

Impact of the Proposed Surveying and Spatial Information Regulation 2017

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ABSTRACT

In New South Wales, practising surveyors are subject to the Surveying and Spatial Information Act 2002 and the Surveying and Spatial Information Regulation 2012. Pursuant to Section 10 of the Subordinate Legislation Act 1989, the Surveying and Spatial Information Regulation 2012 is due to be repealed on 1 September 2017 and replaced by a new Surveying and Spatial Information Regulation 2017. The objectives of the Surveying and Spatial Information Regulation are to ensure the competency of surveyors, maintain the integrity of the cadastre for New South Wales and ensure measurement and marking standards are delivered from modern surveying and communication technologies. Key outcomes of the proposed Surveying and Spatial Information Regulation 2017 are greater enablement of digital government and greater integration of positioning. This paper outlines a number of key reforms introduced in the proposed Surveying and Spatial Information Regulation 2017. These include specifications for positioning outcomes, greater integration with the Map Grid of Australia and the Australian Height Datum and centralising of information workflow to support digital government, digital business and e-Plan automation.

KEYWORDS: *Regulation, positioning, integration, digital government, e-Plan.*

1 INTRODUCTION

Under the *Subordinate Legislation Act 1989* (NSW Legislation, 2017c), all statutory rules (i.e. regulations) must be remade every 5 years to ensure they remain relevant and current to government, community and industry needs. The *Surveying and Spatial Information Regulation 2012* (NSW Legislation, 2017b) is due to be repealed on 1 September 2017. Consultation with the surveying and spatial information industry during 2016 and 2017 ensure that emerging issues and needs are addressed in the remake of the Regulation.

The Regulation is made under the *Surveying and Spatial Information Act 2002* (NSW Legislation, 2017a). The Act incorporates all aspects of the Regulation and oversight of land and mining surveying in NSW. The major objectives of the Act are to:

- Ensure the accuracy and integrity of the State cadastre that “enables people to readily and confidently identify the location and extent of all rights, restrictions and responsibilities

related to land and real property” (ICSM, 2015).

- Maintain and develop the state control survey, which provides a reliable and accurate spatial referencing system underpinning surveying, land information and mapping systems in NSW.
- Provide a framework for registration and coordination of surveys by public authorities.

In order to achieve these objectives, the Act requires that surveyors must be registered and must comply with minimum standards of education and competency. The Act establishes the Board of Surveying and Spatial Information (BOSSI, 2017) to oversee the registration of surveyors, set professional education requirements and conduct disciplinary investigations to ensure consistency and quality in the delivery of surveying services.

The key reforms of the proposed *Surveying and Spatial Information Regulation 2017* are:

- Greater enablement and integration of positioning through greater integration with the Map Grid of Australia (MGA) and the Australian Height Datum (AHD).
- Enablement of digital government, digital business and E-Plan automation by centralising information on Deposited Plans.

2 GENERAL PROCESS

During 2016 and 2017, several workshops and presentations, including consultation with industry representatives, have been conducted to determine the issues and principles within the *Surveying and Spatial Information Regulation 2012* that needed reform. From these workshops and presentations, a detailed working brief has been forwarded to the Parliamentary Counsel’s Office with a request to draft a new consultation draft Regulation. In addition to the draft Regulation, a Regulatory Impact Statement (RIS) will also be prepared. The objective of the RIS is to outline who is making the new Regulation, why it is being made and to consider all options for the proposed changes to ensure the best outcome is to be achieved. The RIS will weigh up the costs and benefits of the proposed Regulation and also consider alternative options for achieving the required outcomes.

The RIS, together with the consultation draft Regulation, will be advertised in the media, sent to all relevant surveying and titling industry groups (such as the Institution of Surveyors NSW, Law Society of NSW, government agencies, etc.) and be available for download by the public of NSW. The intent of the advertising is to ensure that all surveyors and participants in the surveying and spatial information industry are aware of the draft changes and to invite submissions on the draft Regulation. Both documents are anticipated to be available for public and industry consultation during March 2017. The submissions received may, after appropriate consideration, result in amendments to the draft Regulation being made prior to approval of the final Regulation by the Minister and Surveyor-General of NSW.

3 SUMMARY OF PROPOSED CHANGES AND ANTICIPATED IMPACT

A summary of the proposed major changes from the *Surveying and Spatial Information Regulation 2012* to the *Surveying and Spatial Information Regulation 2017* are outlined in Table 1. The sequence or numbering of the changes is based upon the clause numbering in the draft 2017 Regulation.

Table 1: Summary of major changes from the 2012 Regulation to the 2017 Regulation.

2017 Clause Number and Title	2017 Regulation	Reason for Change
4 Mining surveys	References to legislation updated to correspond with current legislation	References to legislation must remain current so Clause 4 retains validity.
<p>5 Definitions</p> <p>The definitions shown on the right were added or changed.</p>	<p><i>Accurate AHD value</i> – defined to be an AHD value in SCIMS equal to or better than Class “B” or Class “LD”.</p> <p><i>Established survey mark</i> – definition changed to Class “D”.</p> <p><i>Mean low water mark</i> – possible addition of definition or reference.</p> <p><i>Positional uncertainty</i> – definition added from <i>Standards and Practices for Control Surveys (SP1) (Version 1.7)</i> published in September 2007 by the Intergovernmental Committee on Surveying and Mapping (ICSM, 2007).</p> <p><i>Road</i> – definition expanded.</p> <p><i>Spline</i> – definition added as part of the change to Clause 65 regarding the method of showing natural feature boundaries. The minimum spline classification that the definition requires is a commonly used form of a spline, that being a piecewise polynomial known as an interpolating cubic spline. Therefore, to comply with the definition, a piecewise polynomial of degree three or higher is required.</p> <p><i>Urban survey</i> – definition updated to correspond with current legislation.</p>	<p><i>Accurate AHD value</i> – refined for clarity; the addition of the “in SCIMS” qualifier has been added so that there is only one single source of truth for accurate height values within NSW.</p> <p><i>Established survey mark</i> – established survey mark changed to Class D to enable more Deposited Plans to be placed on MGA while retaining the integrity required for easy integration within the Foundation Spatial Data Framework; it is an enabler for digital government and network propagation.</p> <p><i>Mean low water mark</i> – as a result of several registered Deposited Plans, there may be a requirement for “mean low water mark” to be added or referenced as some registered Deposited Plans have referenced “mean low water mark”. See: DP1043662, DP1128433 & DP1215295.</p> <p><i>Positional uncertainty</i> – the definition has been included so to express part of the positioning outcomes required as part of the reforms.</p> <p><i>Road</i> – accessways for Community Scheme have been included so that all appropriate marking requirements are met for land effectively used as a road.</p> <p><i>Spline</i> – advice from the spatial information industry indicates that a spline is considered the geometric entity best suited for the mathematical and graphical representation of a natural feature boundary.</p> <p><i>Urban survey</i> – in order to remain current, the definition has been updated to reflect the current planning zones under the Environmental Planning and Assessment Act 1979 as found in the Standard Instrument – Principal Local Environment Plan.</p>

2017 Clause Number and Title	2017 Regulation	Reason for Change
<p>12 Datum line</p>	<p>Clause 12 has been restructured and changes made regarding the adoption of datum lines. Subclause 12(2) has been changed to reference four cases regarding the adoption of a datum line for urban surveys:</p> <ul style="list-style-type: none"> • Case 1: If the land surveyed is less than 300 m from two established marks, then the grid bearing derived from the SCIMS coordinates of those marks must be used as orientation. No change from the 2012 regulation. • Case 2: If Case 1 does not apply and if the surveyor chooses, adopt orientation from the SCIMS coordinates of two established marks if the marks are less than 1,500 m from the land surveyed. • Case 3: If Cases 1 & 2 do not apply and the surveyor has used an approved GNSS method, then: orientation must be derived from the MGA coordinates, as determined by an approved GNSS method, of two unestablished survey marks less than 300 m from the land surveyed. • Case 4: If Cases 1, 2 & 3 do not apply, then orientation must be adopted from a plan on public record. <p>Subclause 12(3) now references two cases regarding the adoption of a datum line for rural surveys:</p> <ul style="list-style-type: none"> • Case 1: If the land surveyed is less than 1,000 m from two established marks, then the grid bearing derived from the SCIMS coordinates of those marks must be used as orientation. No change from the 2012 regulation. • Case 2: If Case 1 does not apply, the surveyor may either <ul style="list-style-type: none"> (i) If the land surveyed is less than 5,000 m from two established marks, derive orientation from the grid bearing derived from the SCIMS coordinates. <p style="text-align: center;">or</p> <ul style="list-style-type: none"> (ii) Derive orientation from the MGA coordinates, as determined by an approved GNSS method, of two unestablished survey marks less than 1,000 m from the land surveyed. 	<p>To place as many plans as possible on an MGA orientation.</p> <p>The placing of as many surveys as possible on an MGA orientation is an enabler of digital government and integration of position into the Foundation Spatial Data Framework. It is reasonable to expect a survey utilising an approved GNSS method to be able to place the survey onto an MGA orientation.</p> <p>The initial desired outcome was for all plans to be placed on an MGA orientation.</p> <p>This proposal was problematic in urban areas, where there exist significant gaps in the “established” network and GNSS usage is less prevalent.</p>

2017 Clause Number and Title	2017 Regulation	Reason for Change
	<p>This effectively means that all rural surveys will be on an MGA orientation whether via established marks or approved GNSS methods.</p> <p>The tolerance specified in the 2012 subclause 12(6) for the verifying line has been loosened to 40 mm + 175 ppm.</p> <p>The 2012 Cl. 12(7)(c) placed in Clause 12(8) and altered to encompass all approved GNSS methods referred to in all clauses.</p>	<p>A looser tolerance is required to accommodate the expansion of the <i>established survey mark</i> definition to Class D.</p> <p>A regulation preventing the use of unchecked GNSS baselines should apply to all approved GNSS methods used.</p>
<p>13 Bench marks</p>	<p>References to “external” bench marks have been removed.</p> <p>Clause 13(6) regarding the determination of the position of each bench mark has been removed.</p>	<p>The stipulation of “external” bench marks is not considered necessary for the vast majority of surveys and removal improves interpretation of the Clause.</p> <p>This stipulation has been placed in Clause 71.</p>
<p>23 Accuracy of angular measurement</p>	<p>Clauses 23 & 24 have been combined.</p> <p>An accuracy of included angles has been inserted as subclause 23(7): If the bearings of two lines shown on the survey plan have a common vertex, the accuracy of the included angle must be within the tolerance of: $206265 \left(\frac{0.01 + \left(\frac{d}{20000} \right)}{d} \right)$ seconds of arc, where d is the length in metres of the shortest line.</p>	<p>Combining the same subject matter for clarity.</p> <p>Individual bearings shown on the plan should be accurate to a minimum standard in the same way that individual lengths need to be.</p> <p>The angular misclose and parcel misclose regulations do NOT regulate the accuracy of individual bearings or individual angles shown on a plan.</p>
<p>25 Accuracy of relative position</p>	<p>An accuracy of relative position has been inserted as Clause 25:</p> <p>When conducting a survey, a surveyor must ensure that the accuracy of the relative positions between any two surveyed points is within the tolerance of:</p> $\sqrt{2 \left(0.01 + \frac{d}{20000} \right)^2} \text{ metres}$ <p>where d is the distance in metres between the points.</p>	<p>Relative positions of surveyed points on a plan should be accurate to a minimum standard just as individual lengths need to be and individual bearings and angles should be.</p> <p>The community expects database tools to be available and be accurate. Integration of surveys into databases requires integrity of shape as well as position – the accuracy of relative position gives the integrity of the shape of the survey.</p>

2017 Clause Number and Title	2017 Regulation	Reason for Change
28 Boundary marks	<p>Inserted as subclause 28(3)(b), regarding inaccessible corners:</p> <p>If the corner that cannot be marked is within a structure or is otherwise made inaccessible by a structure, the corner does not require a reference mark to be placed and must be shown by the appropriate symbol depicted in Schedule 5 (solid circle).</p>	<p>The requirement to place a reference mark at a corner that is within or made inaccessible by a structure (e.g. a corner within a party wall) is considered unreasonable.</p>
29 Reference marks for urban surveys	<p>Clarified so that “extremity” can also include the junction and intersection of roads.</p> <p>Intervening side boundaries subclause clarified.</p>	<p>The junction or intersection of a road in an urban survey was intended to be included as an extremity of the land surveyed; the change explicitly states this and removes doubt.</p>
35 Surveyor to note nature and position of survey marks etc.	<p>All references to how coordinates and heights should be shown on the plan have been moved to Clauses 69, 70 & 71 – “Division 7 – Survey plans”.</p>	<p>This clause is within “Division 4 Use of survey marks and monuments”. All requirements regarding what needs to be shown on the survey plan should be within “Division 7 – Survey plans”. Coordinate and height schedules have been consolidated into one area of the Regulation for ease of interpretation and clarity of purpose.</p>
42 Connection to permanent survey marks	<p>Inserted as a new subclause 42(4):</p> <p>Permanent survey marks used only to comply with Clause 13(2) (verification of AHD for bench marks) do not need to comply with:</p> <ul style="list-style-type: none"> • Subclause 42(3) (connections to the land proved by closed survey). • Subclause 70(2)(b)(ii) (MGA coordinate shown to Class “D”). 	<p>If a permanent survey mark is used only for compliance with 13(2), then it is unreasonable to expect the surveyor to connect the mark to the land surveyed by closed horizontal connection, or to coordinate the mark to Class D standard for the purposes of the coordinate schedule.</p>
60 Method of recording datum line	<p>All references to how coordinates and heights should be shown on the plan have been moved to Clauses 69, 70 & 71.</p> <p>Subclauses added to stipulate that:</p> <ul style="list-style-type: none"> • The survey plan must state from what the orientation of the survey has been derived (from Cl. 12). • The datum line and any verifying line must (if practicable) be related to the survey by closed connection. • Comparisons with SCIMS or the previous plan must be shown for the datum line. 	<p>Consolidation of all matters regarding showing the datum line on the survey plan.</p> <p>Explicit stipulations of datum line comparisons for all cases are not present in the current regulation; comparisons are needed as an affirmation of the datum line validity.</p>
65 Method of showing natural feature boundaries	<p>A survey plan that shows a natural feature boundary must indicate the boundary by a spline curve, not an “irregular line”.</p> <p>A survey plan that shows a natural feature boundary must show the connection between terminals of the natural feature for each lot.</p>	<p>Advice from the spatial information industry indicates that a spline is considered the geometric entity best suited for the mathematical and graphical representation of a natural feature boundary. See spline definition above.</p> <p>To facilitate ease of checking of natural feature boundary closes, especially where a lot boundary intersects the natural feature boundary. Clearly defines the point at which the side boundary of a lot cuts the natural feature boundary.</p>

2017 Clause Number and Title	2017 Regulation	Reason for Change
<p>66 Survey plan to show GNSS validation</p>	<p>The requirement to show GNSS derived lines in the previous (2012) Regulation has been removed. The Clause has been changed to stipulate that if an approved GNSS technique is used in the survey, then details of the GNSS validation must be shown on the plan of survey.</p> <p>A further requirement is for surveys adopting an MGA orientation from MGA coordinates obtained by an approved GNSS method. In this case, the GNSS validation required above must be performed and shown for the datum line of orientation.</p>	<p>All GNSS are operated by international parties. Most GNSS augmentation systems (e.g. CORSnet-NSW, GPSnet) are operated by Government or commercial third parties. These are NOT under the surveyor's direct control. As such, any GNSS equipment and methods used must be confirmed against an independent external source of known accuracy.</p> <p>As, in this case, the datum line is based only on coordinates obtained by an approved GNSS method, those coordinates should be independently checked; the best method of achieving this check is via the GNSS validation process.</p>
<p>69 Survey plan to show height differences</p>	<p>A new requirement to show height differences in a schedule on the survey plan for new permanent marks placed; the permanent survey marks to which this clause applies are those that require AHD to be determined under Clause 13 or Clause 43(2).</p>	<p>The height datum needs to be propagated for infrastructure management and development; survey control is essential public infrastructure, in just the same way as sewer, stormwater drainage, electricity, telephone and data services. Height is an important component of survey control.</p> <p>The body best placed to propagate the height datum is the surveying industry; the industry has the requisite professional skills and local knowledge to effectively propagate height in their local area.</p> <p>The plan of survey is being used as the delivery mechanism for height from the surveying industry for several reasons:</p> <ul style="list-style-type: none"> • The previous information delivery mechanism was through Locality Sketch Plans; Spatial Services have received less than 65% of Locality Sketch Plans for marks placed in 2016, so this delivery mechanism has demonstrably failed. • The information is in one location, facilitating e-Plan validation and Spatial Services' collation and ingestion of the information. • In specifying height differences and height values to be shown, the survey plan becomes self-describing and self-checking.

2017 Clause Number and Title	2017 Regulation	Reason for Change
70 Survey plan to show coordinate schedule	<p>The requirements for showing of the coordinate schedule have been consolidated into one clause.</p> <p>If a survey adopts an MGA orientation, then coordinates need to be shown to Class D or better for unestablished marks.</p>	<p>Consolidation of coordinate schedule requirements into one clause facilitates clarity and ease of understanding.</p> <p>If a mark has been located by the surveyor in a closed survey and the survey has connected to MGA, then it is not unreasonable to ask the surveyor to provide Class D MGA coordinates for the unestablished marks instead of hand-held GNSS coordinates. This enables better initial positioning of the mark.</p>
71 Survey plan to show height schedule	<p>The requirements of clause 35 & 62 in the 2012 Regulation regarding height schedules have been consolidated into the new clause 71.</p> <p>A new classification for marks with accurate AHD values (those in SCIMS) of “height datum validation” has been added; the classifications can be either “SCIMS adopted” or “from SCIMS – datum validation” where the classification “SCIMS adopted” can only be used once.</p>	<p>Consolidation of height schedule requirements into one clause facilitates clarity and ease of understanding.</p> <p>The method used to derive the AHD value is not needed as it will be a derivative of the method/s shown in the height difference table.</p> <p>Of more importance is the height datum validation – the SCIMS AHD value adopted to derive the AHD values for marks not having an “accurate AHD value” and the marks used to validate the “accurate AHD value” of the single mark adopted.</p> <p>The plan of survey is being used as the delivery mechanism for height from the surveying industry for the reasons listed above.</p>
81 Provision of further information and supporting evidence	<p>An amendment to subclause 81(e): an applicant to the Board for registration as a surveyor must furnish a recent photograph of the applicant’s face that meets the specification required for an Australian passport photograph.</p>	<p>Standardization of the photograph specification.</p>
90 Applications to remove survey marks under section 24 of the Act	<p>Subclause 90(2) has been altered to include bench marks.</p>	<p>Bench marks are important survey infrastructure and should be protected.</p>

2017 Clause Number and Title	2017 Regulation	Reason for Change
91 Exemption by the Surveyor-General	<p>New subclause 91(3): If a survey plan to which an exemption applies is lodged with a public authority, then that public authority must be furnished with a copy of the exemption.</p> <p>New subclause 91(4): Any survey subject to an exemption must comply with all conditions contained within the exemption.</p>	<p>Exemptions are often issued subject to one or more conditions. When the plan is lodged with a public authority, the plan currently only contains a reference noting which clause the exemption applies to, not the specifics of the exemption (it may only apply to a part of the plan, not the whole) nor the conditions, if any, of the exemption.</p> <p>This means when examining the plan, the examiner has no way of knowing to what part of the survey the exemption applies, nor whether any of the conditions contained within the exemption have been complied with.</p> <p>Requiring the surveyor to lodge a copy of the exemption with the plan removes this issue.</p>
Schedule 1 Bench marks	“Bench Mark token” added.	Augmentation of bench mark types with a minor modification to an existing, easy to use and readily identifiable mark type (the existing mark type being a “Boundary Mark token”).
Schedule 2 Boundary marks	<p>Uncapped fixed steel fence post added as an approved mark – no reference mark necessary.</p> <p>Punch Mark added.</p> <p>When referencing a specific point on a structure to a corner that abuts a road, an additional reference mark must be placed within the road corridor.</p>	<p>It is very difficult to mark uncapped steel posts at a cadastral corner.</p> <p>Augment available options for marking.</p> <p>Removes the issue where the corner of a building used to reference a corner abutting a road is inaccessible.</p>
Schedule 3 Reference marks	<p>“Reference Mark token” added.</p> <p>Non-corrodible nail (concrete) (20 mm long) has been deleted.</p>	<p>Augmentation of bench mark types with a minor modification to an existing, easy to use and readily identifiable mark type (the existing mark type being a “Boundary Mark token”).</p> <p>Stability of the mark has proven to be not satisfactory.</p>
Schedule 5 Conventional signs and symbols	Schedule updated.	To retain currency and consistency with standard usages and reforms.

Clause 55 of the *Surveying and Spatial Information Regulation 2012* – Surveyor to record astronomical observations – has been removed, as have all references to astronomical observations as very few surveyors utilise astronomical observations in daily practice. The Regulation must reflect the changing practices of the surveying profession to remain relevant.

The clauses within the proposed *Surveying and Spatial Information Regulation 2017* most affected by the proposed changes are:

- Clause 12 – Datum line.
- Clause 23 – Accuracy of angular measurement.

- Clause 25 – Accuracy of relative position.
- Clauses 69, 70 & 71 – Coordinate and height schedules.

The major impacts of the changes in the proposed *Surveying and Spatial Information Regulation 2017* will probably be:

- More survey plans on an MGA orientation.
- All rural surveys to be on an MGA orientation.
- Alteration of the delivery mechanism for height by centralising of all height information on the survey plan.
- Enablement of digital government, digital business and e-Plan automation by centralising information on Deposited Plans.

4 CONCLUDING REMARKS

The *Surveying and Spatial Information Regulation 2012* is due to cease operation on 31 August 2017 and the *Surveying and Spatial Information Regulation 2017* is proposed to commence on 1 September 2017. It is proposed that any survey completed after 1 September 2017 must satisfy the requirements of the *Surveying and Spatial Information Regulation 2017*. This paper has outlined the changes that are proposed in the *Surveying and Spatial Information Regulation 2017* and the anticipated impact these changes will have on the surveying profession.

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