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Council of Reciprocating Surveyors Boards of
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**Review of the National Standard of Competency for
Licensed or Registered Surveyors
affiliated with the Council of Reciprocating Surveyors
Boards of Australia and New Zealand
Issues and Opportunities Paper**

January 2022

Prepared by Michael Nietschke



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Foreword

As Chair of the Council of Reciprocating Surveyors Boards of Australia and New Zealand (CRSBANZ) and on behalf of the nine statutory Surveyors Boards which make up the Council it is my privilege to commission the Competency Review Project.

This project will support CRSBANZ to meet the ongoing commitment to mutual recognition of professional registration in Australia and New Zealand and supports the Cadastre 2034 *Goal 5 - achieve a cadastral system that is a federated cadastral system based on common standards.*

I encourage you to consider the issues and opportunities presented in this paper and participate in the consultation process for this essential body of work.

Paul Rhodes

Chair CRSBANZ



1. Introduction

1.1 Purpose

The purpose of this paper is to:

- Outline the methodology and consultation framework for the Competency Review
- Identify issues and opportunities to be considered in consultation
- Provide the basis for stakeholders to respond to the matters identified in this paper

1.2 Terms of Reference

The terms of reference of the Competency Review are:

1. Establish agreed competency standards that a licensed or registered cadastral (land boundary) surveyor should have in Australia and New Zealand now and into the future
2. Update The Attributes of Surveying Degrees Recognised by CRSBANZ by John Fryer and Harvey Mitchell (2013) (Fryer Michell Report) with a catalogue of agreed mandatory core surveying degree content and non-core topics to be studied to meet the equivalent university degree qualification to be a licensed or registered cadastral surveyor.
3. Develop an Implementation Plan for university education programs to satisfy contemporary requirements of Fryer Michell Report.

1.3 CRSBANZ Steering Committee

The Steering Committee established to guide the Competency Review includes:

Mr Paul Rhodes – Chair of CRSBANZ and Chair of Land Surveyors Licensing Board of Western Australia

Mr Rob Sarib – Chair of the Surveyors Board of the Northern Territory

Mr Joe D'Aloia – Chair of Surveyors Board of South Australia

1.4 Stages of the Review

Stage 1 - Research – first quarter of 2022

- Source supporting materials
- Legislative review - identify and consider the objectives of survey legislation and competency frameworks of cadastral surveyors
- Examine and consider the outcomes of recent surveying legislative reviews that relate to cadastral surveyor licensing or registration
- Empirical analysis of data from each jurisdiction on effectiveness and efficiency of current institutional arrangements

Stage 2 – Competency Review Consultation – January to March 2022

The Competency Review will require extensive consultation and collaboration from all stakeholders to achieve consensus and ownership of the competency standards that cadastral surveyors should have in Australia and New Zealand.



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Competency standards will:

- describe the individual surveyors' skills, attitudes and attributes (e.g. values and beliefs) based on knowledge (gained through study) and experience (gained through practice) that together is considered sufficient to enable the individual to practise as a licensed or registered cadastral surveyor.
- broadly reflect the role of a cadastral surveyor across the diversity of modes of practice and represent the needs of surveying and mapping industry and regulators that reflect current and emerging risks and opportunities across the whole profession.

Proposed Engagement approach

- one-to-one interviews
- group discussions
- workshops
- targeted survey of stakeholder groups
- social media and networks

Stakeholder participants will receive timely feedback to identify connections between competing ideas, opportunities and challenges to harmonisation of competencies, including consideration of the economic and political challenges faced by Boards of Surveying and universities.

Stage 3 - CRSBANZ endorse standard of competency - April 2022

Present consultation report to CRSBANZ and establish agreement on standard of competency for licensed or registered cadastral surveyors.

Stage 4 - University and TAFE Consultation – April to June 2022

Synchronise agreed competencies with a review of Fryer Mitchell Report and catalogue proposed core surveying degree content in detail, as well as a list of non-core topics, including implementation plan for university education programs.

- Stakeholder engagement with university and TAFE institutions
Introduce and clarify agreed competency standards and consider:
 - Intended learning outcomes to be described as the CORE elements for a land surveying degree or equivalent qualification
 - Cadastral Surveying modules required to enable graduates to undertake cadastral training programme
 - Articulation into university degree programmes from TAFE, associate degrees, graduates from allied professions, overseas survey graduates including bridging courses
 - Trends in university education including online learning
 - Sustainability of University courses with financial viability controlled by tight budgets depending on student intake numbers and availability of qualified academic staff
 - Process to facilitate resource sharing through online learning to avoid duplication of effort and deliver economies of scale where specialist undergraduate teaching responsibilities are shared between institutions
- Identify key concerns, needs and objectives and form a proposal.



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- Test proposal for agreement to confirm if consensus is reached and identify any blocks or reservations.

Note – the Implementation Plan may also include a process that guides or assists universities to map their curriculum against the CRSBANZ Competency Statement, as part of an accreditation.

Stage 5 - Final report to CRSBANZ June 2022

Prepare draft report to CRSBANZ including

- Matrix of competency requirements compared to existing for each jurisdiction at:
 - Stage 1 - Undergraduate
 - Stage 2 - Postgraduate training
- Identify any jurisdictional differences in agreed competencies and legislative, regulatory or administrative reforms required to meet the CRSBANZ model
- Fryer Mitchell Report with updated core and non-core topics
- Recommendations for university implementation plan

Respond to feedback on at least one draft project report, and to make recommendations to CRSBANZ regarding adoption of the Final Report by 30 June 2022.

Given the evolving COVID-19 situation, project timelines are subject to review.



2. Background

2.1 Mutual Recognition

One of the primary roles and responsibilities of the nine statutory Surveyors Boards, which are affiliated with the CRSBANZ, is to license or register cadastral surveyors.

The CRSBANZ have a commitment to the principle of mutual recognition of professional registration between the jurisdictions of all Australian States and Territories and New Zealand.

This commitment was established at the initial conference of Reciprocating Surveying Boards in 1892 and subsequently embodied in the survey legislation of all jurisdictions to ensure cadastral surveying qualification requirements in each jurisdiction to remain broadly compatible.

The Surveyors Boards are:

- [The Surveyors Board of Queensland](#)
- [Board of Surveying and Spatial Information New South Wales](#)
- [ACT Planning and Land Authority](#)
- [The Surveyors Registration Board of Victoria](#)
- [Tasmanian Land Surveyors Accreditation Board](#)
- [The Surveyors Board of South Australia](#)
- [The Land Surveyors Licensing Board of Western Australia](#)
- [The Surveyors Board of the Northern Territory](#)
- [Cadastral Surveyors Licensing Board of New Zealand](#)

In support of mutual recognition CRSBANZ has undertaken research projects in recent years to establish content required for appropriate surveying qualification and a review of the competency assessment processes across their jurisdictions.

- The Attributes of Surveying Degrees Recognised by CRSBANZ by John Fryer and Harvey Mitchell (2013); and
- Assessing Surveying Competency by Bill Hirst (2017) (Hirst Report)

The recent Automatic Mutual Recognition of Occupational Registrations (AMR) scheme has provided impetus for CRSBANZ to progressively eliminate jurisdictional variations to facilitate occupational mobility and work towards Cadastre 2034 strategic *Goal 5 - Establish an agreed policy direction and governance framework for a federated cadastral system.*



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2.2 Competency Assessment

CRSBANZ has established the minimum standard of education being a surveying related degree of at least four years duration. Overseas survey degree qualifications are assessed by the Bureau of Assessment for Overseas Qualification as being equivalent to an Australian degree. With a focus on alignment of standards, CRSBANZ has initiated an international accreditation process of university surveying degree programs measured against competencies detailed in the Fryer Mitchell Report.

In order for a cadastral surveyor to become licensed or registered by a Surveyors Board, the surveyor must complete a surveying degree qualification and demonstrate competency as a surveyor. The initial assessment of competency is assessed against the three components of competency.

KNOWLEDGE is usually assessed by academic institutions – a degree in surveying.

SKILLS are progressively assessed against the defined competency standard.

EXPERIENCE is assessed by requiring the candidate to operate at the professional level under supervision.

Finally, the overall assessment of the applicant's - KNOWLEDGE, SKILLS AND EXPERIENCE is assessed by the Surveyors Board.

Jurisdictional variations currently exist in post graduate professional training, experience and skill required under the guidance of an experienced registered or licensed cadastral surveyor, before a graduate surveyor can be registered as a cadastral surveyor as listed in Table 1 below (Hirst, 2016)



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Table 1: Cadastral Surveying Competencies (Nietschke et al, 2019)

	PTA (Minimum)	Cad Survey portfolio submitted to Board	Cad Law	Professional Assessment Project (PAP)	Competency assessment	Final interview
NZ	2yrs (1yr cad)	Portfolio submitted for professional interviews.	Written exam	Complex cad Complex svy report	Exams & projects (Y/N): Measurement (N) Cadastral Surveying (Y) Land Dev Eng (N) Planning & Resource Mgt (Y) Geodetic (Y)	Yes
NT	2yrs (1yr cad in NT)	6 mth	viva-voce	Complex cad urban & rural Engineering Geodetic Subdivision Unit dev	Supervisor certification Project exam & viva-voce	Yes
NSW/A CT	2yrs (1yr cad)	Every 12 mths or on employer changes. 2 x 3 mth; then 6 mth for total 5 projects	viva-voce	Complex cad urban & rural Strata/ comm title Engineering Town planning	Supervisor certification Exam in Rural, Urban, Town Planning & Engineering.	Yes
QLD	Post-graduate Training Plan after 1 yr reg as svy grad	Usually 4 CAR's to demonstrate competency	CER & viva-voce	Personal qualities Data collection Development Surveys Process field measurement Comms Survey control	Complex cad project Candidate's last 10 svy plans Registration exam & 'Cad endorsement' exam	Yes
SA	2yrs (1yr cad - 6 mth urban 3 mth rural)	6 monthly reports	viva-voce	Complex cad	Supervisor certification and oral exam before PAP	Yes and presentation to full Board
TAS	2yrs (1.5 yr cad)	3 Urban and 2 Rural Cadastral Surveys.	None	Complex cad urban & rural	Professional Practice Examination	Yes
VIC	Min 360 days (240 days cad)	1 Urban and 1 Rural Cadastral Survey	Written exam	Complex cad urban & rural Cad Law Land dev process	Supervisor certification Project Examination Viva-voce	Yes
WA	Min 2 yrs (460 work days of which 290 cad - 115 urban & 60 rural)	Urban & rural project Strata Land dev & mgt Mining tenement	Written exam	Practical exam: Survey and Levelling Establishing Survey Network Instrument Adj.	Practical exams after projects approved and Survey Law examination passed	Yes



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2.3 Standards for Licensing Cadastral Surveyors in New Zealand

The Cadastral Surveyors Licensing Board (CLSB) of New Zealand completed a review of Standards for Licensing Cadastral Surveyors in 2021. This Standard lists competencies into three sections that form the basis of the Standard as shown below. The Standard identifies where there needs to be “an understanding of:” and those where there needs to be “an ability to” carry out a task.

Schedule 1 Competencies

1 Introduction

- (1) The competencies form the basis for the standards for the licensing of cadastral surveyors in New Zealand.
- (2) To be able to apply the Surveyor-General's Rules, the Board requires a licensed cadastral surveyor to have a sound understanding of surveying in New Zealand. This entails being competent in—
 - (a) survey measurement; and
 - (b) land tenure systems; and
 - (c) boundary definition; and
 - (d) land information systems.
- (3) To implement properly the legislative requirements for the subdivision of land to the extent they are relevant to cadastral surveying, a licensed cadastral surveyor must have knowledge of and abilities in—
 - (a) the statutory planning process; and
 - (b) land development engineering principles.
- (4) To act in a professional manner, a licensed cadastral surveyor must have and be able to demonstrate high standards of—
 - (a) professional conduct; and
 - (b) communication skills.



2.4 CRSBANZ degree accreditation program

CRSBANZ has commissioned the author to:

1. Develop agreed Australian and New Zealand description of the competencies required of a licensed or registered cadastral surveyor.
2. Synchronise competencies with a review of Fryer Mitchell Report.
3. Develop Implementation Plan for universities to satisfy contemporary requirements of Fryer Mitchell Report

The updated Fryer Mitchell Report will catalogue core and non-core surveying degree content (see appendix A) that will form the basis of CRSBANZ degree accreditation program and for evaluation of an overseas candidate's qualification, when the candidate is seeking to apply for registration as a cadastral surveyor in Australia and New Zealand.

The ongoing CRSBANZ degree accreditation program will:

- Lift the visibility of accreditation of a qualification from a state-based focus to a national focus;
- Clarify national / international level of qualification acceptable for registration;
- Provide greater level of uniformity and rigor of the accreditation process across jurisdictions;
- Improve ability to more effectively accredit degrees that are offered by distance / online methodologies and thereby deliver qualifications across state and national boundaries;
- Allow CRSBANZ to inform, through degree accreditation program, the current competencies required for registration;
- Demonstrate that relevant Australian degrees satisfy the Fryer Mitchell Report.

The following qualifications are currently recognised by jurisdictions affiliated with the Council of Reciprocating Surveyors Boards of Australia and New Zealand as meeting requirements of 4-year degree:

- Curtin University – Bachelor of Surveying
- RMIT University – Bachelor of Applied Science (Surveying)
- University of Melbourne – Master of Engineering (Spatial) depending on subject and prerequisite requirements as noted on the [Surveyors Registration Board of Victoria](#) website.
- University of Newcastle – Bachelor of Surveying (Honours)
- University of NSW - Bachelor of Engineering (Surveying)
- University of NSW - Bachelor of Engineering in Civil Engineering & Bachelor of Surveying in Surveying (Double Degree)
- University of Otago – Bachelor of Surveying
- University of South Australia – Bachelor of Engineering (Honours) (Surveying)
- University of Southern Queensland – Bachelor of Spatial Science (Honours) (Surveying)
- University of Tasmania – Bachelor of Surveying and Spatial Sciences and Graduate Diploma in Land Surveying



3. Issues and Opportunities

3.1 Federated cadastral system

Review of the national standard of competency for licensed or registered cadastral surveyors is the first step in the journey to a unified federated cadastral system.

Cadastre 2034 – Powering Land and Real Property

We are facing change in many facets of life and our cadastral environment is no different; state and territory governments are on the brink of reforming cadastral systems.

Vision - A cadastral system that enables people to readily and confidently identify the location and extent of all rights, restrictions and responsibilities related to land and real property.

Mission - To promote and support innovation and provide the leadership, coordination and standards necessary to deliver a unified cadastral system that can be leveraged to fund sustainable solutions to meet emerging needs and opportunities.

Goal 5 - achieve a cadastral system that is a federated cadastral system based on common standards

3.2 Sustainability of the cadastral surveying profession

To ensure sustainability of the cadastral surveying profession in Australia and New Zealand members of CRSBANZ and the survey and spatial science industry must:

- ensure a strong pipeline of graduating professionals to counterbalance the number of retiring surveyors (Nietschke et al, 2016)
- develop partnerships with government, universities, and training providers to ensure the profession has the necessary skills to create and manage the future cadastre
- capitalise on technology advances

2026 Spatial Industry Transformation and Growth Agenda Action Plan

Although new technological advances – such as drones, the Internet of Things or precision positioning – will have a profound impact on the way we work, creating a plan that centres on this technology would be reactive and short-term focussed: technology will always keep evolving.

If we want to be disruptors not merely adopters, we need to start at the core: organising our current workforce to be resilient and adaptive to change, and enhancing the conditions to develop creative and innovative future spatial professionals and leaders.



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Adopting Cadastre 2034 mission by all jurisdictions affiliated with the CRSBANZ with a national focus on planning and development of the skilled workforce supply chain is essential to ensure the sustainability of our profession.

In October 2015 a joint meeting of the Intergovernmental Committee on Surveying & Mapping (ICSM) Permanent Committee on Cadastre and CRSBANZ was held to discuss ways to achieve the [Cadastre 2034 vision](#) including the following:

- Build skills and knowledge resources aligned to new methods for defining and locating land boundaries (Goal 1)
- Skills development for land surveying professionals to ensure 3-dimensional system elements are maintained with integrity (Goal 4)
- Establish an agreed policy direction and governance framework for a federated cadastral system (Goal 5) including alignment of **cadastral surveying standards**.

(ICSM, 2015)

The 2021 review of licensing cadastral surveyors in Victoria identifies key issues and offers opportunities for reform that are relevant to all CRSBANZ jurisdictions.

Review of Surveyors Registration Board of Victoria Licensing System: Issues Paper

Theme 1: Current education pathways do not attract a diverse cohort or the optimal number of students to meet demand.

Issue 1: There are mixed views about the extent to which a qualification should equip students with knowledge and skills specific to cadastral surveying.

- a. There are mixed expectations on what competencies graduates should have achieved by the time they complete their tertiary qualification.*
- b. Mixed expectations about what graduates should know and be able to do also affects students' perceived readiness for the PTA.*
- c. Clarifying expectations about the level of specialist cadastral surveying skills students should have at any time of graduation is an important foundation for this Review.*

Implementation

On average, the PTA and licensing steps (as set by the Board) takes an average of 7.6 years to complete - and this does not include the four to five years of study at prescribed universities that candidates must undertake before they are eligible to commence SRBV's assessment process.

Incoming workforce supply is insufficient

A 2018 report by Consulting Surveyors National found that the surveying profession is experiencing a workforce gap nationally, with surveyor shortages expected to exist in Victoria through to 2028.



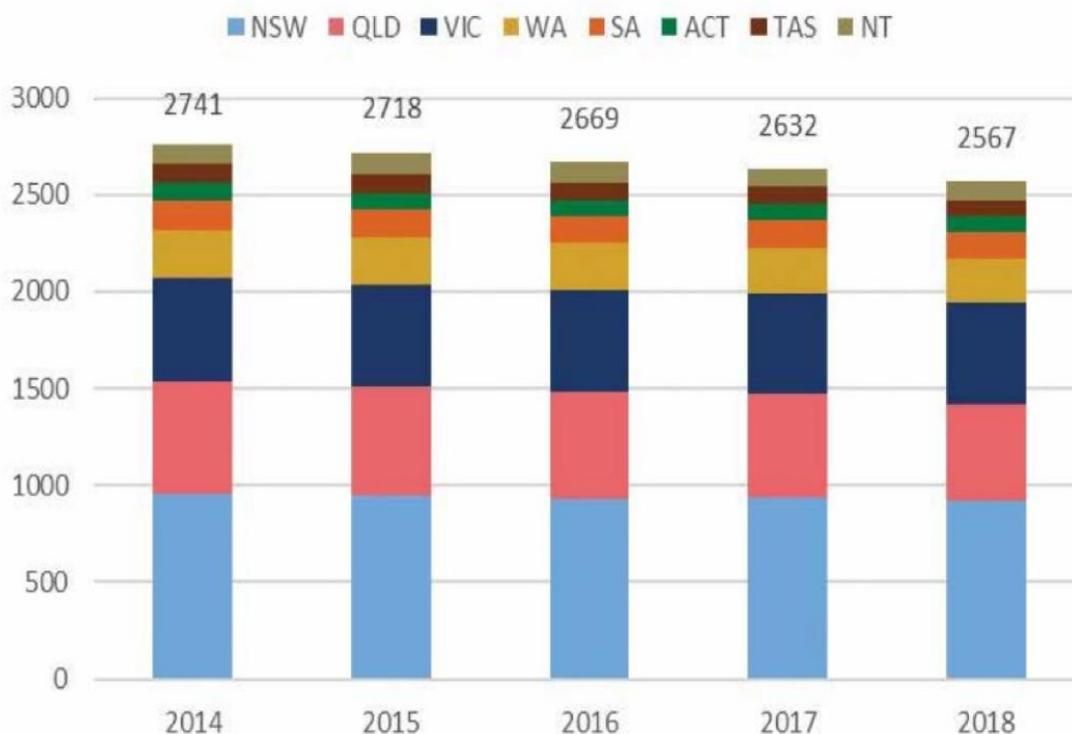
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Currently, the rate of surveyors successfully obtaining a licence is insufficient to match the rate at which licensed surveyors are expected to retire or leave the workforce. In the year 2019/20, the SRBV removed 13 licensed surveyors from the register who either did not renew their registration or died. In contrast, only seven new licensed surveyors were registered.

Data from Consulting Surveyors National & BIS Oxford Economics also shows that eight per cent of the surveying and geospatial workforce are expected to retire in the next seven years in Australia. This issue is exacerbated by the ageing workforce of cadastral surveyors.

National skills shortage is accentuated by dwindling numbers of registered or licensed surveyors in Australia as shown below (BIS Oxford Economics, 2018).



3.2 Need for national competency standards

National competency standards will enable the development of clear, consistent, streamlined, education, training and assessment pathways that will facilitate resource sharing, avoid duplication of effort and deliver economies of scale.

Report to the Institute of Surveyors Tasmania (IST) - Industry Futures Project Review and Recommendations by (Dr Jon Osborn, 2021).

Candidate Training and Practitioner CPD

The importance of comprehensive and agreed competency standards and the importance of their primacy – above any notions of standardisation of assessment or teaching – leads to a clearer picture



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of how jurisdictional Boards may approach the task of training and assessing the competency of candidates, as well as the task of ensuring suitable CPD is made available to practitioners seeking to renew their registration. It also enables records of achievement that are mapped against competencies and that will therefore facilitate mobility of candidates and practitioners if and when they move their candidacy from one jurisdiction to another.

Recommendations:

- *That the IST and TLSAB develop a comprehensive and detailed statement of competencies that supports the assessment and training of candidates and that supports the continuing professional development of Registered Land Surveyors.*
- *That, in doing so, the IST seeks to collaborate (through CRSBANZ) with other Australian and New Zealand jurisdictions to produce an agreed, comprehensive and detailed statement of competencies – with each competency identified as national wherever possible or identified as jurisdictionally-specific where necessary.*

3.3 Unify surveying industry

The Competency Review Project stakeholder consultation will provide inclusive roundtable discussions with representative membership from the many and varied Government, Business and Professional Associations. This will provide a forum for the Boards of Surveying, universities, TAFE and industry associations to collaborate on the development of competencies that will lead to the development of a national post graduate training program.

The stakeholder engagement process will raise the profile of the surveying profession and encourage surveying professionals to better understand the broad scope of their work and their contribution to the community (The Surveying Taskforce Inc, 2018).

Unified qualification design principals will enable:

- Greater mobility through stronger recognition of cross-sector and transferable skills and develop pathways to allow graduates to move or transfer between jurisdictions
- Making better use of industry and educator expertise to ensure better quality outcomes
- Improved pathways advice to support lifelong learning and build resilience for the surveying profession



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4. Have Your Say

Feedback

1. Feedback can be provided by:
 - a) Submitting an individual or collective written submission.
 - b) Contributing to a submission from an organisation or professional body.
 - c) Attending and providing verbal feedback at consultation workshops or webinars

2. Feedback to consider:
 - a) Whether current graduates meet the needs of the industry defined by surveying and mapping and its allied fields, and what key elements will allow this to continue into the future?
 - b) What skills, knowledge and experience are required for licenced or registered cadastral surveyors?
 - c) Identify required level of competence that cadastral surveyors must have to obtain or renew a licence to conduct cadastral surveys, for example needs to be “an understanding of” or needs to be “an ability to” carry out a task.
 - d) What can undergraduate surveying degrees contribute to developing the foundations to build the capacity and capability of land surveying for the future?
 - e) Expression of interest for participation in roundtable discussions to synchronise agreed competencies with a review of Fryer Mitchell Report (scheduled for April 2022 university mid-semester break).

3. Submission to be provided by completing online feedback form [here](#)

Feedback is required no later than COB Monday 14 March 2022.

4. For more detail and opportunity to ask questions before submitting your feedback please register to attend CRSBANZ [webinar](#) scheduled for Tuesday 22 February 2022.

Confidentiality

Please identify any information that you wish to remain confidential.

Enquiries

Email: mnietschke@alexander.com.au



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Appendix A

Fryer Mitchell Report (2013) core mandatory surveying degree topics

Inner core topics:

1) Measurement, or raw data collection in general:

- a) Crucial principles of surveying, including field-note taking, the need to avoid errors and the need for checking.
- b) Surveying concepts: working precisely, in three dimensions, horizontal and vertical components, spherical and ellipsoidal earth shapes, Cartesian and spherical coordinates.
- c) Taking measurements, notably of topographic, urban, engineering and industrial objects: field techniques and detailed usage, including calibration and testing, of all survey instruments, including levels, total stations, GNSS.
- d) Introduction to laser scanners and imaging systems from close-range or aeroplanes,
- e) Sources of instrument errors and measurement errors (including refraction and earth curvature) and corrections; typical accuracies.
- f) Reductions of field measurements for known errors and for calibration.

2) Processing measurement data to convert it into spatial information:

- a) Survey computations: plane coordinates and heights, reading plans to derive spatial and dimensional information; the theory behind all routine surveying calculations.
- b) Typical errors in calculations; significant figures, and accuracies of computed quantities; assorted numerical skills; procedures for check calculations.
- c) Engineering set-out calculations.
- d) Contouring, including accuracy and errors in contouring; areas and volumes from coordinates, accuracy of area and volumes from coordinates.
- e) Spherical and ellipsoidal earth models, Cartesian, spherical, ellipsoidal and geoidal coordinates; geodetic effects, curvature of the earth; geodetic datums; map projections in detail; map grids and their characteristics.
- f) Error propagation/variance propagation; adjustment by least squares; *a priori* survey design; assessment of accuracy of computed quantities.

3) Basic presentation of spatial information to colleagues, clients, and/or public:

- a) Survey software packages.
- b) Report preparation.

4) Control Surveys:

- a) Instrumentation; network design.
- b) Accuracy specifications and relevant regulations.

5) Survey Specialisations:

- a) Engineering surveys for building construction, for road and railway construction, etc.
- b) Underground surveys for mining and tunnelling.
- c) Industrial surveys.
- d) Photogrammetric surveys.
- e) Laser scanning.
- f) Hydrographic Surveys.

6) Cadastral surveying (crucial to registered surveyors but not to non-registered surveyors):

- a) Land boundary and cadastral law to a high level.
- b) Field techniques applicable to boundary surveys.
- c) Professional practices as a cadastral surveyor.



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Outer core topics:

7) Fundamentals of mathematics and sciences:

- Basic sciences, especially physics, earth sciences and geology.
- Basic mathematics and statistics.

8) Specialised presentation of spatial information for colleagues, clients, and/or public:

- GIS, computer graphics/CAD, and city modelling.

9) Communication with colleagues, clients, and/or public:

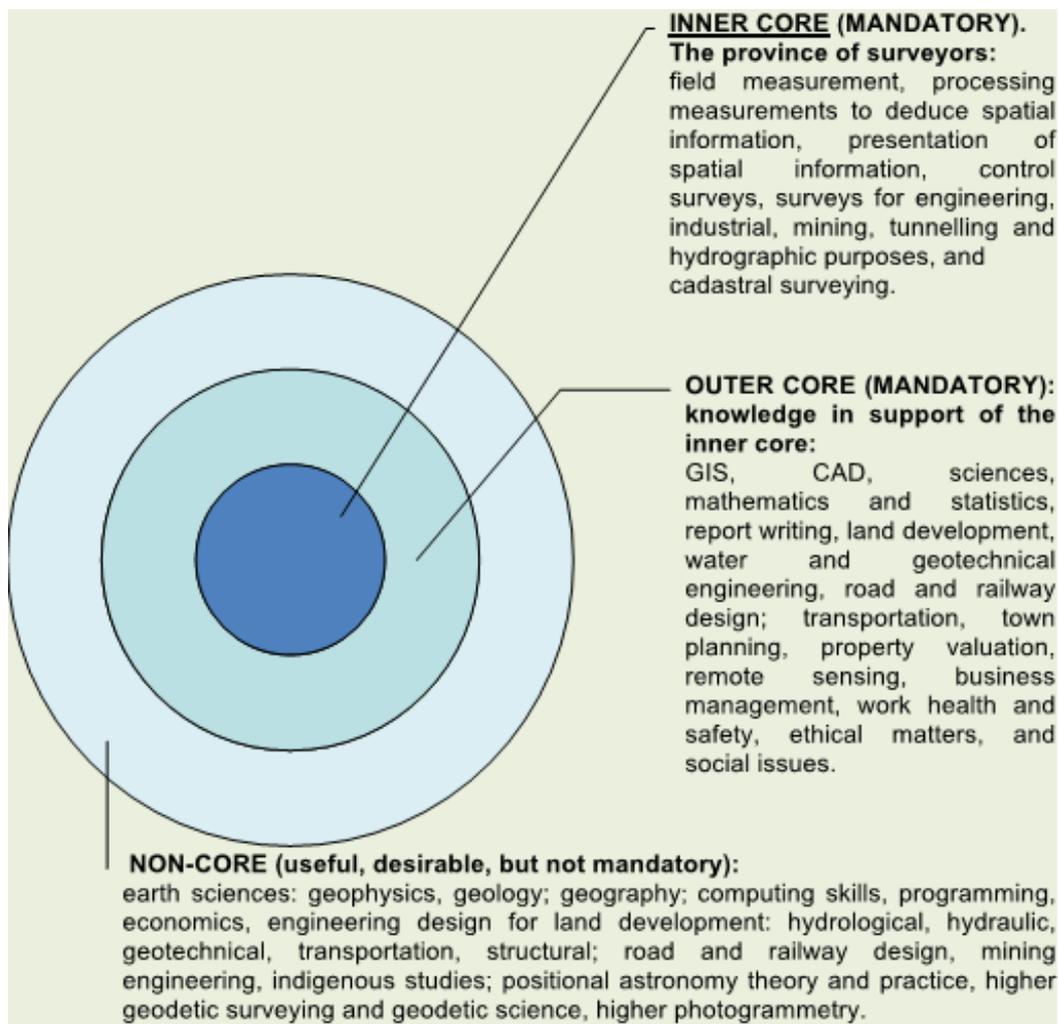
- Communication, report writing, English expression.

10) A working knowledge of applications of surveying in allied professions, to facilitate discussion of surveys with colleagues and clients:

- Introduction to land administration, land development, economics, land usage.
- Basic engineering: hydrologic, hydraulic, geotechnical; road and railway design, transportation.
- Introduction to mining practices.
- Basic town planning.
- Basic property valuation.
- Basic remote sensing.

11) Working professionally, ethically, safely:

- Business management and business practice.
- Work health and safety.
- Ethical matters, social issues.





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