



Articles

*Draw conclusions on the wall** — Defence of the monumented cadastre

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A coordinated cadastre suits bureaucratic convenience, but surveyors and property lawyers need to remember that boundaries must be defined by the evidence on the ground; monuments and occupation. The expectations of a survey accurate cadastre are examined in the context of possession as the origin or title, and concludes that while survey technology may be able to define positions more accurately than ever, the art of defining boundaries remains a legal, not a mathematical process. The professional surveyor must continue to understand and apply the law, and not act as a technician applying the science. This article reviews and critiques the literature about the relationship between survey monuments, occupation, boundaries, measurements and coordinates, in common law jurisdictions with Torrens-style cadastres; New Zealand, Australia and Canada.

Introduction

The identification of boundaries is at the core of the body of knowledge for surveyors, just as it is at the core of property ownership. New Zealand and Australia have very well established cadastral systems which include a state guarantee of titles and state approved surveys, so it may be expected that the identification of boundaries is uncontentious and proprietors have no doubt about the bounds of their property. However, this is far from being the case,¹ and boundary and fencing disputes often erupt, with minimal clarifying commentary coming from legal authorities.

Property law text books are generally superficial about the boundary/fence relationship and there is 'a paucity of comment by the leading writers on the law of real property concerning surveys and boundaries'.² In the United States of America (USA), Justice Cooley's commentary³ on the judicial functions of

* B Dylan, *Love Minus Zero/No Limit*, Warner Bros, 1965.

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1 'There is nothing that causes more problems for landowners than doubts about the position of their boundaries': R R Goodwin and D F McKay, *Land Title Surveys in New Zealand*, New Zealand Institute of Surveyors, ch 3, s 3. More generally 'No aspect of registration of title has caused more controversy than the relationship of boundaries on the ground to the maps': S R Simpson, *Land Law and Registration*, Surveyors Publications, 1976, Book 1, p 125 n 7.

2 B Hayes, 'Is Nothing Sacred? — A legal perspective on Cadastral Surveying in New Zealand' (1986) 31 *New Zealand Surveyor* 320.

3 T M Cooley, 'The Judicial Functions of Surveyors: Appendix A' in J B Johnson, *The Theory and Practice of Surveying*, J Wiley & Sons, 1887.

surveyors stands out as a key text. In other common law jurisdictions; United Kingdom, Australia and Canada,⁴ surveyor-focused commentators⁵ have discussed boundary issues, and in New Zealand, NZIS publications⁶ have attempted to explain the boundary definition and occupation relationship issues for the benefit of surveyors. This literature rarely infiltrates or influences the property law body of knowledge, the result of which is that some judicial decisions are inconsistent in their consideration of survey and boundary law.

New technologies appear to be facilitating more public access to spatial data; including webmaps illustrating legal and topographical overlays of property boundaries, and mobile devices able to provide positional coordinates. The ability to fix single point positions without traditional, complicated and sophisticated survey methods has prompted discussions about the prospects for a coordinated cadastre,⁷ where boundaries would be defined accurately and precisely by coordinates⁸ rather than using traditionally developed legal and pragmatic rules of construction that place a high reliance on boundary marks and evidence of occupation and possession.

This article traverses the literature and the issues associated with boundaries: accuracy of definition, priority of evidence, case law and legislation affecting boundary definition. It concludes that too much reliance on survey mathematics and not enough reliance on pragmatic and legal doctrines has produced, rather than reduced, uncertainty and conflict. It argues against the administratively tidy, but legally contentious coordinated cadastres.

Possession

In the common law, possession is the root of title. This is an obvious result of the importance of settling on land and showing to the world at large that the land is legitimately held by the occupier. ‘The behavioural reality of possession has consistently been regarded ... as the ultimate ground of title to

4 These common law jurisdictions have key survey law texts on the matter of boundaries. These are remarkably consistent in their commentaries about the common law and boundaries. References to these texts will make up a significant part of this commentary.

5 Simpson, above n 1. F W S Cumbræ-Stewart, ‘Metes and Bounds: A discussion on some Legal Problems Requiring the Co-operation of the Surveyor and the Lawyer’ (1931) 3 *Australian Surveyor* 179 at 179–91. F M Hallmann, ‘Boundary Control’ (1970) 23 *Australian Surveyor* 163. D W Lambden and I de Rijcke, ‘Boundaries’ in *Survey Law in Canada. A Collection of Essays on the Laws Governing the Surveying of Land in Canada*, Canadian Institute of Surveying, Carswell, 1989, ch 4, pp 107–66.

6 The most recent is the extensive online document — ‘Land Title Surveys in New Zealand’. Prior to this there was a loose bound ‘Surveyor and the Law’ and then a set booklets generally titled ‘Law for Surveyors’.

7 K Andreasson, ‘Legal Coordinated Cadastres — Theoretical Concepts and the Case of Singapore’, paper presented at *XXIII International FIG Congress*, Munich, Germany, 2006. B Ballantyne, *Defining Boundaries Using only Coordinates: Appealing to Plasticity*, *Proceedings of the Canadian Hydrographic Conference and National Surveyors Conference*, 2008. C A Brown, *The Millimeter Legal Coordinated Cadastre*, PhD thesis, University of Maine, 2011, at <<http://digitalcommons.library.umaine.edu/cgi/viewcontent.cgi?article=2610&context=etd>> (accessed 2 February 2017).

8 Andreasson, above n 7, describes the establishment of such a coordinated cadastre in Singapore — the only example of successful implementation.

an estate in land. Indeed, the more obvious the possessory element, the more likely it is that the claimant of rights in land is the owner of a freehold or leasehold estate.⁹ Enclosure is the strongest possible evidence of possession and the erection of fencing normally demonstrates a state of possession. Bracton, the thirteenth century jurist, wrote ‘everyone who is in possession, though he has no right, has a greater right than one who is out of possession and has no right’,¹⁰ and similarly ‘a possessor acting as owner has not only a personal interest, but a title which is effective against all outsiders ...’.¹¹ Furthermore:

[T]he law presumes that everyone who is in possession is lawfully in possession, and throws upon the man who disputes his right to be in possession the burden of proving a better title. The advantage of this is very great. Possession is thus nine points of the law. Possession and use being the common outward signs of ownership, it is reasonable to presume, in the absence of proof to the contrary, that existing peaceable possession is rightful, and further to infer ownership from the right to possess, which we have thus presumed. Hence the law treats the actual possessor not only as legal possessor but as owner, as against everyone who cannot show a better title.¹²

Put simply, the law has accepted that undisputed possession should not unnecessarily be disturbed. This recognises the principle that efforts should be directed at quietening title rather than creating conflict by disrupting settled possession.¹³ ‘In reality, the long possession rule has operated as a controlled trade-off between documentary title and pragmatic fact, this trade-off allegedly serving both to avert costly disputes and to promote the stabilisation of title.’¹⁴

Justifications for property

Human claims to land and resources are as old as history itself. Some ideal world may have existed at some period where there existed land in plenty, where there was no need to compete for space or resources, and there was no need to recognise any personal property; to claim land as one’s own and to enforce exclusivity. That world was the supposed state of nature that Locke¹⁵ suggested existed before individuals claimed land as their own by adding personal labour to it.

The great eighteenth century jurist, Blackstone, wrote ‘There is nothing which so generally strikes the imagination, and engages the affections of mankind, as the right of property; or that sole and despotic dominion which one man claims and exercises over the external things of the world, in total

9 K Gray and S F Gray, *Land Law*, 7th ed, Oxford University Press, 2011, p 83 s 2–018.

10 *Ibid*, p 85 s 2–023.

11 F Pollock, *An Essay on Possession in the Common Law*, Clarendon Press, 1888, p 23.

12 Cumbrae-Stewart, above n 5, at 183.

13 This argument leads on to a consideration of obtaining title by prescription, such that ‘possession originally without right may be converted into full ownership by lapse of time, so a continuous title derived from such possession will become absolute whenever the time has elapsed which is required in the particular case for the final extinguishment of the former owner’s claim’: Pollock, above n 11.

14 Gray and Gray, above n 9, p 483 s 9–011.

15 J Locke, *Two Treatises of Government*, 1690, ch 5.

exclusion of the right of any other individual in the universe. And yet there are very few, that will give themselves the trouble to consider the original and foundation of this right'.¹⁶

The foundation of the right to property has been expressed in various ways. Perhaps the most influential is Locke's theory of the application of personal labour to the land that 'God gave to mankind in common'. By this means private property was created out of what was gifted, and because of the use of land (the application of labour and therefore production) and its enclosure. Labouring man had a right to such land, and particularly by showing to the world his occupation and use of that land — 'What portion a man carved to himself was easily seen'.¹⁷

Notwithstanding this foundation, property is at the core of government and falls within the protections provided by the law. It is often suggested that the very reason for government is the defence of private property,¹⁸ protection of private space and access to land and resources.¹⁹

Some may argue that property law is the natural state of things and is therefore immutable, but there have been dissenting voices against the institution of property. Thus Rousseau warned:

The first man, who having fenced in a piece of land, said 'This is mine,' and found people naïve enough to believe him, that man was the founder of civil society. From how many crimes, wars, and murders, from how many horrors and misfortunes might not any one have saved mankind, by pulling up the stakes, or filling up the ditch, and crying to his fellows: Beware of listening to this impostor; you are undone if you once forget that the fruits of the earth belong to us all, and the earth itself to nobody.²⁰

More recently, Lippmann²¹ explained:

The rights of property are a creation of the laws of the state, and since the laws can be altered, there are no absolute rights of property. There are legal rights to use and enjoy and to dispose of property.²²

Conceived in this fashion, private property can never be regarded as giving to any man an absolute title to exercise 'the sole and despotic dominion' over the land and resources of nature. The ultimate title does not lie in the owner. The title is in 'mankind,' in *The People* as a corporate community ... The purpose of laws which

16 W Blackstone, *Commentaries on the Laws of England*, Clarendon Press, 1765, Book II, ch II.

17 Locke, above n 15, ch 5 s 51.

18 For example, Locke, *ibid*, ch1 s 3 wrote 'Political power, I take to be the right of making laws, for regulating and preserving of property ...'.

19 'The great end, for which men entered into society, was to secure their property. That right is preserved sacred and incommunicable in all instances, where it has not been taken away or abridged by some public law for the good of the whole. By the laws of England, every invasion of private property, be it ever so minute, is a trespass': *Entick v Carrington* (1765) 19 State Tr 1030 as quoted in *Crown Lands v Minaret Station* DC DUN, Full Court, LVP2/05, 31 July 2009, unreported.

20 J J Rousseau, *On the Origin of Inequality of Mankind*, 1754, at <<https://www.marxists.org/reference/subject/economics/rousseau/inequality/ch02.htm>> (accessed 2 February 2017).

21 W Lippmann, *Essays in the Public Philosophy*, 2015 Facsimile ed, Atlantic Monthly Press, 1954.

22 Lippmann, above n 21, p 119.

establish private property is not to satisfy the acquisitive and possessive instincts of the primitive man, but to promote ‘the grand ends of civil society’ — which comprehend ‘the peace and security of individuals’.²³

The earth is the general property of all mankind. Private titles of ownership are assigned by law-making authorities to promote the grand ends of civil society. Private property is, therefore, a system of legal rights and duties. Under changing conditions the system must be kept in accord with the grand ends of civil society.²⁴

Not only does Rousseau question the institution of property but he refers to the importance of staking boundaries. Of course the often quoted text of Deuteronomy (19:14) illustrates a very much older commentary about the sacred nature of monumented boundaries: ‘Thou shalt not remove thy neighbour’s landmark, which they of old time have set in thine inheritance, which thou shalt inherit in the land that the LORD thy God giveth thee to possess it’.²⁵

The nature of boundaries

Boundaries have been described as invisible lines²⁶ between corner points²⁷ but more accurately they are invisible planes, having depth and height (by old definitions; from the centre of the earth up to the heavens).²⁸ Mathematically, a line (and a plane) has no width. This suggests that there is an immediate change of ownership across that line or plane. In fact it is accepted that ‘surveying is a practical art not capable of the precision of mathematics’²⁹ so the corner positions are in fact not points but error ellipses and the lines

23 Ibid, p 120. He continues ‘And, therefore, the laws of property may and should be judged, reviewed and, where necessary, amended, so as to define the specific system of rights and duties that will promote the ends of society’.

24 Lippmann, above n 21, p 122.

25 King James Bible.

26 The importance that may attach to these lines prompts a suggestion that they must be ‘magical lines’ — see the words of Titokowaru in Shadbolt’s *Monday Warriors* — quoted in M S Strack, ‘Bounding the Land: Cadastral Framework on the Taieri’ in *Making our Place: Exploring land-use tensions in Aotearoa New Zealand*, J Ruru, J Stephenson and M Abbott (Eds), Otago University Press, 2011, p 113.

27 Simpson, above n 1, p 126. He criticises Halsbury’s description of boundaries as ‘imaginary’, observing that boundaries are in fact very real. E M Kelly, *Summary of the Law Relating to Land Surveying in New Zealand*, New Zealand Institute of Surveyors, 1958, p 1 also describes a boundary as an imaginary line.

28 Cuius est solum, eius est usque ad coelum et ad inferos. Note however, that claims to property must in some way be related to the ability to take effective control (Cumbrae-Stewart, above n 5, at 187) of the space. Building and excavation technology have enabled proprietors to take effective control over extended vertical space. Tunnelling, mining and flying technology have enabled others to take effective control over very much more. New conflicts are likely to arise over subsurface rights for mining and deep drilling, and over air space with frequent use of UAVs now able to fly over property in an intrusive manner that will affect people’s right to privacy. An interesting future research question will be: To what extent can our trespass laws or other remedies deal with these intrusions? Strack and Thom have initiated such research in respect of the rights conflict between surface proprietors and subsurface (tunnel) space: M Strack and J Thom, *Claiming the Underworld — ‘ad inferos’*, *Surveying+Spatial*, September 2016, New Zealand Institute of Surveyors, 87:15–17.

29 *Equitable Building & Investment Co Ltd v Ross* (1886) 5 NZLR (SC) 229.

between those points therefore have some thickness.³⁰ In addition, the legal tolerance of title dimensions of ‘a little more or less’ allows for further variation in position within which there must be further uncertainty about ownership. It is because of a lack of understanding about the precision of these points, lines and shapes that so much conflict is initiated. ‘Everyone knows that there is no dispute more unpleasant than one between neighbours, and that if one wants to aggravate a neighbourhood dispute one can resort to the Fencing Act with a great deal of facility.’³¹

Boundaries can be both legal and physical. There is a legal representation of boundaries — the invisible lines described by geodetic reference systems: latitude (for example, the USA and Canada border of 49°N) or longitude (for example, the South Australia and Victoria border 141°E); by other mathematical reference coordinates, by bearings and distances from some origin datum; or by graphical means. Then there is the physical representation of boundaries which may be marks, posts, stones or steel rods which we usually refer to as monuments. Physical boundaries are the visible evidence on the ground which may be natural features (rivers, coastlines, ridges and cliffs)³² or man-made features; ditches, hedges, fences, and walls (even, and increasingly, on an international scale)³³ to keep insiders in and to keep outsiders out.

Boundaries need to be brought into existence either by the owners’ actions to enclose what they claim rights to, or by surveyors in placing monuments in the ground. Those boundaries may subsequently be evidenced by text, graphical or mathematical description. ‘Differences in the perceived images are fruitful sources of litigation.’³⁴ Serious issues and conflict may arise when there is doubt or discrepancy of alignment between the legal boundary and the physical boundary, and it is this issue to which this article is directed.

The purpose of a cadastral survey

The determination of boundaries is fundamentally a legal process, but because boundaries depend on measurements of the land, surveyors take on the legal responsibility to establish boundaries on the ground, and it is the marks on the ground placed by a surveyor that remain the authoritative position of a boundary. ‘Cadastral boundaries, to be useful, need to be able to be realised in the real physical world.’³⁵

30 Perhaps at least 30 mm but often more depending on the accuracy standards required relative to the site conditions and the applicable survey Regulations at the time.

31 Parliamentary discussion about passing the Fencing Act — quoted in *Gosney v Ngai Tahu Property Ltd* [2015] NZHC 515.

32 Ecological boundaries are everywhere, albeit usually rather fuzzy, but some are clearer than others and can serve a property function as well: so, eg, water/land boundaries are often the most obvious (river banks and MHW), although ridges and cliffs also serve as physical barriers and can function as territorial and property boundaries.

33 The recent prevalence of walls and barrier fences says much about our xenophobic attitudes and intolerance of neighbour intrusions. The most recent examples include the fences being constructed in Europe to keep out the flood of refugees from the Middle-East, and proposals for a secure Mexico/USA wall.

34 D W Lambton and de Rijcke, above n 5, p 120.

35 D Grant, C Crook and N Donnelly, ‘Managing the Dynamics of the New Zealand Spatial Cadastre’, Conference paper, *Proceedings of Research@Locate’14*, Germany, 2014, p 60.

The role of the colonial surveyor was significantly different from the role of the surveyor in England.³⁶ In England the cadastral pattern existed by long established occupation and use and the surveyor was involved with measuring and mapping the existing, more organic, patterns of occupation. Land ownership was relatively settled and the land market was relatively inactive. There was also a satisfactory record of ownership and a predominantly compliant population of landowners to satisfy administrative record keepers and tax gatherers. In the colonies, surveyors had quite a different agenda.³⁷ They were involved in establishing a new cadastral framework over the land,³⁸ that allowed for new boundaries and new parcels to be created to serve a newly arriving population of land buyers, keen to start production off the land and participate in an active land market (where land is regarded as a commodity) from which to create wealth either from production or from speculative sale and purchase.³⁹ The cadastral survey, therefore, has the explicit purpose of marking new boundaries on the ground, and of being the definitive evidence about boundary location.⁴⁰ All boundaries were therefore newly created; there was no other recognisable enclosure of longstanding possession.⁴¹

Monuments as boundary evidence

When we refer to monuments we are usually referring to the marks that surveyors place to indicate a boundary position on the ground. In New Zealand the most commonly used such marks are survey pegs of about 50 cm² sectional area, painted white and carved with the broad arrow to indicate government property. Other marks may also be used, such as aluminium pegs,

36 'The modes of survey adopted in a parent state must differ from those adopted in a colony; the object of the former being to map a country long peopled and divided by well-known artificial boundaries; the object of the latter being to prepare a waste of undivided country for an inflowing people': J T Thomson, 1861 as quoted in R P Gough, 'The Land Survey System in New Zealand' (1969) *New Zealand Surveyor* 11. And Scott carries this idea further: 'Where the colony was a thinly populated settler-colony, as in North America or Australia, the obstacles to a thorough, uniform cadastral grid were minimal. There it was a question less of mapping pre-existing patterns of land use than of surveying parcels of land that would be given or sold to new arrivals from Europe and of ignoring indigenous peoples and their common-property regimes': J C Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*, Yale University Press, 1998, p 51.

37 'In New Zealand, as with other younger countries, such occupation did not and even now does not frequently exist. The land has to be subdivided into parcels and monuments placed prior to the issue of titles. Survey was carried out to determine the position of the boundaries and was to a standard to enable the replacement of monuments should they be lost, and the preparation and maintenance of cadastral maps': Gough, *ibid*, as quoted in P F Dale, *Cadastral Surveys within the Commonwealth*, Her Majesty's Stationery Office, 1976, p 245.

38 Lambden and de Rijcke, above n 5, p 157: 'Colonial development of total wilderness lands needed survey definition on the ground and this had to precede the granting of title: the parcel came into physical existence by the defining survey marks. In some instances, all bounds of a parcel were marked by survey and it followed that such marks of the first survey had to assume the status of inviolable boundary determiners'.

39 M S Strack, 'Lines and Landscapes', *NZIS 120th Conference: Development in a Changing Landscape*, New Zealand Institute of Surveyors, 19–22 October 2008.

40 Dale, above n 37, p 3.

41 Of course, the whole colonial project ignored the pre-existing possession of Maori throughout Aotearoa: see Strack, 'Bounding the Land', above n 26.

steel spikes and tubes, alloy or bronze plaques, or stone cairns. Existing structures like fences or walls may be marked with a nail or a carved symbol, and trees may be blazed (a strip of bark cut away and marks carved in the wood). The point about placing a monument as an indicator of the boundary is that, in some way or other, property boundaries need to have some physical and visible presence (to represent the invisible boundary) in order to make sense to occupiers.⁴² While the invisible definition has a numeric or descriptive context, it is what is seen on the ground that takes precedence and that has meaning for occupiers.

Monuments are specially protected by law because of their importance in providing evidence of boundary position. The [NZ] Cadastral Survey Act 2002 ss 55 and 56 provides legal protection for survey marks because they represent such a vital part of our legal infrastructure. It is an offence to move or destroy any survey mark just as it is an offence for any non-surveyor to place a survey or boundary mark with the intention of misleading another person.⁴³

So any claims to private property require the establishment and recognition of boundaries, and ideally those boundaries should have some physical form.

General boundaries

The scheme of general boundaries is well described:

A *general boundary* means that the exact line of the boundary has not been ascertained in relation to the physical feature which demarcates it. It is a device of English conveyancing which has carried forward into registration of title in order to avoid the necessity of ascertaining the exact line of long-established physical boundaries. It has the great advantage of enabling the English Ordnance Survey map, a purely topographical map, to be used to illustrate the register.⁴⁴

Under this scheme the exact line of the boundary is left undetermined: as, for instance; whether it includes a hedge and ditch, or runs along the centre of a wall or its inner or outer face, or how far it runs within or beyond a fence or any other

42 See, eg, the discussion about the problem of having a no-man's land in the case *South Australia v Victoria* (1914) 18 CLR 115; [1914] AC 283.

43 An issue with the protection of boundary marks was reported in 'Removal of Survey Pegs. Magistrate's Decision', *The Evening Post*, Wellington, 8 September 1899: 'Addressing a young fellow, the head of a cooperative labour gang, brought before him at New Plymouth on a charge of having willfully removed survey pegs from Crown land, Mr Stanford SM, said: The offence of moving a survey peg is one the gravity of which it is difficult to exaggerate in fact is too impossible to see where the evils caused by removing or altering what are the landmarks of the colony will cease, as far more depends upon these marks than you at your age have possibly any idea of. I have heard from time-to-time that the offence has been committed in different parts of the colony and it is sometimes treated with a degree of levity and indifference which has always shocked me. If you knew as much as you perhaps will know some day you would realise that removing these pegs is liable to cause quarrels, disagreements, law suits, and often something more serious even than all these matters between neighbours. The existence of a peg looks obscure; it may often seem a matter of little moment to the passer-by but on the exact location of a peg depends the question of ownership of property, right of passage and other intricate matters. Therefore to remove that peg is a crime against society far greater, in my opinion than any crime of the same kind that you can imagine in any future case of this kind I shall feel inclined to impose the maximum, viz two years imprisonment, so serious do I think the crime'.

44 Simpson, above n 1, p 157.

physical boundary shown on the plan. While the register guarantees the title to the parcel as a whole against the world, it does not guarantee its boundaries to the last inch as against adjoining owners.⁴⁵

The concept of general boundaries means that a purchaser buys by description and occupation (and the plan of title is topographic), rather than by dimensions that (unrealistically) suggest precision. In England, the land was occupied and boundaries created and accepted long before the land was surveyed and before there was any cadastral or geodetic control that could provide a mathematical definition of boundaries. When boundaries are defined by occupation then there is no problem with gaps or overlaps in the cadastral record, and nothing to suggest that there is any need to define boundaries with any more accuracy than the occupation evidence.⁴⁶

General boundaries in the United Kingdom appear to provide a satisfactory account of the legal boundary. There 'the public ceased to be boundary conscious ...'.⁴⁷ Ruoff compares the registration of land in the United Kingdom with New Zealand and Australia and suggests that the evidence 'proved conclusively that attempts to fix boundaries too meticulously prompted a crop of disputes that would otherwise have remained dormant for ever'. While boundary disputes in the United Kingdom are not unheard of,⁴⁸ the pedantic insistence on unrealistic expectations of accuracy is largely avoided.

Metes and bounds

Parcels of land have also been described by metes and bounds. The metes are the measurements in a direction that describe the boundary line, the bounds are anything on the ground that marks the limits of a parcel (usually monuments — artificial or natural — placed to mark the extent of the parcel — pegs or fences; but also occupation evidence of adjoining parcels). Metes and bounds have provided satisfactory descriptions of the extent of land parcels especially when there were few surveyors to provide measuring datums and maps, and new parcels were being claimed with consent of adjoining occupiers.⁴⁹ One of the problems with such boundary definition is that some physical elements used in the description may be removed or disturbed during the development activities on the land, so the definition may

45 Dale, above n 37, p 29 — citing Wallace, Chief Land Registrar, 1931.

46 In England, stone walls, hedges, ditch and banks are common boundary features — all of which could be several metres wide. Nor is there an issue with technological improvements which enable distances to be measured with ever increasing accuracy.

47 Ruoff as quoted in Hallmann, above n 5, at 167. This is mirrored by research in Cape Town which 'found that those who knew of the presence and location of boundary monuments were "fiercely protective" of their space and of their boundaries ... On the other hand, respondents in areas in which there were no monuments were amenable to "reorganising" their boundaries, in light of minor encroachments over boundaries': B Ballantyne, K Khan and T Conyers, *Coordinates in Context: Technical, Social & Legal Implications of using Coordinates-Only to Define Boundaries*, Report to the Canadian Council on Geomatics, 1999, p 16.

48 See *Alan Wibberley Building Ltd v Insley* [1998] 1 WLR 1092, *The Guardian*, 2000. C Dyer, *The £250,000 border skirmish*, 1998. Also reported in (2000) 22 *Survey Quarterly* 29.

49 For example, in the early colonial period of settlement in North America.

lean more heavily on the occupation evidence. ‘The evidence of the bounds, however, carries more weight than that of the metes, so where they come into conflict with each other the evidence of the bounds will, as a general rule, prevail over that of the metes.’⁵⁰ This is another way of saying that accepted occupation is more important than measurements.

Coordinated boundaries

Coordinates have long been used as a convenient way to describe boundary positions; observation coordinates are simply another way to describe the bearing and distance of a boundary. Coordinates facilitate positional calculations and the matching of overlapping survey data. But such coordinates do not serve to fix boundaries; they only provide initial evidence of where a boundary may be. Observation coordinates are therefore, quite different from a legal coordinate cadastre, where it is the coordinates which define the legal boundary.

Brown⁵¹ investigated the establishment of a legal coordinate cadastre with a particular focus on whether a truly accurate (defined by Brown as millimetre accurate) coordinate cadastre was achievable. He concluded that it was technically possible, but would take considerable effort to achieve. Singapore was the best example, having been established with the goal to make coordinates absolute and legal, but even there, full indefeasibility of the coordinate boundaries was not achieved. Coordinates ‘may be corrected or adjusted under certain situations and therefore do not meet the requirements and characteristics of the legal coordinated cadastre ...’.⁵²

The quality of a coordinate cadastre depends on the quality of the national datum.⁵³ However, the datum may need almost constant refinement as measurement standards change, as understanding of plate tectonics improves, as local scale distortions are identified, and as progressive decisions are made with regard to which and when updates are applied. Coordinates may only be relevant when time stamped, so can never be described as absolute. The NZ dynamic cadastre will be intermittently updated according to the dynamic control network.⁵⁴ Patches will be available to account for exceptional ground deformation, such as earthquakes, but other surface changes, like liquefaction shifts, will be much harder to account for given that the shift may only affect a few boundary marks or part of a land parcel. From a geodetic scale such a shift may be insignificant, but from a property definition point of view it may be very relevant for a proprietor.⁵⁵

There is no doubt that GIS and computer technology has facilitated both large databases and relatively user-friendly processes to make positioning technology available to all well-informed and well-resourced users. It is also

50 Hallmann, above n 5.

51 Brown, above n 7.

52 Ibid, p 13.

53 Ibid, p 14.

54 Grant et al, above n 35.

55 This is the dilemma that property redefinition in post-earthquake Christchurch is dealing with now — Canterbury Property Boundaries and Related Matters Act 2016 s 8(2) ‘The boundaries are deemed to have moved or to move with the movement of land caused by the Canterbury earthquakes unless the movement was a landslip’.

true that GIS applications and use are rapidly expanding (beyond boundary information, to include all infrastructure and feature recording) and the need for a standardised locating framework is recognised. A dynamic coordinate system serves these GIS purposes, and should certainly be used as the standard for the spatial requirements of the GIS.

The advances in GNSS technology has enabled relatively cost effective, accurate and easily used single point positioning,⁵⁶ and very significant technological progress made in the new dynamic geodetic datums enables a very high level of accuracy in positioning. ‘This would enable all boundary points to be assigned geodetic coordinates.’⁵⁷ This does not, however, mean that the definition of property boundaries needs to prioritise a coordinate over a monument. So ‘it is proposed that this not be a legal coordinate cadastre but that in the absence of other evidence, such as an undisturbed boundary mark, that the coordinate will provide another layer of evidence’.⁵⁸ One of the strengths of a monument-based cadastre is that the relatively permanent ‘witness marks’ from which either observation vectors or coordinate pairs exist, can be used to easily reproduce boundary monuments.

It is worth noting that Cadastre 2034⁵⁹ suggests that the spatial data required for GIS should be used for cadastral work also: ‘The vision is that the information in such a broadened cadastre will be readily accessible and that people will have confidence in the spatial extent of all the various rights, restrictions and responsibilities’ and that access to the spatial data on mobile devices ‘could be used for locating and depicting boundaries on the ground’.⁶⁰

There is evidence of the trend towards adopting coordinate cadastrals amongst many states developing sophisticated databases and systems. The justification is illustrated in the statement from Craig Sandy: ‘improved rigour and accuracy of the DCDB⁶¹ will provide powerful spatial infrastructure to generate technical and legal certainty for all stakeholders’.⁶² I suggest that this may be the dream of bureaucrats, but it is certainly not based on legal precedent nor on the expectations of property owners. ‘Designers of information systems will need to come to terms with varying levels of legal reliability and uncertainty, both of which, while perhaps unpalatable, have always been part of the survey practitioner’s reality.’⁶³

56 These systems do not need any local control marks or reference system as the coordinate reference system is external to any allotment boundaries, thus positioning is quick and easy.

57 G Blick and D Grant, *Possibility of a Dynamic Cadastre for a Dynamic Nation*, International Association of Geodesy Symposia, 1998, vol 118, pp 107–13.

58 Ibid.

59 Land Information New Zealand, *Cadastre 2034: A 10–20 year strategy for developing the cadastral system*, 2014.

60 and Information New Zealand, *Excellence in the Cadastre. A program to improve the cadastral survey system within New Zealand*, Consultation draft, March 2014. This statement stops short of suggesting that boundaries may be defined by the coordinates.

61 DCDB — digital cadastral database. For example, see <<http://www.linz.govt.nz/data/linz-data/property-ownership-and-boundary-data/historic-property-databases/dcdb-data>> (accessed 3 February 2017).

62 C Sandy, ‘Shaping the Cadastral Infrastructure for a Digital Future’, *FIG Congress Engaging the Challenges — Enhancing the Relevance*, Kuala Lumpur, Malaysia, 2014.

63 Lambden and de Rijcke, above n 5, p 163.

Ballantyne et al⁶⁴ prepared a report to the Canadian Council on Geomatics to discuss whether a legal coordinated cadastre was technically feasible, socially acceptable, and legally permissible. It concluded that if a coordinates-only approach to boundary definition was established 'then legislation must be explicit in setting out the conditions that must be met so as to ensure that the use of coordinates is reliable; must prohibit the concurrent use of monuments at the same boundary; must give no legal sanction to temporary monuments; and must set relative accuracy tolerances within which no boundary dispute would be entertained'.⁶⁵ It remains difficult, however, to work out what a statute would say about the importance of monuments, fences, longstanding occupation and the public interest in quietening titles.

Hierarchy of evidence

The law has long recognised that while surveying is an art as well as a science — measuring the earth's surface is not capable of achieving the perfections and precision of a science. It is left to the ART of surveying to define boundaries. 'The art of boundary redefinition must by some degree be acquired by experience ... it is therefore necessary that the surveyor try to emulate the courts' decision making process when carrying out a boundary redefinition.'⁶⁶

The hierarchy of evidence is a concept that has been developed, expressed and repeated in a series of case reports. Fundamentally it derives from the common law recognition of the importance of possession, but it has been further modified to suit the development of cadastral surveying which puts the focus on the monuments placed to represent legal boundaries. In New Zealand it has its clearest expression in the case *Equitable Building Society v Ross*, where Richmond J provided a commentary that has served as a model for many later statements.⁶⁷ In this case about a boundary dispute on Lambton Quay, where there was some uncertain survey evidence, where deed dimensions did not quite match the occupation, and where there had been many years of quiet possession, the judge stated:

In such circumstances, there can really be no better identification of the land to which the grant relates than long and unchallenged occupation by the grantee and those who claim through him of an allotment which in position, dimensions and area

⁶⁴ Ballantyne et al, *Coordinates in Context*, above n 47.

⁶⁵ *Ibid*, p 3.

⁶⁶ Queensland Surveyor General, 'Survey Principles and Case Law Rulings' in *Cadastral Survey Guidelines*, 2004, Issue 2, s 4.1. And similarly, Lambden and de Rijcke, above n 5, p 140: '... it is vital to this operation that the surveyor understand the legal process in the courts and how evidence is treated in the search for facts'.

⁶⁷ Richmond J's commentary follows earlier American precedent from an 1807 case: 'There is no rule of construction more established than this, that where a deed describes land by its admeasurement, and at the same time by known and visible monuments, these latter shall govern. And the rule is bottomed on the soundest reason. There may be mistakes in measuring land, but there can be none in monuments. When a party is about purchasing land, he naturally estimates its quantity, and of course its value, by the fences which enclose it, or by other fixed monuments which mark its boundaries, and he purchases accordingly' (*Howe v Bass*, 2 Mass 380 (1807) as cited by G Campbell, 'A principles-based approach to cadastral reinstatement for Australian jurisdictions' (2011) 56 *Journal of Spatial Science* 15 at 17).

corresponds, in general, though it be somewhat roughly, with the description in the grant. Neither the words of a deed, nor the lines and figures of a plan, can absolutely speak for themselves. They must in some way or other, be applied to the ground. Where there are no natural boundaries, and original survey marks are gone, and there is no great difference in admeasurement, a longstanding occupation originally authorised by the proper public authority, and acquiesced in throughout the period by the surrounding owners, is evidence of a convincing nature that the land so occupied is that which the deed conveys. Even where monuments exist which enable a more accurate survey to be made, no trifling discrepancy can be allowed to over-rule the practical interpretation put upon the instrument by such occupation. The occupier is not to be driven to rely on a mere possessory title; but has a right to assert that the land he holds is the very land granted. Land surveying is a practical art; which is as much to say that it is not capable of the ideal precision of the mathematics. The most accomplished surveyors must differ in their measurements, though it may be only by some minute fraction of a link. The measuring-chain itself varies with the temperature. It would be absurd to say that title is to be affected by every re-measurement.⁶⁸

As an additional warning to surveyors examining boundary evidence, Richmond J further states: ‘It is utterly unsafe to depend upon the interpretation which surveyors may put on the documentary evidence of title without reference to possession’.⁶⁹ Richmond J recognised that the purpose of the Land Transfer Act was to make title to land more ‘dependent on a “cadastre” or register-survey map’ and that no title shall be acquired by possession, so he advised that increased vigilance would be required to ensure accurate surveys that took into account longstanding possession, but that ‘it will be found impossible in the long run to dispense with reference to possession as one of the bases of the title to land’.⁷⁰

In simple terms, the principle extracted from Richmond J’s statement ranks the priority of evidence thus:

- (1) natural boundaries;
- (2) originally placed survey monuments;
- (3) longstanding possession (acquiesced in and authorised);
- (4) abuttals — the bounds represented by surrounding parcels;
- (5) lines on a plan and words and dimensions on a deed.

This hierarchy is not necessarily intuitive, so it is worth some explanation. First of all, boundaries should be based on evidence which is least likely to be doubted.⁷¹ Natural monuments take precedence over artificial monuments,

⁶⁸ *Equitable Building & Investment Co Ltd v Ross* (1886) 5 NZLR (SC) 229 at 234.

⁶⁹ *Ibid*, at 237.

⁷⁰ *Ibid*, at 238.

⁷¹ ‘This ranking flows from the proposition that most weight should be given to those matters about which a person is least likely to be mistaken’: Dale, above n 37, p 26. Similarly Greenleaf states (*Lambton and de Rijcke*, above n 5, p 129): ‘Where there is ambiguity in a grant, the object is to interpret the instrument by ascertaining the intent of the parties; and the rule to find the intent is to give effect to those things about which men are least liable to mistake. On this principle, the things by which the land granted is described are thus ranked according to the regard which is to be given to them: (1) natural boundaries; (2) lines actually run and corners actually marked at the time of the grant; (3) the lines and courses of an adjoining tract, if these are called for and if they are sufficiently established, to which the lines will be extended; and (4) the courses and distances, giving preference to one or the other according to circumstances’.

because they are more certain in identification and less likely to be disturbed. A natural boundary in the form of a river, lake or sea, is readily observable and normally will not disappear.⁷² The fact that these boundaries are ambulatory causes some concern, and so in fact the legal boundary may not remain coincident with the water boundary.⁷³ Furthermore, the actual definition or survey fix of the natural boundary line may be rather vague.⁷⁴ However, none of the above detracts from the recognition of a natural feature as a legitimate boundary.

New boundaries (for example, of a subdivision) are designed, calculated, mapped and set out (pegged) on the ground; the boundaries have no meaning to any land occupier until they are marked on the ground. It takes a surveyor to transfer the planned and described boundaries to the land. Once this is done there is an expectation that an occupier can depend on those boundary pegs to define their boundary.⁷⁵

Once monuments are placed in the ground, land proprietors will then be able to occupy their land and enclose it if required. In that act of occupation, development or enclosure boundary pegs are often lost or disturbed, so in subsequent reliance on found pegs there must be a careful check to determine if they are in the position as originally placed. Adjoining witness marks and original field notes showing check measurements are useful sources of evidence about original position, proving the reliability of the marks.

The occupied boundary, if long established and undisputed is the next best evidence of the boundary. Subsequently ‘... in a legal controversy the law as well as common-sense must declare that a supposed boundary line long acquiesced in is better evidence of where the real line should be than any

⁷² Except when a river bed may dry up.

⁷³ For example, when the water body has moved as a result of observable storm damage, that is, when the movement was not slow, gradual and imperceptible. See the doctrine of accretion and erosion in G W Hinde, D W McMorland and P B A Sim, *Land Law in New Zealand*, LexisNexis Wellington, 2003, s 22.010.

⁷⁴ For example, when the line of MHWL varies day by day, or when the bank of a river has no readily identifiable edge.

⁷⁵ Owners ‘must be taken to know their own boundaries, and these may be taken to be the true boundaries until the contrary appears’: Cumbrae-Stewart, above n 5, at 186. In resolving any uncertainty about boundaries; ‘pegs are paramount to the [survey] plan’ and this is a ‘principle of general law consistent with its bias to giving effect to the actualities of possession’; F M Brookfield, ‘Prescription and Adverse Possession’ in *The NZ Torrens System Centennial Essays*, G W Hinde (Ed), Wellington, Butterworths, 1971, p 197. ‘Pegs are paramount to plans’ or ‘marks before measurements’. ‘The boundaries are fixed [by the placing of monuments] regardless of any survey; indeed there is theoretically no need for measurement although in practice it is desirable to have some survey evidence of the boundaries’: Dale, above n 37, p 25. Citing Australian case *Steven v Williams* (1886) 12 VLR 152: ‘a parcel of land described in a certificate of title means the parcel of land marked out on the ground by pegs, the position of which pegs is shown (correctly or incorrectly) on the plan. The parcel of land so referred to is the parcel of pegged land and is not the parcel of land which would have been pegged if the pegs had been put in where the plan erroneously indicates that they had been put in’. And ‘to hold that the person who enters and takes possession by the survey pegs is not entitled to hold that possession would be to introduce confusion into all the surveys of the Colony’ (*Russell v Muller* (1905) 25 NZLR 256), ‘parties buy or are supposed to buy in reference to those monuments, and are entitled to what is within their lines, and no more, be it more or less’ (Cooley, above n 3, p 580).

survey made after the original monuments have disappeared'.⁷⁶

In attempting to change from the common law's dependence on possession as the origin of title, in New Zealand the Land Transfer Act 1870 was passed in the context of recognising the need for security of title and for more dependable survey definitions; in other words, to provide for a cadastral system where the register was everything and land parcels were unambiguously defined by high quality survey information.⁷⁷ However, 'No evidence has been found to support the idea that boundaries are ever guaranteed in an absolute sense. There is no such thing as an exact measurement ...'.⁷⁸

While it should be the aim of the cadastre to provide a clear picture of all boundaries and property rights, and accurate surveys are required to contribute to the cadastre, the goal is not to have a tidy cadastre, but to quieten titles; to accept longstanding undisputed occupation; to avoid creating boundary disputes.

The cadastre exists to serve the people, not for the convenience of administrators:

Within the Commonwealth, the definition of boundaries in terms of coordinates rather than monuments is contrary to common law. Title is issued with respect to what is on the ground, not in terms of lines on the map. The definition of boundaries in terms of coordinates is a neat bureaucratic solution that is particularly useful when land banks are introduced and information is held in computer compatible form. But administrative convenience should not override or be divorced from conditions on the ground. Coordinate systems are an extremely convenient method for describing boundaries and their use has many advantages if numerical information is considered necessary. In all cases, however, the function of the cadastral surveyor is to determine what is on the ground. Coordinates may be a good means to that end but should not be treated as the end itself.⁷⁹

In any event the coordinate system 'overlooks the subordinate role which measurement plays in cadastral work for what is inferred mathematically is only part of the evidence and often may carry little weight'.⁸⁰

This hierarchy has been applied widely throughout Torrens-style jurisdictions and it is strongly supported by case precedent, although

76 Cooley, above n 3, p 582. This commentary about the 'Judicial Functions of Surveyors by Justice Cooley of the Michigan Supreme Court' was included as Appendix A in Johnson, above n 3. It has been cited with some text variation as Johnston and Smith in E M Kelly, *Summary of the law relating to land surveying in New Zealand*, 3rd ed, New Zealand Institute of Surveyors, 1958, p 54.

77 'The case shows the danger of allowing titles to be registered under the Act, without an actual survey of the property as occupied': *Equitable Building & Investment Co Ltd v Ross* (1886) 5 NZLR (SC) 229 at 237. This point relates to the later 1924 amendment to the Land Transfer Act requiring the registration of all parcels, but allowing for parcels limited as to parcels; which subsequently require a survey to identify the extent of occupation before allowing a new guaranteed/ordinary title to issue.

78 Dale, above n 37, pp 24-5. And similarly: 'So far as I have been able to discover, no compensation in respect of boundaries has even been paid under the Torrens system, not because mistakes have never been made, but because the Torrens system gives no more security of boundary than does the English general boundary system': Simpson, above n 1, cited in p 34.

79 Dale, *ibid*, p 167.

80 *Ibid*, p 71. See also Hallmann, above n 5, at 180.

Ballantyne et al⁸¹ report a Canadian case where the court explicitly defined the hierarchy as only an evidentiary principle, and was not a hard-and-fast substantive rule.

Re-establishing boundaries — Settled possession

A surveyor's role in settling boundary disputes is recorded at least as far back as AD500: 'choose a land surveyor whose authority may be sufficient to settle this dispute, that the litigants may henceforth cultivate their lands in peace'.⁸²

There are many logical and rational reasons for occupiers of land to mark the extent of their land; maintenance of privacy, to keep out intruders, and to ensure hazards do not intrude or escape. When newly allocated land is first acquired, the desire to fence is strong, and when land is subsequently purchased, it is upon the actual observation of fences that satisfies one about what is being acquired.⁸³ The physical evidence of the occupation is therefore generally accepted, and only disputed or defended if there is another conflicting definition. Surveyors should therefore be careful about asserting any positions which conflict with the occupational evidence:

In resurveying boundaries of occupied properties the surveyor should be very cautious about doing anything that would upset the established limits of occupation. Settled possession, where it can reasonably be related back to the time of the original survey, may provide the courts with satisfactory evidence of the original boundary. There will be cases where, if the surveyor replaced monuments in what he believed to be their original positions, the results would lead inevitably to a dispute. In this event the surveyor can do no more than report the circumstances and his opinion to the parties concerned.⁸⁴

Surveyors must also remember that their primary professional responsibility is to the cadastral system, not to be an advocate for a client. Surveyors must therefore work together with other surveyors to ensure that all the boundary evidence is shared and their boundary determinations are uncontestable:

Surveyors have a duty to communicate and consult with one another, for the benefit of their clients, particularly when they are engaged upon surveys of the same line or of adjoining properties. Although the judicial process in Canada is based upon the adversarial system, this does not, or should not, affect the capacity and willingness of surveyors to make known to each other the evidence they have found about boundaries. Cooperation and the free exchange of information is but an extension of

81 Ballantyne et al, *Coordinates in Context*, above n 48, p 23.

82 Cited in Dale, above n 37, p 46.

83 What you see is what you get. The stated dimensions and areas have a bearing on valuation and are important for description, but most land owners only use such dimensions for comparative purposes — not for absolute understanding: not many owners would notice the difference of a few decimetres or a few square metres.

84 J F Doig, 'Settlement of Boundary Uncertainties' in *Survey Law in Canada: A Collection of Essays on the Laws Governing the Surveying of Land in Canada*, Canadian Council of Land Surveyors, Carswell, 1989, ch 8, p 294 quoting the Surveyor General of Canada, Manual of Instructions for Canada Lands Surveyors, 1979. It is also worth recording that Salmon J (in *Ponniah v Surveyor-General* [2002] NZAR 593 at [37] (*Ponniah*)) advised that in approving any survey, 'a relevant consideration for the chief surveyor and for the Surveyor-General on a reference on him must be the consequences that would flow to land owners if a survey is approved which would alter boundary lines which had themselves been identified in reliance upon an earlier survey'.

the principle that when adjoining properties have been surveyed and the surveyors are not in agreement, matters should be discussed between them before any public pronouncements are made about mistakes or disagreement.⁸⁵ One mark of a competent person, secure in his capacity to conduct affairs creditably, is his willingness to cooperate with others in matters of mutual concern.⁸⁶

The principle remains: 'If pegs are disturbed, the question of the original position becomes one of the best evidence available on the ground to establish where the original pegged position might have been'.⁸⁷

Surveyors trained in measurement science are at risk of considering the science absolute, determinative and unquestionable,⁸⁸ But Cooley J's advice describing the judicial functions of surveyors to use their skills to define and confirm boundaries must be heeded:

Occupation, especially if long continued, often affords very satisfactory evidence of the original boundary when no other is attainable; and the surveyor should inquire when it originated, how, and why the lines were then located as they were, and whether a claim of title has always accompanied the possession, and give all the facts due force as evidence. Unfortunately, it is known that surveyors sometimes ... disregard all evidences of occupation and claim of title, and plunge whole neighbourhoods into quarrels and litigation by assuming to 'establish' corners at points with which the previous occupation cannot harmonize.⁸⁹

To summarise Cooley J's advice about the duty of the surveyor where boundaries are in dispute:

- (1) He is to search for original monuments, or for places where they were originally located, and allow these to control if he finds them, unless he has reason to believe that agreements of parties, express or implied have rendered them unimportant.⁹⁰ (2) If the original monuments are no longer discoverable, the question of location becomes one of evidence merely.⁹¹

85 A point that could usefully have been noted by the surveyors involved in the *Ponniiah* case, where 2 surveyors determined a boundary position 0.11 m different.

86 Doig, above 85, pp 294–5. Note that the recently released best practice guidelines (NZIS/ICS Working Party, *Best Practice Guidelines for Cadastral Surveying in Areas Affected by Ground Movement Caused by Earthquakes*, New Zealand Institute of Surveyors, 2015, p 5) recommend that surveyors actively share data among themselves in order to facilitate best definitions of earthquake affected boundaries.

87 Hayes, above n 2, at 323.

88 Cooley, above n 3, p 579: 'When a man has had a training in one of the exact sciences, where every problem within its purview is supposed to be susceptible of accurate solution, he is likely to be not a little impatient when he is told that, under some circumstances, he must recognise inaccuracies, and govern his action by facts which lead him away from the results which theoretically he ought to reach. Observation warrants us in saying that this remark may frequently be made of surveyors'. He continues '[I]t is by no means uncommon that we find men whose theoretical education is supposed to make them experts who think that when the monuments are gone, the only thing to be done is to place new monuments where the old ones should have been, and where they would have been if placed correctly. This is a serious mistake. The problem is now the same that it was before; to ascertain, by the best lights of which the case admits, where the original lines were': p 580.

89 Cooley, *ibid*, p 582.

90 Perhaps the last point here must be interpreted with caution in New Zealand because it would amount to subdivision or boundary adjustment by agreement rather than by survey. Statute has intervened here on that point.

91 Cooley, above n 3, p 583.

Plans are useful in representing the position of boundary lines, but ‘a plan may even be an embarrassment if it disagrees with the position of the feature ...’.⁹² This is well illustrated in the recently established and widespread public access to local authority web maps which portray a cadastral plan of uncertain accuracy over an aerial photograph of uncertain accuracy, which often highlight discrepancies between physical and theoretical boundary correlation — these often initiate conflict where there had been peaceable acceptance of occupation;⁹³ where dependence on the accuracy of maps has ‘excited rather than resolved dispute’.⁹⁴

Boundary problems: Monument loss

The main problem with relying on monuments is that they are of uncertain permanence. Over time, construction and maintenance of roads and many other human acts, along with acts of nature such as earthquakes, movement of water, and tectonic shift can shift, obliterate or damage the monumented locations of land boundaries.

Ballantyne and Rogers⁹⁵ have sensibly called for acceptance of deferred monumentation. Deferred monumentation allows for boundaries in greenfields subdivision to be marked rather casually in the first instance, allowing for the physical development of the subdivision to proceed: service trenches to be dug, dwellings to be set out and fences to be built. The final boundary pegging can be left until all site works are completed. This allows for a much higher survival rate of boundary monuments which is the desirable end result for a client and subsequent proprietors and it provides for some discretion in the pegging plan to position pegs to accord with the as-built occupation; so the monuments and the law confirm the occupation.⁹⁶ Goodwin⁹⁷ on the other hand, has suggested the benefits of early monumentation outweigh the problem of monument losses.

Un-monumented boundaries

Many boundaries in New Zealand are not and have never been monumented. The most common and obvious examples are our riparian boundaries — defined by reference to a bank of a river (see definition in the Resource Management Act 1991) or a tidal position (MHWM under the Crown Grants Act 1886, and MHWS under the RMA 1991). These boundaries are defined not by monument in the ground, not by any coordinate, but by description of

92 Simpson, above n 1, p 126.

93 Recent examples of this in Dunedin include the newly illustrated evidence of garages, gardens and fences encroaching into road reserves. See M Strack, *Occupying legal roads — Land Law Disputes*, (2014) 78 *Survey Quarterly* 15.

94 Simpson, above n 1, p 139.

95 B Ballantyne and S Rogers, ‘Nothing but blind pitiless indifference: Boundary monuments, deferral and the public interest’ (2010) 42 *Survey Review* 256 at 256–69.

96 Rather than requiring the occupation (recognising the vagaries of practical construction) fit the monuments.

97 D Goodwin, ‘Deferred monumentation and the shakedown factor’ (2013) 45 *Survey Review* 19 at 19–24.

the physical feature.⁹⁸ The location of such a natural boundary is self evident and therefore needs no monumentation and no assigned coordinate value.⁹⁹ However, it is ambulatory, so a surveyor need only measure to such a feature to a standard suitable for reproducing the alignment on a plan. The line thus drawn on a plan becomes the only documentary definition of that boundary, such that any new position is only determined to be different by the comparison of the position on the old plan with a new one. Any different alignment must then be judged as either a better fix or a moved position.

Other examples of unmonumented boundaries include the internal boundary lines between cross lease flats — the boundaries that separate the dwelling structure, the exclusive possession areas, and the common areas. These boundaries are measured on the ground and illustrated on the plan, but are not monumented in any way (at least not until the cross-lease development was described as a subdivision in the RMA and the dividing boundary between the exclusive occupation areas was sometimes monumented), nor dimensioned or coordinated, nor necessarily indicated on the ground — so for example, dividing fences may not accurately reflect the line on a plan. A surveyor is only required to certify that the dwelling structure has been measured and its position, shape and orientation is accurately represented on the plan.

If some destruction or movement of the ground features was to occur, the survey issue would be how then to transfer the lines on the plan back to the ground — again, a process that would not have the accuracy expected of normal cadastral work.

Unit titles boundaries are in a similar position to cross lease boundaries in that the unit boundaries are usually illustrated by use of measurements to the structure that is then plotted on the survey plan. Unit titles are also defined in three dimensions so have an upper and lower dimension. The reduced level is related to a local datum, and is shown on the plans, but the vertical boundary is more obviously related to the structure (for example, some described location in a floor slab), and almost certainly, if there was any dispute about where such a boundary was, it would be determined to be the feature rather than any numerical reduced level position.

Other situations where boundaries may not be monumented include some kinds of easements, conservation covenant areas, forestry licences, marine licences¹⁰⁰ and mining prospecting licences which do not need to be surveyed to the same standards nor monumented.

In many situations, boundaries are not monumented because of practical limitations. When boundary points fall on structures (walls, building corners, etc) then a monument may be dispensed with. These boundaries may be measured to in order to illustrate the location but the legal definition remains

⁹⁸ Note the difficulties involved in any 'accurate' definition of such a feature — the subjective decisions involved in selecting a point to choose cannot possibly be reproduced to normal survey standards of accuracy.

⁹⁹ Notwithstanding the thorough examination of very detailed and apparently precise methods for defining such a natural boundary by R F Baker and M Watkins, *Guidance Notes for Determination of MHWM for Land Title Surveys*, New Zealand Institute of Surveyors, 1991.

¹⁰⁰ Which are defined by coordinates due to the impossibility of placing reliable monuments at sea.

either the actual physical feature, the textual description or the graphical depiction of the line on a small scale plan.¹⁰¹ In all cases, to reproduce that line back on the ground leaves any consideration of accuracy wide open.

Accuracy expectations — More or Less

Land parcels have always been described with the proviso that dimensions and areas are a little more or less.¹⁰² In McRae's commentary about 'a little more or less' he talks of survey tolerances, closure errors and error ellipses as being relevant for addressing the 'fuzziness' of surveyed positions, but reminds us that the term 'a little more or less' as used in title documents is a legal term, not a surveying term, and that the law takes 'a much more liberal and somewhat flexible or ... elastic interpretation of the term'.¹⁰³ And this general condition is not just applicable to Torrens titles; it has been a standard part of the descriptions of parcels in the United Kingdom also:

The practice [of describing land] is elastic ... it permits the 'little more or less' descriptions so often found in conveyances of land. It allows sleeping dogs to lie in a characteristically English way. It prevents officialism getting to work over a few inches of border land here and there of no value to anyone. This accommodating method, with its light touch in a delicate and often contentious sphere, has been one of the corner stones in the practical and popular working of land registration in England.¹⁰⁴

This relates closely to the legal principle of *de minimus non curat lex* — the law does not concern itself with trifles.¹⁰⁵ This should be a lesson to all neighbours in dispute about boundary and fence locations, that an expectation of a surveyor's precision¹⁰⁶ is something quite different from a legal defence against a claim for mere centimetres.¹⁰⁷ If we accept some uncertainty (as

101 Interestingly these examples of unmonumented boundaries are also the boundaries that are not usually assigned a coordinate value in the normal course of data presentation (ie, the normal coordinated traverse sheet would not normally record the coordinates of the natural boundary or the extent of other interests) thus adjudication of the physical boundary location would be unrelated to monuments and coordinates, but depend on a graphical transfer of a position on a plan to the ground.

102 Lambden and de Rijcke, above n 5, p 141: 'The error analysis of present surveys, if applicable and used; can tell the surveyor the likely range of error, and it will be very fine; this is not the "more or less" of the courts, which is a rough measure of what people will, or should, accept as discrepancies between the facts on the ground and the numerical values in the record'.

103 J A McRae, 'The "guarantee of parcels" and "a little more or less"' (1985) 31 *New Zealand Surveyor* 144 at 146.

104 Dale, above n 37, p 30 citing Wallace, Chief Land Registrar 1931.

105 The *de minimus* principle is the basis for the law of accretion and erosion; that a boundary moves if changes are slow gradual and imperceptible, but the boundary does not move for more clearly observable changes. It is satisfying to note that Mander J discussed the *de minimus* principle in the recent case *Blakesfield Ltd v Foote* (2015) 16 NZCPR 417; [2015] NZAR 1140; [2015] NZHC 1325; BC201561756 concerning trees encroaching over the boundary. This was in reference to measurements to tree trunks. It could have looked at the more fundamental issue about the fuzziness of the boundary over which trees may or may not have been encroaching.

106 Dale, above n 37, p 168: 'from a purely technical point of view, the claims for precision are often bogus'.

107 The dimensions or the coordinates may indicate 'about in what direction and about how far

indeed we do in the sense that all boundary dimensions are described as ‘a little more or less’) then we should not need to get bogged down in petty disputes about what should be insignificant differences.¹⁰⁸

The quantum of ‘a little more or less’ has never been defined (although some analysis has been applied to case law examples), is certainly case, location and value dependent, and is likely to allow for discrepancies significantly greater than the expected survey tolerances, and it may relate to the sorts of physical feature placed on boundaries. Boundaries are not just lines, they may also be features — fences, hedges, etc which range widely in width dimensions. This obviously provides for very much more allowance of uncertainty.

Surveyors are often uncomfortable with this legal fuzziness.¹⁰⁹ There are several cases where the parties have been arguing over relatively tiny dimensions on the strength of a surveyor’s evidence.¹¹⁰ However, in all cases the surveyor must keep in mind ‘first, that neither his opinion nor his survey can be conclusive upon parties concerned; second, that courts and juries may be required to follow after the surveyor over the same ground, and that it is exceedingly desirable that he governs his action by the same lights and rules that will govern theirs’.¹¹¹

In fact this uncertainty about boundaries is nothing to do with surveyors — it remains a legal allowance at the sole discretion of the judge:

In any case of a disputed boundary, the surveyor can only advise the disputants and give his opinion as to the correct or most equitable position of the boundary. In addition to this, he should take care not to perform any act that might have the effect of prejudicing the case of either party. So long as the dispute continues, no surveyor can lay down the boundary since its determination is of necessity a judicial act, and must be judged in court according to the law after hearing evidence.¹¹²

distant from this point he may expect to find some other marked point’ but the precision of that fix is dependent on not just a ‘radius being large or small according to the standard of accuracy of the measurers, both present and past’ but of the accepted standards of the time, and on the perhaps much larger uncertainty about the actual dimension (a little more or less): Hallmann, above n 5, at 180.

¹⁰⁸ The High Court has provided useful comment in the recent case *Blakesfield Ltd v Foote* (2015) 16 NZCPR 417; [2015] NZAR 1140; [2015] NZHC 1325; BC201561756 by accepting that stated measurements to tree trunks encroaching over boundaries in the region of one to five centimetres must be regarded as de minimus. Mander J also comments that encroachments of 17 cm, 28 cm and 44 cm of tree trunks over the boundary are incapable of constituting a nuisance because of ‘the minimal nature of that encroachment and the fact the encroachment is not onto any usable part of the land’.

¹⁰⁹ McRae, above n 102, suggests that surveyors may disagree with such elastic legal interpretations of dimensions.

¹¹⁰ See, eg, *Ponniiah* [2002] NZAR 593.

¹¹¹ Cooley, above n 3, p 583.

¹¹² Doig, above n 83, p 294 quoting the Surveyor General of Canada, above n 85.

Discussion

‘Never set a corner in disagreement with the improvements without satisfying yourself that you are not only right but that your “right” will prevail in court if necessary.’¹¹³

The Royal Commission in 1870 reporting on the UK Land Registry Act 1862, an Act with similar intent to the NZ Land Transfer Act in that it required boundaries to be accurately determined on a plan (when previously they were indicated by a feature — wall, fence, hedge, ditch or stream), observed that ‘People who were quite content with an undefined boundary are compelled to have it defined,’ one result of which is that ‘a dispute is forced upon neighbours who only desire to remain at peace’.¹¹⁴ As a result of this review of the Act, general boundaries were adopted into the UK 1875 Act and possession was again prioritised.

In New Zealand, on the other hand, the Land Transfer Act promoted the assumption that the survey system could deliver documentary boundaries. Simpson comments that in New Zealand parcel definition under the Torrens system has on occasion ‘excited rather than resolved dispute’¹¹⁵ and he quotes Curtis and Ruoff: ‘The Torrens system contemplates that all titles will be supported by a meticulous survey, but any Englishman who questions the wisdom of his native rules as to general boundaries would do well to study the vast labour and expense and the multiplicity of disputes that are born of too nice a regard for this question’.

Hawkey¹¹⁶ appears to recognise the low public demand or awareness of the importance of accurately placed monuments, while he suggests that it is reasonable ‘to accept a lesser demarcation of boundaries without regulation mark placement where the purpose is simply to erect fences and buildings in a relatively approximate relationship to boundaries’.¹¹⁷ One might wonder, what is the purpose of marking boundaries other than to align fences? However, the comment illustrates that the accuracy with which proprietors align their fences is not particularly important, therefore we should be even less tolerant of conflict arising from fence/boundary inconsistency.

Any proposal to prioritise coordinates will, by definition, upset established occupation and work directly contrary to the principle of ‘quietening title’. ‘It should never be forgotten that, from the landowner’s point of view, the best boundary is still the boundary which speaks for itself and requires neither map nor survey to prove it.’¹¹⁸

Attempts to depend more on coordinates for the determination of boundary location and therefore to make boundary redefinition into a scientific, mathematical, technical issue is likely to aggravate boundary disputes. It is the art of the professional surveyor to apply the law to boundary redefinition, and

¹¹³ E K Elder, ‘Monuments — When are They in Control’, *Surveying and Mapping*, 1973 cited in *Land Title Surveys in New Zealand*, New Zealand Institute of Surveyors, 1973, ch 2 s 12.

¹¹⁴ As quoted by Simpson, above n 1, p 134.

¹¹⁵ *Ibid*, p 139.

¹¹⁶ W Hawkey, ‘Land Boundary Definition — Changing provisions for the times’ (1985) *New Zealand Surveyor* 260 at 260–7.

¹¹⁷ *Ibid*.

¹¹⁸ Simpson, above n 1, p 130.

to take account of the inherent fuzziness in boundary measurement. Position fixing is rapidly becoming merely a technical task dependent on the quality of the equipment. Boundary fixing remains a professional task, requiring a wide understanding of and respect for the law and recognition of the weakness of the application of mathematics to the surface of the earth.

Property is never permanent. The land is always changing (from crustal plate movements to local land slips). To impose a mathematical permanence on our property claims to this moving landscape is impractical. We are on this earth for but a short time and we must act in sympathy with nature's forces. Property and boundaries are not a natural right, nor are they guaranteed by the state. The land moves, boundaries move.

Surveyors must remember that in re-establishing boundaries, they are applying the law, not undertaking a mathematical exercise. As such, they should consult closely with clients and other interested parties, including other surveyors, in order to avoid suggesting boundaries which are at odds with occupation. It is recognised that some occupation (fences) may be incorrectly placed, but the surveyor must carefully investigate all discrepancies between boundary and occupation to seek to quieten title. Similarly, lawyers and judges should not tolerate legal action over minor boundary/occupation discrepancies. The de minimus rule, a little more or less, and the established hierarchy of evidence of boundaries allow multiple routes to resolve many boundary conflicts.