

## Overview and Operational Plan 2017-18

Endorsed by the Australian Soil Network

October 2017

## 1. Summary

### Overview

The National Committee on Soil and Terrain (NCST) is a standing committee on the implementation committee of the National Soil Research Development and Extension Strategy, the Australian Soil Network (ASN). The NCST is the peak government committee coordinating information on soil and terrain issues in Australia. It is committed to ensuring access to a consistent set of the best soil information on the nature, distribution, condition, limitations and potential of Australia's soil resources for improved decision making and policy development. The committee is formed as a collaboration of government agencies that have a lead in soils from across Australia. It includes representatives from all states and territories with core responsibilities in soil assessment and monitoring, plus CSIRO, Department of Agriculture and Water Resources (including ABARES) and Geoscience Australia. Further information on the committee is provided on the attached information sheet (The National Committee on Soil and Terrain (NCST)).

### NCST Goal

The goal of the NCST is to provide Australians with access to consistent and the best information on the nature, condition (including trend), limitations and potential of Australia's soil resources for improved decision making and policy development.

This aligns with the goals of The National Soil Research, Development and Extension Strategy to:

1. Improve effectiveness of co-investment to generate and apply new knowledge
2. Improve quality, availability and access to soil data and information
3. Improve communication and exchange of soil knowledge
4. Adopt a national approach to building future skills and capacity
5. Collaborate on development and use of physical infrastructure.

### Outcomes

Specifically, the NCST works to achieve the following outcomes:

1. Enhanced Australian soil and land data infrastructure
2. Current and future needs for Australian soil and land data and information satisfied
3. Improved accessibility and utility of soil and land information to users
4. High quality technical advice on soil and land issues available for government
5. Better land use/management decisions through effective use of soil and land information.

## NCST Terms of Reference

- Act as a Standing Committee on the National Soil RD&E Strategy
- Provide national leadership, coordination and direction in soil and terrain issues and information for sustainable use and management of the soil and land resource
- Provide expert advice on policy proposals and a strategic appreciation of emerging issues and priorities on soil and terrain matters
- Advise on the implications and relevance of soils to broader land management issues
- Coordinate national soil and terrain data and information to support evidence-based policy and decision making
- Provide national advocacy for soil and terrain issues of state and national significance
- Identify trends and technologies in soil and terrain assessment and monitoring and advise on implications for sustainable use and management of the soil and land resource and regional development issues
- Provide the framework and national standards for soil and terrain assessment
- Encourage capacity building in soil and terrain matters within government agencies, educational institutions and the community.

## 2. NCST Procedures

### Membership

The NCST comprises State, Territory or Commonwealth representatives who specialise in soil and terrain assessment and mapping.

Each State or Territory is required to represent its whole jurisdiction and, where appropriate, key activities outside the agencies. This is especially important where the soil and terrain activities within a State or Territory are in more than one agency. The committee also comprises a representative from the Australian Soil Network.

Soil Science Australia is represented on the committee through a nominated member.

Experts or representatives of agencies or organisations such as universities, not listed may be invited from time to time to ensure informed consideration of issues.

Current membership of the NCST is (as of October 2017):

Name	Agency	Jurisdiction	Email
Mr Jason Hill (Chair)	Department of Environment and Natural Resources	NT	<a href="mailto:jasonv.hill@nt.gov.au">jasonv.hill@nt.gov.au</a>
Mr Daniel Brough (Deputy Chair)	Department of Science, Information Technology and Innovation.	QLD & Soil Science Australia	<a href="mailto:daniel.brough@qld.gov.au">daniel.brough@qld.gov.au</a>
Mr Tim Overhue	Department of Primary Industry and Resources	WA	<a href="mailto:tim.overhue@agric.wa.gov.au">tim.overhue@agric.wa.gov.au</a>
Dr Neil McKenzie	CSIRO (Australian Soil Network)	Australian Soil Network	<a href="mailto:neil.mckenzie@csiro.au">neil.mckenzie@csiro.au</a>

Mr Mark Imhof	Department of Economic Development, Jobs, Transport and Resources	VIC	<a href="mailto:mark.imhof@ecodev.vic.gov.au">mark.imhof@ecodev.vic.gov.au</a>
Ms Sandy Carruthers	Department of Environment, Water & Natural Resources	SA	<a href="mailto:Sandy.Carruthers@sa.gov.au">Sandy.Carruthers@sa.gov.au</a>
Dr Darren Kidd	Department of Primary Industries, Parks, Water and Environment	TAS	<a href="mailto:darren.kidd@dipwe.tas.gov.au">darren.kidd@dipwe.tas.gov.au</a>
Mr Brian Jenkins	Office of Environment and Heritage	NSW	<a href="mailto:brian.jenkins@environment.nsw.gov.au">brian.jenkins@environment.nsw.gov.au</a>
Dr Alison McInnes	Environment and Planning Directorate	ACT	<a href="mailto:alison.mcinnes@act.gov.au">alison.mcinnes@act.gov.au</a>
Dr John Wilford	Geoscience Australia	Comm.	<a href="mailto:john.wilford@ga.gov.au">john.wilford@ga.gov.au</a>
Dr Jane Stewart	Australian Bureau of Agricultural and Resource Economics and Sciences	Comm.	<a href="mailto:jane.stewart@agriculture.gov.au">jane.stewart@agriculture.gov.au</a>
Dr Michele Barson	Department of Agriculture and Water	Comm.	<a href="mailto:michele.barson@agriculture.gov.au">michele.barson@agriculture.gov.au</a>
Mr Mike Grundy	CSIRO (Soil and Landscapes in Agriculture and Food)	Comm.	<a href="mailto:mike.grundy@csiro.au">mike.grundy@csiro.au</a>
Mr Peter Wilson	CSIRO (National Soil Information)	Comm.	<a href="mailto:peter.wilson@csiro.au">peter.wilson@csiro.au</a>

## Reporting and working arrangements

In the National Soil RD&E Strategy (Figure 9), the NCST is a standing committee on the strategy implementation committee, the Australian Soil Network. Reporting arrangements for the NCST, including working group activities are outlined in Figure 1.

The NCST oversees technical working groups, which currently include the Australian Soil Classification and Digital Soil Assessment working groups. A NCST representative is a member of each of these working groups. An overview and work plan for both of these groups is outlined in Attachment A and B.

NCST representatives may also assist ASN working groups such as the Australian Soil Information Facility proposal.

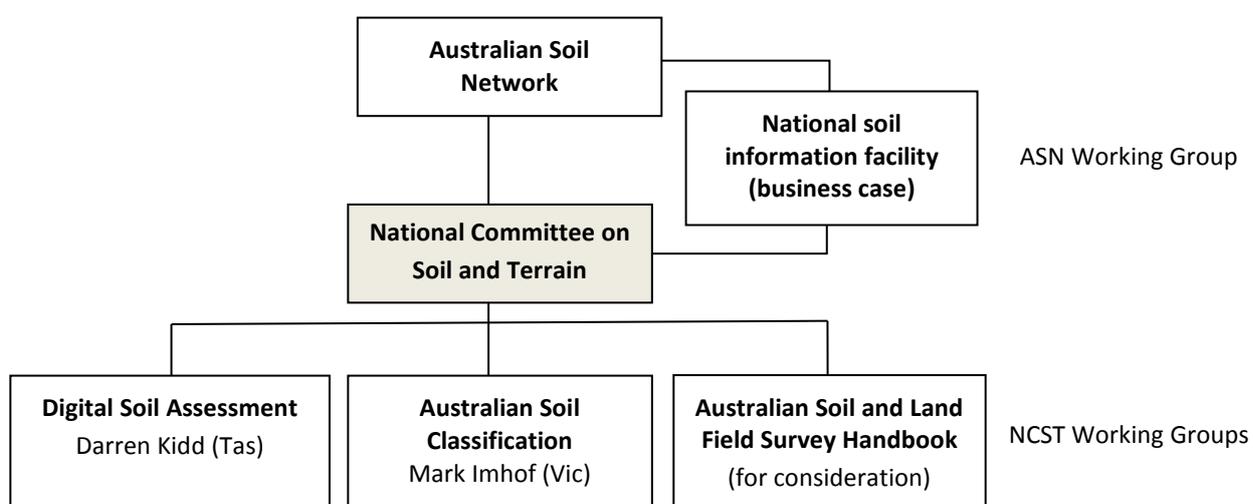


Figure 1: Reporting arrangements for the NCST including current working groups (2017/18).

## **Operation**

The NCST, through an annual face-to-face meeting, out-of-session communication, representation on working groups and tasks undertaken by individual working group members, delivers to a work plan guided by its Terms of Reference.

The annual meeting will be hosted by a different jurisdiction each year.

## **Chairing arrangements**

NCST is chaired by a member of the committee. This position is reviewed every three years at the annual meeting through a nomination and balloting process. The last change of Chair was made in April 2016.

## **Financial considerations**

Members will fund their own costs incurred to attend meetings. The host agency for the annual meeting will fund any meeting costs, costs related to field trips or other ancillary costs.

Representatives are expected to allocate resources to NCST activities such as leading working groups, chairing the committee and/or development of work plans.

### 3. NCST Operational Plan 2017-18

Under the five goals of the National Soil RD&E Strategy, the committee will support the activities of the Australian Soil Network through the following;

	<i>Proposed work for 2017/18</i>	<i>Outputs</i>	<i>NCST Lead</i>
<b>1. Improve effectiveness of co-investment to generate and apply new knowledge</b>			
	Review NCST membership through a presentation/discussion with ASN members in October 2017.	<ul style="list-style-type: none"> <li>• Develop proposal for NCST discussion at May 2018 meeting.</li> <li>• Seek ASN endorsement in 2018.</li> </ul>	Jason Hill
<b>2. Improve quality, availability and access to soil data and information</b>			
	Continue to coordinate the following NCST working groups: <ul style="list-style-type: none"> <li>• Australian Soil Classification (ASC)</li> <li>• Digital Soil Assessment (DSA)</li> </ul> Support the potential development of an Australian Soil information Facility	<ul style="list-style-type: none"> <li>• Further develop the proposal for an Arenosol soil order (see ToR and Work Plan - Attachment A)</li> <li>• Finalise group membership and hold initial meetings. Develop protocols for exchange of knowledge and information (see ToR and Work plan - Attachment B)</li> <li>• Provide NCST representation on this ASN working group.</li> </ul>	Mark Imhof  Darren Kidd  Dan Brough

		If required, the NCST to meet to progress the development of the facility (subject to support for facility at ASN October 2017 meeting)	All
<b>3. Improve communication and exchange of soil knowledge</b>			
	Seek ASN endorsement for a NCST representative to regularly present to the ASN	NCST representatives to present key government/ industry collaborative projects to the ASN	Jason Hill
<b>4. Adopt a national approach to building future skills and capacity</b>			
		-	-
<b>5. Better land use/management decisions through effective use of soil and land information</b>			
	Prepare a summary of the Australian Soil Assessment Plan (ASAP)	Produce a simplified version of the ASAP for ASN review by December 2017	Neil McKenzie & Sandy Carruthers

Other Activities:

	<i>Proposed work for 2017/18</i>	<i>Outputs</i>	<i>NCST Lead</i>
<b>Strategic Plan</b>			
	Seek endorsement from the ASN to develop a 5 Year Plan (2018-2022)	NCST Strategic Plan (2018-2022)	TBC

## Attachment A

# Australian Soil Classification Working Group

## Overview and 2017/18 Work Plan

### Overview

Soil classification is the primary means that soil scientists use to communicate efficiently about soils, their nature, properties and management. Soil science is a relatively young discipline, which means that classification needs to be updated as new knowledge is acquired and useful improvements identified. In 2016 for example, the Working Group facilitated a new edition of the Australian Soil Classification (ASC) incorporating knowledge gained in recent decades on acid sulfate soils (soils with sulfidic and sulfuric properties). It is important to understand these soils, as they are difficult and expensive to manage, to ensure their disturbance does not cause environmental or infrastructure damage. The Working Group continues to examine proposals to amend the ASC and make recommendations.

### Objectives:

1. To assess submissions to amend the ASC and make recommendations to the NCST. The working group is currently working on a major proposal for an Arenosol soil order to better accommodate soils of sandy texture:
2. To keep abreast of developments in international soil classification.

## Membership

Current membership on the working group is provided in the following table.

Name	Agency	Jurisdiction
Bernard Powell	Industry	QLD
Noel Schoknecht	Industry	WA
James Hall	Industry	SA
Mark Imhof	DEDJTR	VIC
Brian Lynch	DENR	NT
David Rees	DEDJTR	VIC
David Morand	E&H	NSW
Ben Harms	DSITI	QLD
Ted Griffin	DAFWA	WA
Mark Thomas	CSIRO	-

## Work Plan 2017-18

### **May 2017:** Teleconference meeting

May - August: The Arenosols proposal will be further developed and tested using the WA soil profile database of sandy soils. A feature article on the activities of the Working Group and the Arenosol proposal will be prepared for the next edition of the Soil Science Australia Profile newsletter. Any other submissions will be considered.

### **August 2017:** Teleconference workshop on draft Arenosols proposal

August - November: following the workshop, national soil database testing will be undertaken, and the draft structure of Arenosols enhanced. Any other submissions will be considered. The Working Group will also contribute to the International Universal Soil Classification meeting in Darwin (date still to be determined).

### **November 2017:** Webex (or similar) teleconference

November - March: Circulate draft structure of Arenosols to soil community for comment. Any other submissions will be considered.

### **March 2018:** Teleconference meeting

March - August: Review feedback on draft structure of Arenosols. Any other submissions will be considered.

### **August 2018:** Teleconference meeting

August - November: Finalise structure of Arenosols for ASC Workshop at National Soils Conference. (December 2018). Contribute to International Universal Classification launch at the 21<sup>st</sup> World Congress of Soil Science in Rio de Janeiro, Brazil (August 2018).

**November 2018:** Conduct an ASC Workshop at Soil Science Australia's National Soils Conference, Canberra (December 2018).

## Attachment B

# Working Group on Digital Soil Assessment (WGDSA)

## Overview and 2017/18 Work Plan

### Overview

In recent years many state and territory agencies have integrated digital soil assessment (DSA) into their land resource assessment programs in Queensland, Victoria, NSW, Tasmania, South Australia and Western Australia. This has progressed largely in isolation, with informal and ad hoc contact made between DSA users to discuss methodologies, application and feedback on approaches.

Applying a largely theoretical science into operational applications, has resulted in trial and error, modifications and compromises by DSA-practicing agencies to meet budgets, work-programs and timeframes. Regular interaction through a working group would support and collaborate on DSA development to increase its application rates and reduce replication. The working group would develop guidelines, coding repositories, and electronic digital soil mapping (DSA) resources to reduce replication in operational efforts.

As a major driver for DSA, there is a current need for land evaluation to support agricultural development of Northern Australia. A reformed working group would build upon and support:

- DSA training - as provided in recent years by the Australian Collaborative Land Evaluation Program (ACLEP)
- DSA development - such as currently by Queensland and Western Australia
- Land assessment programs - such as the expanded program in NT.

### Purpose

The Working Group on Digital Soil Assessment (DSA)<sup>1</sup> is a working group under the National Committee on Soil & Terrain (NCST). The WGDSA is a skills and knowledge based group that provides information, advice and recommendations to the NCST, as well as guidelines, operational DSA frameworks, leadership and support with respect to the development and use of digital technologies and methodologies designed to produce high-quality land and spatial soil information for improved management and use of Australia's soil and land resources.

## Scope

Themes of the original working group were from Recommendations for the Advancement of Digital Soil Assessment in Australia (Robinson *et al.* 2010). The scope of the reformed working group has been expanded and now includes:

- **National Forum:** Provide a national forum to present activities and share information, methods and automated code relating to DSA, including at DSA-focussed Technical Workshops<sup>2</sup>, stimulate collaboration and resource-sharing
- **Operational:** Document and distribute efficiencies, compromises and methods applied in jurisdictional operational DSA (to date) to facilitate DSA theory into operational jurisdictional resourcing.
- **Reporting:** Report annually to the NCST on:
  - current state and application of DSA/DSA in Australia
  - likely future needs and directions, and risks or deficiencies in this approach, for example the importance of maintaining general soil landscape and pedology skills.
  - recommendations for advancing DSA in Australia
  - achievements.
- **Guidelines & Manuals:** Develop and support the establishment of guidelines, recommendations and/or manuals of operational DSA<sup>3</sup>.
- **Resource-Sharing:** Provide ordnance for sharing fully documented automated coding for different components of DSA (sampling, modelling, depth-standardisation, and uncertainties).
- **Standards:** Recommend and support the development of standards for DSA products. Review whether existing standards support Australian needs.
- **Infrastructure:** Assist in the development, maintenance and application for funding of a shared resource—a cloud computing infrastructure (under the NCI) with pre-loaded DSA coding (web-based Linux R studio), where jurisdictions/ universities can have shared access, upload cleaned and formatted data to apply various DSA applications (sampling design depth standardisation, predictions, uncertainties, raster production etc). This will fast-track jurisdictional DSA application in many areas, providing consistency and standards in methods, and avoid development duplication. Each jurisdiction to have a permanent allocation, which can be negotiated for sharing depending on workloads and current activities. Include training in its use, and an approval process for uploaded code.
- **Technologies, Methodologies & Trends:** Advise on and circulate newly published DSA technologies, methodologies and trends for operational application and testing (new sampling strategies etc).
- **Mentoring:** Appoint individual experts (as a first point of contact) to field ad hoc queries from Australian's DSA specialists for each of the main DSA components; geo-statistics, sampling design, spatial modelling, covariates development, disaggregation and harmonisation of legacy data, depth splines, generation of uncertainties.
- **Training:** Recommend, support and facilitate further DSA training and staff exchange opportunities as needs are identified.
- **Projects:** Recommend and support DSA projects that are designed to develop high-quality spatial data, build capacity and enhance collaboration across Australia<sup>5</sup>.

- **Products:** Recommend and support strategies with respect to development, accessibility and use of DSA products for a broad range of users in and outside the soil mapping profession.
- **Soil Science Australia:** Increase interaction with Soil Science Australia; DSA-related content provided to 'Profile'; semi-regular reports provided to the newsletter outlining Australian progress in DSA. Explore SSA accreditation for DSA applications.
- **Promotion:** Advise on promotion of DSA techniques, methodologies and products, as well as support related activities.
- **Policy:** Advise on associated policy development, and engage with policy and decision makers outside the soil/DSA community on the purpose of DSA, demonstrate how DSA can meet the needs of stakeholders and user groups across Australia.
- **ACLEP:** Continue to assist ACLEP in its role of support for collaborative DSA projects and capacity building, as well as product development and facilitation of data accessibility<sup>7</sup>.
- **Endorsement:** Recommend DSA approaches for endorsement by NCST.
- **Application:** Through the relevant state or territory agency, support national initiatives such as further development of SLGA. Develop guidelines and recommendations (and associated coding) on how to develop and apply operational DSA into DSA as agency core business.
- **Academia:** Advisory group to consult with Australian leading DSA Universities to enhance integration and application of DSA theory into operation.

## Objectives and Work Plan

The working group is to provide an annual work plan for endorsement by the NCST at its annual face to face meeting.

## Reporting, Monitoring and Review

Report on progress by the working group chair (or proxy) at each NCST meeting. Monitor DSA uptake and methods. The working group will be reviewed by the NCST annually.

## Meeting and Internal Communication Arrangements

Meet as required by teleconference or other means. Communication outside of meeting times via email, Skype, Lync, etc.

## Membership

Members of the NCST, where required, will nominate an agency representative for the working group. At least one NCST member is required to be on the working group. The NCST may decide to invite additional representation from particular sectors / organisations for either time bound or issue bound purposes.

Current membership on the working group is provided in the following table.

Name	Agency	Jurisdiction
Nathan Robinson	DEDJTR	VIC
Kaitlyn Andrews	DENR	NT
Michael Carnavas	DENR	NT

Karen Holmes	DAFWA	WA
Paul Galloway	DAFWA	WA
Craig Liddicoat	EWNR	SA
Mat Webb	DPIPWE	Tas
Darren Kidd	DPIPWE	Tas
Ross Searle	CSIRO	-
Peter Wilson	CSIRO	-
Brendan Malone/ Budi Minasny	Uni Sydney	-
Jon Gray	E&H	NSW
Peter Zund	DSITI	QLD
Lauren Obrien	DSITI	QLD
Dan Smith	DNRM	QLD
John Wilford	GA	-
Mark Thomas	CSIRO	-

### Wider Group of Interest

A wider group of interest involved in DSA activities will be kept informed of the working group's activities and provided with the opportunity to comment on plans and documents.

### Chair

The chair will be nominated by the NCST or NCST executive (Chair and Secretariat). The interim chair is Darren Kidd (Tasmania DPIPWE).

### Financial Implications

No special allocation. In-kind preparation time and teleconferencing by members and their agencies. Any funding for travel etc will be incurred by the represented agency. The NCST and its member agencies will consider where possible potential external funding sources to assist the working group.

## Work Plan 2017-18

- The NCST endorsed the DSAWG 2017 Terms of Reference (ToR) at the 2017 Meeting in Perth, WA, May 2017.
- Final membership is to be advised, consisting of key State, CSIRO and University DSM practitioners.
- Darren Kidd (TAS) is the interim chair.
- The provisional work plan of the DSAWG is to have quarterly phone meetings.
- The first meeting is to be held before June 30<sup>th</sup>, 2017, once membership is finalised by each jurisdiction (currently awaiting final membership advice from NSW and USYD).

## The preliminary key activities of focus during 2017 will be to;

- Develop group consensus on a comprehensive work plan for 2017-18, based on the scope identified in the ToR.
- Gain endorsement of the work plan by the NCST.
- Support maintenance and development of the Soil and Landscape Grid of Australia.
- Support NAWRA and State-based DSA activities.
- Investigate development of a 'DSM Code Portal' – a common location where DSM code can be shared and updated for a variety of purposes (sampling, modelling and uncertainties).

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## Footnotes

1. DSA is the computer-aided development of predictive maps of soil properties or attributes (e.g. soil pH or clay content). It uses traditionally developed soil data (both site and spatial data), newly available remotely or proximally sensed data (e.g. terrain analysis), as well as a range of geo-statistical techniques to predict the soil attributes of spatial entities (usually in the form of geographic grid cells). (Robinson et al. 2010, p.4). The overall DSA is a land evaluation process that specifically incorporates pedometrics and digital soil mapping (DSA).
2. A semi-regular series of national workshops (subject to funding) would facilitate information-sharing and collaboration among practitioners and other interested parties, with state-based projects used as foci at these events. Multi-disciplinary/ integrated NRM approaches could also be encouraged and explored at such workshops.
3. Capacity would be enhanced by developing DSA 'centres of excellence' to lead, support and provide a linking role for various aspects of DSA. This follows national RD&E strategies, where various jurisdictions concentrate on specific fields of endeavour (not every jurisdiction needs to have capacity or skills in every area), while membership of such groups need not be limited to a jurisdiction/locality. This is encouraged through resource-sharing, including code-development, cloud-based infrastructures and implementation,
5. A collaborative DSA program would enhance project development and coordination across Australia as well as capacity building.
6. Further, development of a 'DSA knowledge centre' would facilitate the capture and free availability of lessons learnt, experience and technical information.
7. ACLEP would continue to develop collaborative pilot projects in DSA in each state/territory that meet both state and national needs. This would ensure that DSA is advanced across the country, thereby improving jurisdictional capacity and creating collective national capacity, capabilities and skills.
8. This includes development of electronic guidelines and an operational framework as part of NCST's Australian Soil & Land Survey Handbook