



CERTIFIED PROFESSIONAL  
SOIL SCIENTIST

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# Certified Professional Soil Scientist Recognised Competencies for AUSTRALIAN SOIL SURVEY



SOIL SCIENCE  
AUSTRALIA

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Soil Science Australia was established in 1955 to work toward the advancement of soil science in the professional, academic and technical fields.

**The objectives of the Society are to**

- promote the field of soil science
- further the expertise in soil science of members
- provide a forum for discussion on soil science
- increase government and community awareness of the importance of soil science
- liaise and cooperate with other organisations in support of mutual interests
- encourage research and extension in soil science and
- promote wise management of the soil resource throughout Australia.

Members of Soil Science Australia can apply for and maintain professional accreditation within the field of soil science through the Certified Professional Soil Scientist (CPSS) accreditation scheme.

Further details on the Society can be found at [www.soilscienceaustralia.org](http://www.soilscienceaustralia.org) and on professional soil scientist accreditation at [www.cpss.com.au](http://www.cpss.com.au).

## Recognised competencies for Soil Survey\*

This document outlines the minimum standards and competencies expected for accreditation as a Soil Surveyor under the Certified Professional Soil Scientist (CPSS) accreditation program managed by Soil Science Australia.

Soil Surveyors accredited under these recognised competencies must already be accredited as a Certified Professional Soil Scientist.

Certified Professional Soil Scientists are required to observe the Soil Science Australia and CPSS Code of Ethics, a public statement of the principles, values and behaviour expected of members of the Society, and the Rules of Conduct.

The competencies listed below are skills that can be reasonably expected of a professional soil surveyor in Australia.

The term 'soil surveyor' is defined here as follows: 'A soil surveyor is able to undertake the systematic examination, description and delineation of the distribution of soils and is able to evaluate soil and landscape characteristics for a range of potential land uses.'

\*These competencies are reviewed by the CPSS Board.

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# Soil Science Australia - Standards for Professionals in Soil Science with a recognised competency in Soil Survey

The following Soil Survey competency standards identify the competencies that can be reasonably expected of a CPSS Soil Survey and are in addition to the minimum requirements for Certified Professional Soil Scientist accreditation, which can be found at [www.soilscienceaustralia.org.au](http://www.soilscienceaustralia.org.au)

## Section 1. Core Knowledge for a Soil Surveyor

A CPSS Soil Surveyor will demonstrate a detailed knowledge and understanding of soil description, classification, survey design and land evaluation processes.

### (1 Skill set with 7 Competencies)

Competency	Minimum Standard
K-1	Recognises rock types and understands their relationships to soil formation and soil type.
K-2	Understands the principles of pedogenesis and landscape evolution, with particular relevance to the Australian environment and the application of those principles to develop appropriate mapping units, using available resource data (geology, climate, etc).
K-3	Demonstrated knowledge of soils and soil classification within Australia and a more detailed knowledge of soils and landscapes within specific geographic areas.
K-4	Demonstrated knowledge of the principles of soil morphological description as detailed in the Australian Soil and Land Survey Field Handbook and soil classification nomenclature according to the Australian Soil Classification.
K-5	Understands the principles of survey design, in particular appropriate site intensity and sampling strategies for surveys of differing scales and purposes.
K-6	Demonstrated knowledge of remote sensing methods and tools available for use in soil survey and an understanding of the limitations and practical use of these tools.
K-7	Understands the relationships between soil physical/chemical properties and land use limitations, in terms of land evaluation methods used in Australia.

## Section 2. Practice of Soil Survey

A CPSS Soil Surveyor is able to competently plan and execute a soil survey as well as communicate the outcomes to the client in a professional manner. A CPSS Soil Surveyor is also able to develop an appropriate land evaluation framework to enable interpretation of the soil information for a specified purpose.

### Skill set 1: Planning (3 Competencies)

Competency	Minimum Standard
P-1	Consults effectively with clients on survey requirements, obtains pre-existing soil and land evaluation data/information, designs, and develops a survey proposal including purpose, content, delivery schedule and cost.
P-2	Complies with government policy and regulatory requirements as they relate to soil survey and reporting.
P-3	Undertakes pre-field analyses of survey area including where appropriate, stereo-pair aerial photograph interpretation, or use of other remote sensing data to prepare preliminary soil maps (e.g. digital soil mapping).

### Skill set 2. Investigation (7 Competencies)

Competency	Minimum Standard
I-1	Determines where soil assessment sites should be located with regard to landscape features and pre-existing information.
I-2	Operates modern GPS equipment for geo-referencing of sampling sites.
I-3	Prepares soil pit faces that meet OH&S guidelines, description and photography requirements.
I-4	Accurately identifies soil horizons and describes soil horizon characteristics in the field using accepted methodologies (e.g. Australian Soil and Land Survey Field Handbook).
I-5	Accurately classifies soil profiles according to the Australian Soil Classification (Isbell, 2002).
I-6	Collects soil samples at representative sites for the accurate and meaningful analysis of soil chemical, physical and biological properties in the laboratory.

### Skill set 3: Communication (6 Competencies)

Competency	Minimum Standard
C-1	Accurately describes soil properties and their variation in language that can be understood by the clients of the soil survey.
C-2	Accurately interprets laboratory data to meet the objectives of the client and comply with accepted government and industry standards.
C-3	Reports the soil data that supports the mapping and the soil profile photography in a clear and consistent standard format.
C-4	Applies GIS software to produce soil or attribute maps that address the project objectives with all appropriate map elements (scale, coordinates etc) (may work in conjunction with a person having the required competence).
C-5	Produces standard soil map formats according to conventional survey standards, such as the construction of a map legend around a geomorphic framework.
C-6	Communicates effectively with the client regarding the scope and scale of the survey, field procedures used (data collection), the materials produced (maps and reports), and the limitations of the data and outputs including the provision of reliability maps.

### Skill set 4: Land Evaluation and Interpretation (3 Competencies)

Competency	Minimum Standard
LE-1	Develops an appropriate land evaluation framework for one or more land uses.
LE-2	Demonstrated understanding of the physical, chemical and biological constraints of soils and how these constraints are utilised in land evaluation.
LE-3	Demonstrates an understanding of how soil properties influence the environmental consequences of the use of land, for example: <ul style="list-style-type: none"><li>• the effects of the chemistry of irrigation water (e.g. urban effluent or coal-seam-gas water) on chemical/physical properties of soil profiles</li><li>• the role of soil in nutrient and pesticide runoff/contamination</li><li>• the accumulation of metals or other toxic substances in soils</li><li>• the role of soil properties in erosion.</li></ul>

### Guiding texts for soil survey in Australia

- Isbell RF (2002) 'The Australian Soil Classification: revised edition' (CSIRO Publishing: Collingwood) [known as the 'ASC']
- Isbell RF, McDonald WS, Ashton LJ. (1997). Concepts and Rationale of the Australian Soil Classification. CSIRO Publishing [known as the '**Black Book**']
- Hazelton P, Murphy B (2007) 'Interpreting soil test results: What do all the numbers mean?' (CSIRO Publishing: Collingwood)
- McKenzie N, Coughlan K, Cresswell H (Eds.) (2002) 'Soil physical measurement and interpretation for land evaluation.' (CSIRO Publishing: Collingwood) [known as the '**Brown Book**']
- McKenzie NJ, Grundy MJ, Webster R, Ringrose-Voase AJ (Eds.) (2008) 'Guidelines for surveying soil and land resources: second edition.' (CSIRO Publishing: Collingwood) [known as the '**Blue Book**']
- Rayment GE, Lyons DJ (2011) 'Soil chemical methods – Australasia.' (CSIRO Publishing: Collingwood) [known as the '**Green Book**']
- The National Committee on Soil and Terrain (2009) 'Australian soil and land survey field handbook: third edition.' (CSIRO Publishing: Collingwood) [known as the '**Yellow Book**']
- McKenzie N, Jacquier D, Isbell R, Brown K (2004) 'Australian soils and landscapes: an illustrated compendium.' (CSIRO Publishing: Collingwood)
- Pevehill KI, Sparrow LA, Reuter DJ (eds.) (1999) 'Soil analysis: an interpretation manual.' (CSIRO Publishing: Collingwood)