outcomes**. These are the end results experienced by the community from a combination of government interventions and external factors. These are high level results. At the next level are **Intermediary Outcomes**. These are expected to lead to a desired end outcome, but are not the results sought. Next are **Objectives**. These are lower level results that must be achieved operationally in order to deliver on the intermediary outcomes.

The second step involves looking at the related processes and structures and identifying the risks of not achieving the desired outcomes and objectives. Initially this would be in the context of existing interventions and controls.

The third step determines the level of intervention required to manage the identified degree of risk – see Figure 3. Levels of intervention include, in decreasing strength, legislation, regulation, standards, guidelines, education, and none.

Finally the details of the interventions are developed to match the related risks.

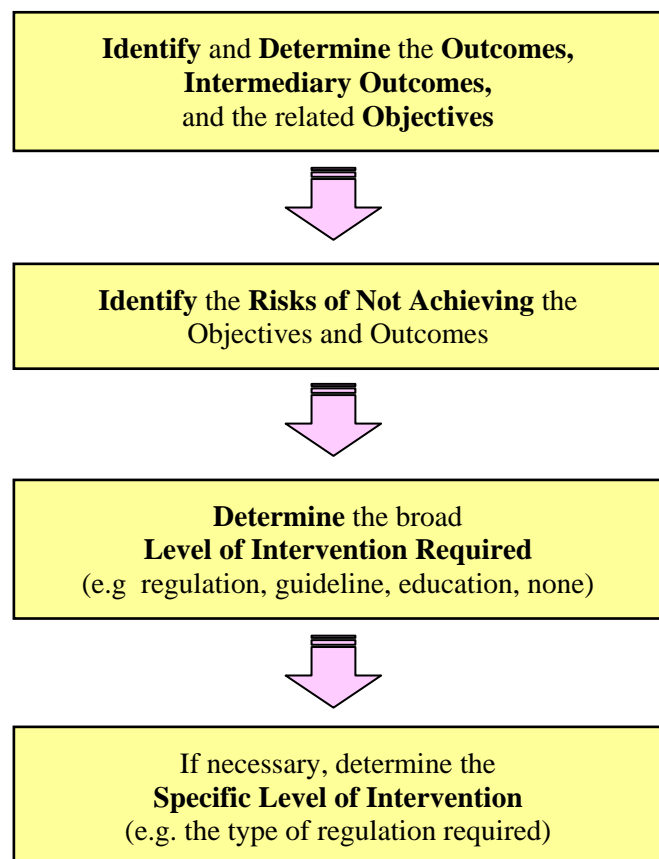
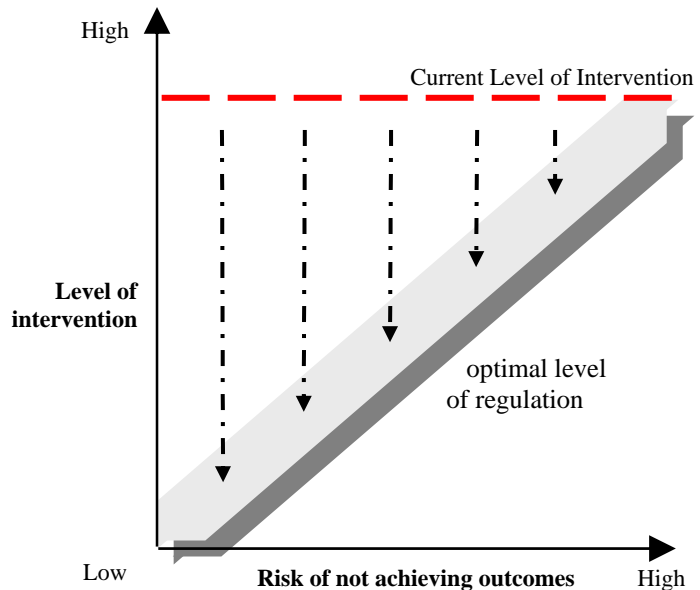


Figure 2 – Regulatory Analysis Framework

## 5. THE CADASTRAL OUTCOMES

The Cadastral Survey Outcomes and Objectives articulate what we want the New Zealand survey system to achieve i.e. our end outcome. How we achieve that is a different question. It may require a variety of tools and activities. But the key question is what we are trying to achieve in the first place. These Cadastral Survey Outcomes and Objectives are shown in Figure 4.



**Figure 3 – Optimal Regulation / Intervention**

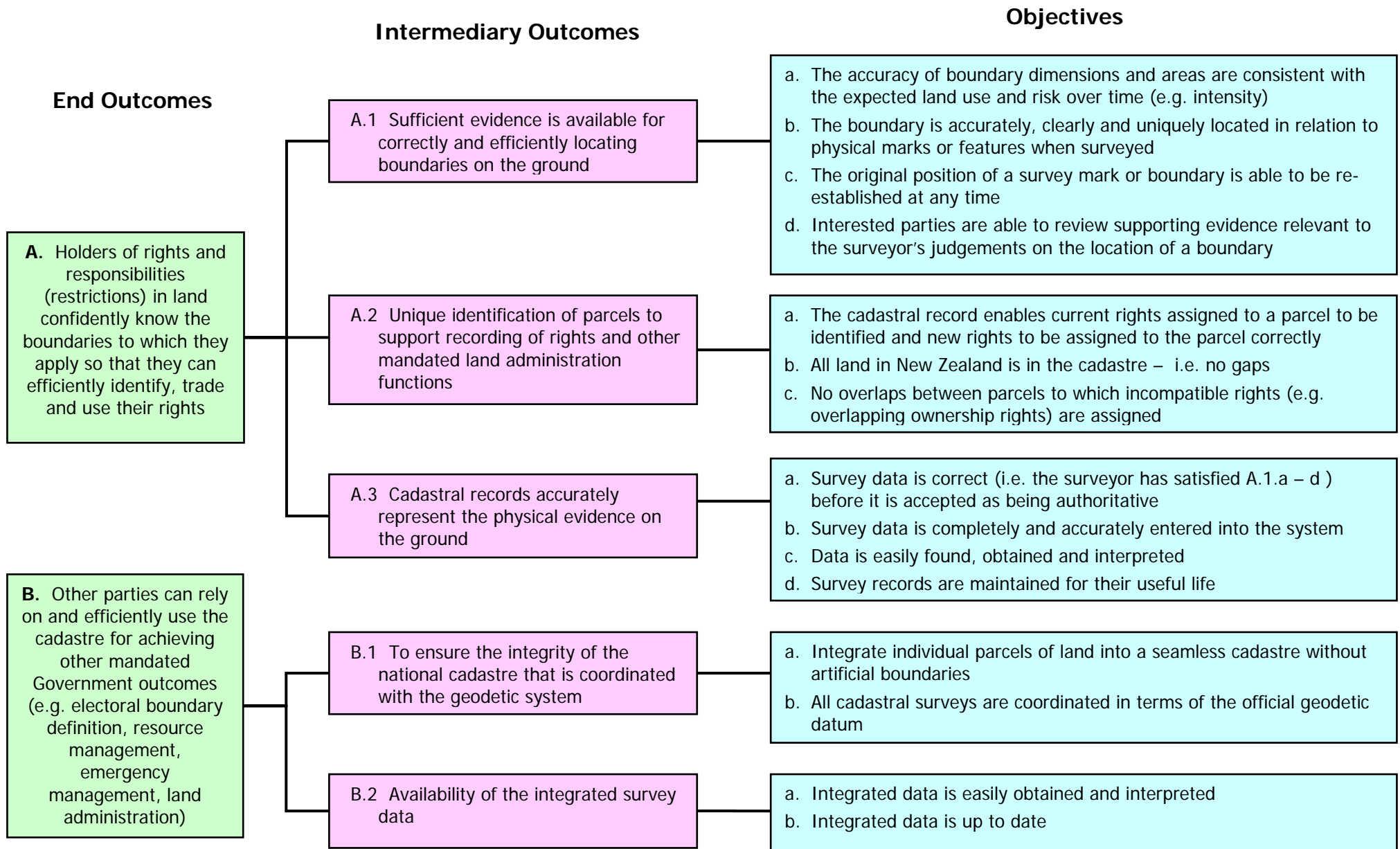
A cadastral system can be likened to a jigsaw puzzle. The pieces are individual parcels of land. The whole puzzle is the integrated cadastre. We have identified two End Outcomes. The first and most important is Outcome A:

*Holders of rights and responsibilities (restrictions) in land confidently know the boundaries to which they apply so that they can efficiently identify, trade and use their rights*

This is the fundamental purpose of the cadastral system and relates to the pieces of the jigsaw puzzle and land-owners (right-holders) interests in land. Land-owners are interested in the boundaries of their land; that it is correctly described by its size, shape, orientation and position; and that it correctly fits in with adjoining land without gaps or overlaps – particularly overlaps.

Outcome B relates to the integrated cadastre and its role in good land administration:

*Other parties can rely on and efficiently use the cadastre for achieving other mandated Government outcomes (e.g. electoral boundary definition, resource management, emergency management, land administration)*



**Figure 4 Cadastral Outcomes, Intermediary Outcomes, and Objectives**

This is the whole jigsaw puzzle. Landowners have an indirect interest in the integrated cadastre but central and local government agencies have a direct interest in it. The Cadastral Survey Act 2002 recognises this role by requiring the Surveyor-General to have regard for (amongst other things) “*the use of cadastral survey data for purposes other than cadastral survey*”.

## **6. THE CADASTRAL INTERMEDIARY OUTCOMES AND OBJECTIVES**

We do not have space in this paper to consider and describe all of the Cadastral Survey Outcomes and Objectives. We will trace one objective, A.1.c, to illustrate the purpose of developing this hierarchy and the use made of it in developing appropriate survey interventions.

Each objective must be considered in the context of the Intermediary Outcome and End Outcome that it contributes to. Therefore before discussing objective A.1.c, we will discuss its Intermediary Outcome:

***Outcome A.1 Sufficient evidence is available for correctly and efficiently locating boundaries on the ground***

The cadastre has not achieved its primary purpose unless boundaries are able to be located in the real world – i.e. the world in which right holders apply and exercise their rights. In this context, “right holders” includes neighbours and other affected parties, future holders of rights, and, in the case of public rights such as public access, also includes members of the public. In practice the locating of boundaries may be undertaken by right-holders themselves or by professional surveyors. The cost efficiency of boundary definition is particularly relevant because if it is too difficult, expensive or uncertain to locate boundaries, right-holders and others will tend to make assumptions or misrepresentations about their boundaries which is likely to lead to incorrect financial and other decisions being made on the basis of those assumptions.

Objective A.1.c is one of four objectives contributing to Intermediary Outcome A.1 described above. It has been chosen for discussion as it is a critical objective of the cadastral system from the landowner’s perspective. This Objective is.

***Objective A.1.c The original position of a survey mark or boundary is able to be re-established at any time***

This objective comes into play after the survey has created a new parcel of land with new boundaries. It may be shortly after the original survey as the new landowner occupies the land for the first time and, for example, builds fences and a house. It may be many years or

decades later as a new landowner seeks to further develop their land by adding buildings or to resolve a boundary dispute with a neighbour. It may come into play when a surveyor subdivides the property, first establishing the boundaries of the underlying parcel to prove that adjoining titles have been respected.

There is a long established (centuries old) common law principle that original evidence on the ground, particularly where it has been relied on by right holders, takes precedence over documentary evidence and even over the intended boundary location where this differs from the actual location. To over-turn this common law would require specific legislation and this is not envisaged. While cadastral administrators have debated moving from mark-based to coordinate based or vector based cadastres in the past, there appears to be no pressure from the land-owning public (or the survey or legal professions) to replace the current mark-based cadastre (grounded in the real world, through physical evidence) with a theoretical cadastre (based principally on records and databases). The effects of ubiquitous and continuous earth deformation in New Zealand also count against a theoretical cadastre because vectors and coordinates slowly degrade with time. Therefore reliance on the original position of a mark or boundary (where it can be established) is taken to be a fundamental objective of the New Zealand cadastral system – in common with most other cadastres. This is supported by a number of court decisions and precedents in New Zealand and the Commonwealth.

Achievement of this sub-objective depends on both the surveyor and LINZ. When the boundary is first created its location must be clearly and correctly described (refer also objective A.1.b). This information must then be correctly copied or transferred into the cadastral record<sup>1</sup>.

When the surveyor goes to re-establish the boundary at a later date, they will need to find and extract all relevant cadastral records, and will need to find (without ambiguity) survey marks or physical features in the field that are located on or in relation to the boundary. Some marks will have gone but there must be enough marks left for the surveyor to establish a survey relationship with the ones that remain, thence the ones that are missing, and finally the boundary itself. In relying on disparate and potentially conflicting evidence, the surveyor will need to make judgements of the relative accuracy and reliability of conflicting survey information.

## **7. RISK ASSESSMENT FOR OBJECTIVE A.1.C**

Before considering the level of intervention required, we have identified the following risks of not achieving this objective (“*The original position of a survey mark or boundary is able to be re-established at any time*”).:

1. **Insufficient provision of marks or boundary evidence.** The risk is that insufficient marks and boundary evidence were provided by the original survey to support reliable

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<sup>1</sup> For this purpose, the cadastral record is defined as the sum of structured and unstructured numerical, textual and graphical data held in digital and hardcopy form in authoritative cadastral databases



re-establishment of boundaries at a later date. This risk may be realised when a search for physical evidence of boundaries fails to find adequate marks or other physical evidence. Currently this risk is managed by a requirement to place boundary marks (usually pegs). However pegs are routinely destroyed or disturbed by development works or fencing.

2. **Incorrect recording of marks or boundary location.** Marks are placed for boundary marking but the recording of the original position of a survey mark or boundary may be incorrect or misleading. This may result in original marks not being found and being reinstated incorrectly, or being found in conflict with cadastral record. This may result in new surveys failing validation or not being able to be integrated into the cadastre due to conflict with the underlying cadastral record.
3. **Incorrect transfer of survey data into the cadastral record.** The survey may be correct and sufficient but the transfer of survey data from the surveyor's dataset to the authoritative cadastral record may be incorrect – i.e. new errors or deficiencies may be introduced during capture and recording. This may result in future surveys relying on authoritative records that are incorrect and boundaries being misplaced as a consequence.
4. **Insufficient survey marks survive for future definition.** Marks are placed to identify boundaries and are correctly recorded but the marks that remain in the field years later may not be able to be used to re-establish boundaries. This may be either because the number of surviving marks is insufficient or because those that do survive do not have a reliable and accurate survey connection to the boundary.
5. **Information on boundary definition not retrievable from the cadastral record.** The original survey information on the position of a survey mark and/or boundary may not be able to be readily found and retrieved from the Cadastral Record – either because it has been lost, because plans or images have been rendered illegible through deterioration, or are not discovered due to inadequate indexing. A crucial element of boundary evidence may be missed, affecting subsequent re-establishment of boundaries.
6. **Accuracy of original survey data is unknown.** Where conflict is found between different survey records, or between those records and the field evidence, the accuracy tolerances of the original survey may be unknown or unclear. Consequently, invalid judgements may be made based on incorrect weighting of the evidence.

Risks 1, 2, 4 and 6 are currently managed through the Surveyor-General's Rules for Cadastral Survey, directed at surveyors. Risks 3 and 5 are managed by separate Surveyor-General's standards directed at the part of LINZ (Customer Services) that processes and approves survey transactions and manages the integrated cadastral record.

## **8. ASSESSMENT OF CURRENT RULES (REGULATIONS) FOR OBJECTIVE**

### **A.1.C (RE-ESTABLISHMENT OF survey mark or boundary)**

One of the current methods of controlling risk 1 (and to a lesser extent risk 4) is the mandatory requirement to place boundary marks (usually pegs) on new boundaries. Arguments can be made that this is not a very efficient or effective way of managing these risks for the following reasons:

- A relatively high proportion of boundary pegs are disturbed during the subdivisional development phase or shortly after. Thus they are relatively ineffective at managing risks 1 and 4.
- The surveyor's client may require boundary pegs at the time of selling or fencing new sections but this may be well after the survey and engineering works.
- Pegs affected by engineering works may need to be reinstated several times at some expense.
- There are other options for managing risks 1 and 4 – most notably witness marks or permanent reference marks placed to minimise the risk of disturbance.
- Survey technology has reduced, and will continue to reduce, the cost of reinstatement of boundaries from secure and reliable witness or permanent reference marks, enabling reinstatement to occur at the time when actually required.

Therefore it is possible that the need for, and timing of, emplacement of boundary marks, should be left to the surveyor and their client to negotiate themselves. In this case standards for the permanence of witness and reference marks, and for confidence in the survey relationships between them and the boundary, may be more effective tools for managing the risks.

## **9. CONCLUSIONS**

A framework for determining the optimal level of regulatory intervention is been applied to the New Zealand cadastral system. It is expected to provide transparency through linking the proposed Rules for Cadastral Survey to the risks of not achieving the outcomes and objectives of the cadastral system. The full process has yet to run its course, but has already proven useful in developing non-traditional options for achieving the objectives.

This paper has taken just one of the objectives, identified related risks and suggested some options for intervention. There are fourteen other objectives. Further work is underway to address these, including breaking these down to sub-objectives where necessary.

It is expected that the resultant Rules for Cadastral Survey will provide appropriate freedom to allow surveyors to determine how to meet the outcomes and objectives.

## **BIOGRAPHICAL NOTES**

### **Don GRANT**

**Academic experience:** BSc Honours in Physics - Canterbury University;  
Dip Surveying - Otago University;  
PhD (Surveying) - University of New South Wales

**Current position:** Surveyor-General, Land Information New Zealand

**Practical experience:** Cadastral surveying, GPS, Geodesy, e-Land Administration, Geographic Names, International Boundaries

**International experience:** Chief Geodesist, UN Iraq-Kuwait Boundary Demarcation Commissions (UNIKBDC) 1991-93;  
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#### **Activities in home and International relations:**

Member, New Zealand Institute of Surveyors  
Councillor, New Zealand Institute of Surveyors 1996-2002  
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Member IAG Cassinis Committee 2004-  
Advisory Board on the Law of the Sea (ABLOS) 2004-

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**Practical experience:** Cadastral surveying, Spatial Information Systems, Land Information Systems, e-Land Administration, survey data conversion.

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