Agenda Meeting 6 of the Soil RD&E Implementation Committee

**Location:** University of Sydney, Level 1, Biomedical Building, 1 Central Ave, Eveleigh, Sydney.

**Date** 10th May, 2016

**Attendees**
- Georgina Kelly  New South Wales Department of Primary Industries (Chair)
- Neil McKenzie  CSIRO Agriculture, Canberra
- Hamish Cresswell  CSIRO Agriculture, Canberra
- Jan Edwards  Grains Research and Development Corporation, Toowoomba
- Jennifer Alexander  Executive Officer, Bendigo
- Alex McBratney  The University of Sydney
- Ian Anderson  Western Sydney University, Richmond
- Michael Crawford  Department of Economic Development, Jobs, Transport & Resources, Bendigo
- Jason Hill  Department of Land Resource Management, Darwin
- Paul Lawrence  Department of Science, Information Technology, Innovation and the Arts, Brisbane
- Cameron Allan  Meat and Livestock Australia, North Sydney
- Michele Barson  Department of Agriculture, Canberra
- Felice Driver  Sugar Research Australia, Brisbane
- Cathy Phelps  Dairy Australia, Melbourne
- Brenda Kranz  Horticulture Innovation Australia, Sydney
- Peter Voller  Department of Primary Industries, Parks, Water and Environment, Launceston
- Vicki Woodburn  Rural Industries Research and Development Corporation, Canberra
- Sharon Harvey  Wine Australia, Adelaide
- Karen Holmes  Department of Agriculture and Food Western Australia, Perth
- Neal Menzies  University of Queensland, St Lucia
- General Jeffery  National Advocate for Soil Health, Canberra

**Apologies**
- Allan Williams  Cotton Research and Development Corporation, Narrabri
- Warwick Dougherty  New South Wales Department of Primary Industries, Menangle
Agenda

09:15 Welcome
09:20 ITEM 6.1: Minutes of last meeting and correspondence
09:30 ITEM 6.2: Member updates and members-in-focus
10:25 ITEM 6.4: Planning Forum Action 1: Updated capability audit

10:45 Morning Tea

11:00 ITEM 6.5: Planning Forum Action 2: Prospectus for our five priorities and the CRC option
11:30 ITEM 6.6: Planning Forum Action 3: Economic case for investment into Soil RD&E
12:00 ITEM 6.7: Planning Forum Action 4: Building the soil information infrastructure to meet public and industry needs

12:45 Lunch

13:30 ITEM 6.8: Update from the National Advocate for Soil Health
14:00 ITEM 6.9: Committee name change
14:20 ITEM 6.10: Communication management and reports from sub-committees
14:40 ITEM 6.11: Budget update

15:00 Afternoon Tea

15:20 ITEM 6.13: Other business
15:40 ITEM 6.14: Next meeting and forthcoming events
16:00 Close
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<th>Soil RD&amp;E Implementation Committee</th>
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<td>Location: Sydney</td>
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### AGENDA Paper
**ITEM 6.1**

**Background**
The minutes of Meeting 5 of the Soil RD&E Implementation Committee are presented for review and endorsement (Attachment 1).

**Key issues**
None identified.

**Required action**
For review and endorsement.

**Resource implications**
None

**Preparation and consultation**
Soil RD&E Secretariat.

**Attachments**
Minutes of Meeting 5 of the Soil RD&E Implementation Committee.
Minutes of meeting 5 of the Soil RD&E Implementation Committee

Location: Cleveland Grange, 55 Shannons Road, Lancefield.
Time: 13.30-15.00, Thursday 4th February 2016
Attendees: Georgina Kelly (Chair), Neil McKenzie, Hamish Cresswell, Jennifer Alexander, Michele Barson, Paul Lawrence, Budiman Minasny, Felice Driver, Cathy Phelps, Peter Voller, Cameron Allan, Allan Williams, Mark Imhof (for Michael Crawford)
Apologies: Jan Edwards, Michael Crawford, Ian Anderson, Warwick Dougherty, Pauline Mooney, Brenda Kranz, Alex McBratney, Vicki Woodburn, Jason Hill, Sharon Harvey, Karen Holmes

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<tr>
<th>No</th>
<th>Agenda Item</th>
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<tr>
<td>5.1</td>
<td>Minutes of last meeting and correspondence</td>
<td>Refer to agenda paper 5.1 and the minutes of the last meeting.</td>
<td>Follow up membership nominations with ACDA</td>
<td>Secretariat</td>
<td>Next meeting</td>
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<td>A number of actions from last meeting have been held over for the next meeting due to the shortness of this meeting following the forum.</td>
<td>Brief the Chairs of the National Landcare meeting about the role of the Soil RD&amp;E Implementation Committee and follow up with the CMA CEOs forum.</td>
<td>Peter Voller</td>
<td>Next meeting</td>
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<td>Develop a plan of action as a result of the forum discussion.</td>
<td>Secretariat</td>
<td>Next meeting</td>
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<td>Launch the Soil RD&amp;E website at Outlook</td>
<td>Secretariat</td>
<td>2 March</td>
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<td>Minutes of the last meeting were endorsed except for item 4.4. Moved by Cathy Phelps, seconded by Felice Driver.</td>
<td>Minutes for item 4.4 to be amended to better reflect meeting discussion. Seek endorsement from members out of session</td>
<td>Executive Officer</td>
<td>Within 3 days</td>
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<td>5.2</td>
<td>Member updates</td>
<td>Refer to agenda paper 5.2.</td>
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<td>Michele Barson</td>
<td>Next meeting</td>
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<td>Verbal updates were provided by members to the committee.</td>
<td>Department of Agriculture will have some new mapping products to share with the Committee</td>
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<td>5.3</td>
<td>Appointment of the Chair</td>
<td>Refer to agenda paper 5.3.</td>
<td>Georgina was unanimously supported as the Chair and was appointed for a period of two years.</td>
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<td>Iain Young has resigned from his position as Chair of the Committee.</td>
<td>Following the meeting, the Implementation Committee moved to thank Iain Young for his contribution as Chair of the National Soils Strategy Implementation Committee during 2015, and wish him well as he takes on his new role at University of Sydney.</td>
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<td>The Committee agreed to retain the process of appointing the Chair as outlined in the Terms of Reference. Nominations were called for and Georgina Kelly was the sole nominee.</td>
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<td>5.4</td>
<td>Round 2 of Rural R&amp;D for Profit update</td>
<td>Agenda paper 5.4 provided as background.</td>
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<td>Rural R&amp;D for Profit round 2 announcements for successful projects will be made in April</td>
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<td>5.5</td>
<td>R&amp;I committee presentation on Soil Strategy</td>
<td>Agenda paper 5.5 provided as background. The Soil RD&amp;E Strategy is due to present on progress with implementation to the R&amp;I Committee on 24th February in Sydney.</td>
<td>Material will be distributed prior to the meeting for comment</td>
<td>Secretariat</td>
<td>Before 24th February</td>
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<td>5.6</td>
<td>Other Business</td>
<td>The Forum held over the last day and a half was discussed and what the outputs would be. The Committee discussed current arrangements with quarterly face-to-face meetings. Sponsorship of our Outlook session allows for a number of session tickets to Outlook A vote of thanks was made by the Committee to Hamish and Jenny for their organisational efforts.</td>
<td>Build on the discussions from the Forum to develop an impact analysis and M&amp;E plan. Detail activities to be done in-house and those to be contracted Reduce the number of annual meetings to three and align to other significant events or hold every second meeting via videoconference Members nominated the Chair to attend Outlook along with Neil McKenzie</td>
<td>Cameron Allan and Michael Crawford</td>
<td>Within 2 weeks</td>
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<td>Next Meeting</td>
<td>25th May via teleconference (tbc)</td>
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# Soil RD&E Implementation Committee

**Meeting Number:** 6  
**Location:** Sydney  
**Date:** 10th May 2016

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<th>AGENDA Paper</th>
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**Background**

It was agreed at Meeting 1 that members of the Implementation Committee would provide written updates that highlight key developments, challenges and emerging issues for their organization. A brief 3-5 minute verbal overview of additional items not included in the update can be provided at the meeting. It was subsequently agreed that at each meeting, one or two members would provide a more detailed account of their activities.

**Key issues**

The intent is to provide all members with a clearer understanding of soil RD&E matters across all jurisdictions and organizations. With time, members should develop a more collegiate and integrated understanding of soil management across Australia.

**Required action**

- Written member updates are included in Attachment 2.
- Members are requested to provide a brief 3-5 minute verbal summary at the meeting.
- GRDC will provide a 10-minute overview of their soil RD&E investments and priorities.
- The University of Sydney will provide a 10-minute overview of their activities in Australia and overseas.

**Resource implications**

- Minor. Members will normally draw on existing review and reporting materials from their organization.

**Preparation and consultation**

- Soil RD&E Secretariat with input from members of the Soil RD&E Implementation Committee.

**Attachments**

- Attachment Two: Member Updates
Attachment Two: Member Updates

- New South Wales
- Victoria
- Western Australia
- Tasmania
- CSIRO
- RIRDC
The key soils based initiative for NSW DPI this quarter is the Masterclass ‘Soil Productivity – Growing Agriculture’ (9-13 May 2016). Apart from the training provided to early and mid-career researchers from developing countries, the Masterclass has also been designed to increase collaboration with NSW government soil efforts and partnerships with key universities such as University of Sydney. We have also taken the opportunity to provide a platform for the National Soil Strategy. Aligning individual agency initiatives with the work plan/priorities of the Strategy provides for practical on ground delivery within the field key purpose of the Masterclass (e.g. Priority 4: Support innovation in soil management (Communicate, collaborate and learn).

The Draft press release below describes the masterclass:

**INTERNATIONAL DELEGATES SUPPORT SOIL MASTER CLASS**

International delegates will explore the latest soil research during a five day Master Class ‘Soil Productivity – Growing Agriculture’ convened by the NSW Department of Primary Industries (DPI) and the Crawford Fund.

DPI Director Soils, Dr Georgina Kelly said the Master Class will bring together the collaboration of state and national partners with international delegates to identify new opportunities and collaborations to foster increased soil productivity and sustainability to grow agriculture.

“The aim of the Master Class is to improve the understanding of the key issues for soil productivity for industry, business, government and research leaders in Australia and neighbouring Asian/Oceanic countries,” Dr Kelly said.

“NSW DPI undertakes a range of cutting-edge scientific research and development in soil productivity that is relevant for local, national and international agricultural regions.

“The Master Class will commence with a one day Symposium held in Sydney to provide emerging agricultural science and policy leaders with the opportunity to explore a range of contemporary soil management challenges, opportunities and progress in relation to agricultural productivity and sustainability.

Dr Kelly said the delegates will have the opportunity to see first-hand the valuable soil research conducted at the DPI Elizabeth Macarthur Agricultural Institute at Camden, including a tour of the Centre for Recycled Organics in Agriculture field site which examines the risks and benefits from various compost and soil amendments.

“The DPI Primary Industries Institute at Wollongbar will showcase to the delegates the in-field methods to collect greenhouse gases from soil. The onsite analyses of these samples allows DPI scientists to recommend options that increase agricultural productivity while minimising the carbon footprint of agriculture,” Dr Kelly said.

“While on the north coast the delegates will also visit local horticultural industries, including blueberry, coffee, banana, macadamia and sugarcane, to see and learn about innovative DPI research trials covering soil amendments and greenhouse gas mitigation.

“The final day will be hosted by the University of Sydney to present a global approach to digital soil mapping followed by a tour of the soil security laboratory.”

Crawford Fund Master Class coordinator, Dr Colin Chartres said Master Classes are the flagship training initiative of the Crawford Fund and are delivered in partnership with other key agencies, including, NSW DPI, ACIAR, CSIRO, CGIAR Centres, universities and state governments.

“Master Classes are delivered by experienced instructors, each class offers high quality tuition to early and mid-career researchers within the field they have already trained and are actively working in, to build a higher level of expertise across emerging areas of science, policy and agribusiness,” Dr Chartres said.

“Since 1992, around 1,000 people have participated in more than 50 Master Classes, held in 14 countries across the Asia Pacific, Africa and Australia.”
Agriculture Victoria (Michael Crawford)

- Through the GRDC-DEDJTR Bilateral Research Agreement, Agriculture Victoria undertook a business case analysis of R&D investment needs and opportunities for the grains high rainfall zone of south eastern Australia. High level priorities identified included improving the understanding of 1) the use of subsoil amelioration to improve soil conditions, 2) the spatial distribution and management of soil acidity, and 3) nitrogen dynamics and availability under waterlogged (anaerobic) soils. A large collaborative project to address the first priority has been supported through the GRDC External Investment Prospectus process, and two projects to address the next two priorities have been developed and agreed through the bilateral agreement process. All projects commence on July 1.

- Web-based information dissemination – the Victorian Resources Online (VRO) website (which has now been running for 19 years), led by Mark Imhof, continues to be the key means for making soil data and information available in Victoria. A current key focus for the VRO project is development of LRA based information products relevant to agricultural industries (e.g. overview soil maps of dairy, grains cropping and grazing regions). Statewide derivative maps (soil surface and subsoil texture, surface depth, subsoil sodicity) have also been published on the website. http://vic.gov.au/vro

- Victoria has 5 long-term research trials in cropping and grazing regions (Hamilton, Horsham, Rutherglen and Walpeup) which continue to be funded and supported by the Victorian Government. Together they represent 283 years of research into a range of issues from different rates of phosphorus fertilisers on pastures to how rotation and tillage management affects wheat yields. These trials allow us to assess the effect of a range of agricultural management practices on productivity, soil resources and sustainability, which can’t be measured in short term trials. In 2016, LR1 (Longernong Rotation No 1) is celebrating 100 years since it was first established in 1916 to examine cropping rotations.

- The Victorian Government and University of Melbourne are jointly hosting the 7th International Nitrogen Initiative Conference, at the Melbourne Cricket Ground, 4 - 8th December 2016. The theme of INI 2016 is "Solutions to improve nitrogen use efficiency for the world". The program includes plenary presentations from many of the world’s experts in the fields of nitrogen cycling and management, crop and animal production, emissions and environmental impacts with participation from research, industry and policy organisations globally. Further details of the conference are available at ini2016.com. This is a fantastic opportunity for Australian scientists, investors and policy makers to showcase our work and attend a world class international conference in Melbourne with high relevance to Australian agriculture and the broader community.

Western Australia, Department of Agriculture and Food (Karen Holmes and Tim Overheu)

Senior leadership changes, Agriculture and DAFWA.

In late March, DAFWA’s Director General (Rob Delane) was offered a transfer / secondment to a role in the Department of State Development, which he accepted. An interim Director General has been appointed – Mr. Mark Webb who was previously the long serving CEO of the WA Kings Park Botanical Gardens Authority.
A WA Ministerial reshuffle in March 2016 has resulted in the Agriculture portfolio receiving a new Minister. The Hon. Mr Dean Nalder replaces the Hon. Mr Ken Baston. Mr Nalder is the local member for Alfred Cove (Perth City) and retains the Ministry role for WA Transport.

As the committee is already aware, Noel Schoknecht has resigned as Soil Discipline Leader at DAFWA to pursue his many other interests (December 2015); Tim Overheu (current president of Soil Science Australia) will be filling much of this role in this post-Noel era.

**Government funding in soil-related activities:** DAFWA soil related activities are expected to receive further cuts in the new budget, pending a review currently underway. The role of the Soil Commissioner (administering the Soil and Land Conservation act) is also under review. Current projects are largely funded through Royalties for Regions, and will end in 2018; there has been a recent change to the WA Public Service Commission Act removing permanency of employment for public servants.

**Agricultural intensification and expansion:** WA government investment in soil and landscape assessment continues to focus on intensification of agriculture, and expansion into the north. Three new land assessment and suitability projects have begun in 2016 (1 in North, 2 in southwest) together with water availability assessments. A CSIRO-led land suitability assessment of the Fitzroy catchment (east of Broome) is beginning this month. This is one of 3 areas being modelled in their DAFF project: Northern Australia Water Resource Assessment (NAWRA).

**Soil and nutrients in urban catchments:** A recent government announcement (April 4) is the launch of a $20M funding program to review the condition of six regional estuaries in WA (DoW lead) – funding will include support for ‘whole farm nutrient mapping’ and soil testing across catchments draining into the estuaries.

Projected population expansion around Perth is anticipated to impact some of the State’s best southern intensive agriculture and food production areas and challenge the region’s unique natural environment. The Green Growth Plan is a draft strategic document introducing proposed environmental policy (land, soil, water etc) including the introduction of mandatory soil testing.

**New GRDC project** with co-funding from WA government (DAFWA, UWA, and Murdoch University), to characterise the nature, distribution, and management needs of ‘forest gravelly soils’ through the south west land division of WA. Commencing July 2016.

**WA soil archive being established:** Western Australia will have a State Soil Archive this year, housing soil samples from the Kimberley to the South Coast at the Muresk Institute (Northam, about 100km NE from Perth). The facility will be fairly basic (e.g. not climate controlled).

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**Tasmania:** Dept. Primary Industries Parks Water and Environment (DPIPWE) (Darren Kidd)

The Department of Primary Industries Parks Water and Environment (DPIPWE) is the lead agency for soils and terrain assessment in Tasmania. A number of other organisations provide a significant role in research, extension and education. These include the University of Tasmania; the Tasmanian Institute of Agriculture, Forestry Tasmania, the three Tasmanian natural resource management regional bodies and a number of agricultural consultants. The DPIPWE role is primarily to generate and store land resource information and to provide information to government to support and guide policy related to land use and land resource management.
Continuation of Tasmanian Government ‘Water for Profit Program’ (DPIPWE/ TIA/ UTAS)

(Program progress has been delayed due to staff redeployment into biosecurity (Myrtle Rust disease Response) and Wildfire management duties (SW world heritage areas)

- DPIPWE have completed v1.0 Enterprise Suitability Mapping (ESM), which will be updated during the Water for Profit Program using Digital Soil and Climate mapping at 80m resolution (with an aim of improving to 30m resolution). These products have now been placed on the Department’s publically accessible spatial web portal (www.theLIST.tas.gov.au).
- DPIPWE is about to commence (April 2016) latest round of soil sampling as calibration data to update v1.0 Tasmanian Digital Soil Maps (TDSM) – strategically based on areas with high predictive uncertainty and high agricultural versatility in the major new irrigation schemes.
- DPIPWE continue the Tasmanian Legacy Soil Data Capture project to feed into the v2.0 TDSM process – to date, over 18,500 additional soil sites of varying quality have been sourced, including data from forestry and world-heritage land and Bass Strait Islands, that was previously under-represented in v1.0 TDSM.
- DPIPWE have used Enterprise Suitability surfaces for 20 crops to develop a spatial ‘Enterprise Versatility Index’ at 80m resolution. This tool can be used in identifying which areas of the state are more suited to a range of enterprises. Gross-margins agricultural analysis data has been applied to each Enterprise suitability surface to determine a ‘median potential gross-margins’ map, showing which areas of the State are more likely to successfully host high-valued enterprises. This will be refined and released with v2.0 TDSM updates.
- Strategic climate loggers redeployment for a further 12 months has been finalised to enhance the DPIPWE v1.0 Tasmanian Digital Climate Maps (TDCM) (terrain based micro-climate mapping)
- Refining Enterprise Suitability rulesets – in conjunction with Tasmanian Department of State Growth to identify new areas for sparkling wine grape production – other industry engagement being established/ continuing. DPIPWE are also working at incorporating parametric weighting of suitability soil and climate inputs, and a continuous (fuzzy) rating system.
- DPIPWE have been using v1.0 TDSM surfaces to develop ‘soil vulnerability’ layers, to incorporate into v2.0 ESM – preliminary suitability rulesets were predominantly productivity-based – updated rulesets will also incorporate the vulnerability layers as a measure of sustainability of enterprise assessments. These include soil (water) slope erosion (based on the KLS components of RUSLE), Wind Erosion, Salinity, Sodicity, Compaction (livestock) pugging potential, and waterlogging. Draft surfaces have been completed, and will be refined using v2.0 TDSM.
- DPIPWE are working with the University of Sydney (FAE) to incorporate TDSM uncertainty ranges into the ESA rulesets, as probability estimates of each suitability class occurring in each pixel.
- TIA (Tasmanian Institute of Agriculture)/ University of Tasmania has established a new ‘soil hydrology lab’ – will be hydlogically ‘characterising’ significant/ common Tasmanian irrigated cropping soils – this will then feed into National Pedo-transfer Inference systems to improve Tasmanian inferences, then applied to re-run and improve v2.0 DSM hydrology surfaces (ksat, WP, FC etc)
- TIA have established peer-to-peer networks of farmer groups. Benchmarking will be used to support the groups to set productivity goals for yields and inputs for both cropping and pasture-based farming systems. The groups will set goals for improving irrigation management, and develop and share strategies for meeting these goals across their region.
ESA Climate Change Scenarios

DPIPWE have statistically down-scaled climate futures mapping for the Tasmanian Climate Change Office (Dept of Premier and Cabinet) to 80m resolution, and incorporated into v1.0 ESA mapping developed under the Water for Profit Program. This shows how the suitability extents of certain crops will be affected by changing climate, at 80m resolution, in terms of terrain-based predictions of ‘frost-risk’, growing-degree-days’, ‘chill-hours’ and ‘heat-stress’. These products for different emissions scenarios have also been uploaded to www.theLIST.tas.gov.au for spatial public access.

DPIPWE Tasmanian Soils Database

- Tasmania’s soil database archives, previously stored on an ORACLE database system with locally-derived storage structures, then re-mapped to ‘SITES’ format and stored using MS Access, has been migrated to the Tasmanian Natural Values Atlas – a publically accessible web-based information portal (www.naturalvaluesatlas.tas.gov.au). This has a web-based front end and ORACLE back end. The SITES format has been maintained, as well as the development of a variety of reporting, data-upload and entering features, as well as full spatial viewing capabilities. Testing of this database will continue over 2016 before going ‘live’.

Soil Condition Monitoring

- The Tasmanian Soil Condition Evaluation and Monitoring Project continues through the 3rd round of sampling, re-sampling long-term sites established in key soil-land use combinations around the State, including agriculture (cropping, grazing and perennial horticulture), forestry and conservation uses.

DPIPWE- Sense-T Collaborations

Sense-T is building an economy-wide sensor network and data resource, creating a digital view of Tasmania and giving industry, governments and communities the tools to solve practical problems and make better decisions; tested in Tasmania and applied across Australia and the world. Based at the University of Tasmania, Sense-T is a partnership between the University, CSIRO and the Tasmanian Government, and is also funded by the Australian Government.

- Smart-Sensor Irrigation/ Irrigation Pathway Projects - On-farm sensors will inform the development of a smartphone app to help farmers decide when and how much to irrigate, tailored to their individual irrigation systems and soil and crop types, helping to improve water use efficiency and agricultural sustainability. DPIPWE have developed automated code (as part of the app) that allows upload of existing soil data, EM mapping, or v1.0 TDSM surfaces, and clusters these into variable-rate irrigation (VRI) management zones, based on the number of soil moisture sensors a farmer can afford. The code uses the Fuzzy- k-means algorithm to cluster the key soil properties, which are then applied to the VRI type (speed or emitter control), which will then allow the farmer to optimise water application based on current moisture levels, and weekly forecasts using BoM Meteye climate grids. The project is a collaboration between TIA, CSIRO, UTas, NCEA, DPIPWE, and Definium Technologies.

- Pasture-Predictor App – Collaboration between TIA and CSIRO to extend research conducted during Sense-T’s Stage 1 Beef and Dairy project. Researchers will enhance pasture prediction models by using sensors and data to allow farmers to predict and prepare for different scenarios, and will further develop on-animal sensors to better monitor health, grazing and productivity in the dairy and livestock industries. Pasture growth predictions through the app have been based on regional (APSIM-enabled) modal soil characteristics and coarse resolution climate date – DPIPWE have been collaborating with TIA to spatialize these products using v1.0 TDSM and TDCM products, and have applied them to downscaled Climate Futures Tasmania datasets to predict pasture growth at 2030 and 2050.
DPIPWE (Sustainable Landuse & Info Management (SLIM)) have secured a secondment arrangement to firstly, prove the concept of downscaling existing BoM Meteye forecasting from 5km resolution, down to 80m resolution using long-term Bom data, DPIPWE temperature sensors, and correlations with terrain derivatives. Once the automated coding is developed, this will then be incorporated into existing Sense-T sensor systems through the Sense-T platform, and made available as a publically accessible web-service and/ or app, allowing farmers to plan for extreme temperature events, at a resolution that will capture niche terrain areas hosting niche agricultural markets. Preliminary testing shows that the downscaling (near real-time and weekly forecast) can successfully be downscaled to 80m resolution to around 1.5°C.

National Activities

DPIPWE (through travel funding from ACLEP/ CSIRO) have provided in-kind support at the recent DSM training of NT soil-mapping recruits, assisting Ross Searle and Mark Thomas deliver different DSM training components through the R-coding platform (see NT jurisdictional/ DSM training report). DPIPWE have recognised and acknowledged the collaborative support and assistance received through ACLEP over many years, especially in developing their own DSM potential through pilot projects and DSM training, which is now part of core-business. DPIPWE will continue to offer support and advice to the NT/ CSIRO in mapping the developing areas across the North, especially in the operational aspects of applying DSM, as a gesture of returning developed expertise back into the collaborative process, and sharing resources in terms of DSM knowledge and experience.

Continued Collaboration and Innovative Development with the University of Sydney (FAE)

The Australian Research Council Linkage Project (LP110200731, “Wealth from Water” was completed for the pilot project areas (Meander and Midlands) in 2015 – this was a highly successful partnership that adapted theoretical DSM into operational government land evaluation, developing professional expertise in DSM, working with Alex McBratney, Budiman Minasny, and Brendan Malone.

The collaboration is being continued in working (presently un-funded) on using v1.0 TDSM surfaces to quantify spatial Soil Security for Tasmania, in terms of the inputs of Capability, Condition, Capital, Connectivity and Codification (McBratney 2015). This will include incorporating v1.0 soil vulnerability surfaces and versatility indices as a measure of agricultural capability, using SCEAM rulesets, applied to land use and ASC order (with development of new ASC orders map of Tasmania, based on TDSM inputs as covariates) to determine average condition over time, gross-margins analysis to provide a measure of spatial economic agricultural capital and other measures of natural capital in terms of eco-systems services (carbon storage, riparian filtration etc). It is hoped that the methodology developed and Soil Security outputs will provide a measure of the soil’s contribution to food and water security in Tasmania, enable marketing of sustainable enterprises, consistent with the State’s clean, green market image, and provide at least a starting template for this analysis to be applied elsewhere.

The University of Sydney and DPIPWE (SLIM) have developed another ARC project application and methodology to provide a pilot project and near real-time and short-term forecasting of soil moisture status at 30m resolution using DSM surfaces, downscaled MetEye and a network of soil-moisture sensors. If successful, this three year collaborative project will provide a tool for farmers to better schedule irrigation (as per the Sense-T project), and plan for optimal operational activities such as seed-bed preparation, planting, sowing, stock rotations and harvesting.
CSIRO (Hamish Cresswell)

As you will be aware from media reports CSIRO is undergoing further staff cuts, in the vicinity of 275 positions. This follows the loss of about 1300 other positions since 2014. There is an active debate about levels of support for public good research and a senior leadership view that CSIRO investment into public good research priorities should follow the lead of the federal Government (i.e. if Government is not prepared to fund particular areas of public good research then CSIRO should withdraw from those and instead focus on other areas with greater external investment). It is expected there will be a loss of research capacity in CSIRO science units such as Oceans and Atmosphere, Land and Water, Food and Nutrition, Minerals, Agriculture, and Manufacturing. The soil research capability within CSIRO is primarily in Land and Water (about 75 positions impacted) and Agriculture (about 30 positions impacted). The specific research areas to be impacted are not clear at time of writing. Support functions are also set to be reduced – likely in addition to the 275 positions mentioned above. The CSIRO Food and Nutrition Business Unit will be disbanded with much of the Food research and post-farm gate processing capability merging with CSIRO Agriculture (adding to the current 680 FTE staff in Agriculture). This enables a greater emphasis in value-adding and better connection from farm to food products.

In this funding environment there is very considerable pressure on internal strategic appropriation funding and it is becoming very difficult to sustain current levels of investment in national soil information infrastructure and in national coordination roles. CSIRO has committed $60,000 cash (up-front payment for 3 years) to the Soil RD&E strategy implementation, and considerable ongoing in-kind time in the co-leadership of the strategy. The last quarter of 2017 is the 3-year point of the current CSIRO contribution to this process. We will need to review our ongoing level of involvement in the first half of 2017.

CSIRO has been developing and implementing an organisation-wide impact framework since 2010 to consistently plan, monitor and evaluate the impact of our research. This approach allows for a more comprehensive view of the impact being delivered and supports the management of impact from a large portfolio of research. In CSIRO Agriculture our soil-related R&D feed into impact areas such as: ‘Sustaining the base’, ‘Closing yield gaps’, ‘Transforming yield’, and ‘Efficient digitised agriculture’. Annual impact planning requires each Business Unit to strategically link their goal to Impact Areas and then to more specific individual Impact Statements. Each Program leads one or more Impact Statements, which requires them to be responsible for co-ordinating efforts to achieve the stated impacts. To provide robust evidence that goals are being accomplished a common Impact Evaluation Framework has been developed for understanding and assessing impact and to help ensure consistent and rigorous evaluation across the Organisation. Use of a common evaluation framework helps ensure that outcomes from each evaluation are comparable – across projects, programs and business units, and across time. We are happy to share more details of this impact framework should it be useful to other members in demonstrating the value of your soil (and other) RD&E.

Rural Industries Research and Development Corporation (Vicki Woodburn)

- John Harvey will start as RIRDC’s Managing Director on 3 May 2016.
- In February 2016, it was decided that RIRDC would relocate all staff from Canberra, ACT to Wagga Wagga, NSW. As a result, RIRDC will be going through a significant change process in the coming months with a high degree of staff turnover.
- RIRDC in collaboration with the Council of Rural Research and Development Corporations are hosting a senior level workshop of the RDCs to discuss cross sectoral priorities and the approaches used by the RDCs to instigate cross sectoral activities. This meeting is being held 17 May 2016 and will play a role in shaping what areas the RDCs will pursue in future R&D for Profit rounds and other collaborative activities.
### Soil RD&E Implementation Committee

**Meeting Number:** 6  
**Location:** Sydney  
**Date:** 10th May 2016

### AGENDA Paper

**ITEM 6.3**

**AGENDA Paper**

Summary of activities at Outlook 2016 and the R&I Committee

#### Background

At Meeting 3 (Agenda Item 3.11) it was agreed to sponsor a session at the National Outlook Conference in February 2016 and to use the Planning Forum to develop the narrative and key messages for the session sponsored by the Soil RD&E Strategy. The Planning Forum was held four weeks prior to Outlook and the guidance from that meeting was used to prepare the talk entitled ‘Australian soils: significant risks but excellent opportunities’. This talk and others from Outlook 2016 can be viewed online.

A modified version of the Outlook talk was presented to the R&I Committee on the 23rd of February (Attachment Three) and to the Cotton Innovation Network on the 24th of February. In each case, our purpose was to outline the priorities of the Soil RD&E Implementation Committee and to highlight both the risks to soil function under current systems of land management and also the very substantial benefits arising from a transition to improved and sustainable soil management.

#### Key issues

- The Outlook Conference provides an ideal forum for the Soil RD&E Implementation Committee to report on the status of soil management in Australia.
- Securing a regular segment at Outlook would be beneficial but the Implementation Committee will need to decide on its preferred mode for reporting to Outlook.
- Options include focussing on one of our five priorities each year. Alternatively, we could develop a regular report card on the status of Australian soils with different themes each year (e.g. acidification, nutrient management, soil erosion, soil carbon).
- A commentary on the Outlook Conference and the R&I Committee meeting will be provided at the meeting.

#### Required action

- Members are requested to consider and suggest options for having a more regular presence at the annual ABARES Outlook Conference.
- Members are asked to note the presentations made at the R&I Committee and the Cotton Innovation Network and seek further feedback if required.

#### Resource implications

- None at this stage.
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<th>Preparation and consultation</th>
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<td>● Soil RD&amp;E Secretariat.</td>
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<td>● Attachment Three: PowerPoint presentation to the R&amp;I Committee</td>
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Attachment Three: PowerPoint presentation provided to the R&I Committee
Update on the National Soil RD&E Strategy

Neil McKenzie

Sydney, 25th February 2016

Context 1: Soil management in Australia has improved a lot

• Early European land use (1850-1950) led to widespread and intense land degradation
• The era of soil conservation (1950-1985) slowed the most obvious forms of degradation
• Recent large improvements in soil management driven by economic factors and NRM policy
• Significant reductions in erosion, contaminants and nutrient imbalances
Context 2: The outlook for Australia is still mixed

- Ongoing risks:
  - acidification
  - erosion
  - nutrient imbalance
  - compaction
  - carbon
- Half-solved chronic problems
- Not immediately obvious

Percentage of sites with soil pH below the critical pHCa of 5.0

Agricultural lime sales for south-west Western Australia

Ganey, Andrew and Griffin, 2013

Context 3: Further gains in profitability are feasible

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<tr>
<th>Farm location</th>
<th>Goodwindi</th>
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<tr>
<td>Farm area</td>
<td>2820 ha</td>
</tr>
<tr>
<td>Period</td>
<td>2000 to 2009</td>
</tr>
<tr>
<td>Average yield gap over 10 years</td>
<td>1.4 t/ha</td>
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<tr>
<td>Area with consistently poor yield</td>
<td>44%</td>
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<tr>
<td>Annual yield loss due to soil constraints</td>
<td>5% to 24%</td>
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<tr>
<td>Lost production due to soil constraints</td>
<td>$52,780</td>
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Precursor to the Soil RD&E strategy

The stocktake of investment in soil RD&E (DAFF 2011)

• 150 organisations involved in soil RD&E
• $124 million per annum provided by 32 organizations
• Shift of effort underway (from state agencies and CSIRO to the tertiary education section)
• Decline in state agencies (ongoing) and major decline in field survey and monitoring
• Private sector unable to readily access relevant soil information and indications of under-investment in knowledge exchange
• No clear and agreed organisational responsibility or mandate to coordinate and deliver major national soil-related outcomes.

More recently

• PISC endorsed development of the soil cross-sectoral strategy (March 2012)
• Subsequent wide-ranging consultation including surveys, regional workshops and stakeholder engagement
  – Priority soil issues
  – Information needs
  – Current strengths and weaknesses in soil RD&E
  – Human capacity issues and opportunities
• Strategy endorsed and released by Minister Barnaby Joyce (March 2014)
• CSIRO takes on the role of jurisdictional lead with GRDC (November 2014)
Goals and work plan

- Improve effectiveness of co-investment to generate and apply new knowledge
- Improve quality, availability and access to soil data and information
- Improve communication and exchange of soil knowledge
- Adopt a national approach to building future skills and capacity
- Collaborate on development and use of physical infrastructure
- Work plan outlined in Table 8
- Clearer priorities developed in 2015

Priority 1: Find solutions to soil-based constraints
Priority 2: Improve water and nutrient use efficiency

- Improve nutrient-use efficiency, especially of nitrogen and phosphorus
- Improve fertiliser management
- Optimize soil water-use
- Rebuild stocks of organic carbon
- Reduce greenhouse gas emissions from soils

Priority 3: Develop better soil information systems


Essential for the Big Data Revolution in Australian Agriculture
Priority 4: Support innovation in soil management

- Capture ideas and experience
- Verify and test innovations
- Communicate, collaborate and learn
- Context and location are critical

A good soil in Lameroo is a poor soil in Gunnedah and vice versa!

Priority 5: Develop more effective soil and land-use policy

- Address market failure in supply of soil information
- Estimate the return on investment for soil RD&E
- Protect good quality agricultural land
- Develop complementary policies on climate, agriculture and environment
- Support education to lessen urban-rural divide
Australian Government Science and Research Priorities

- Nine Science and Research Priorities developed by the Chief Scientist in 2015
- ‘Soil and water’ one of the nine
- Published Soil RD&E Strategy was fundamental to the outcome
- Should influence future investment, especially via Australian Government programs (e.g. NCRIS, NLP)

Initial 15 months: achievements

- Implementation Committee established and active
- Executive team active and functional
- Working Groups operational
- Improving collaboration and coordination
- Two Annual Forums
- Increasing advocacy (e.g. Outlook 2016)
- New website www.soilstrategy.net.au
Initial 15 months: key issues

Functional matters
- Transition from a Committee to a Team
- Attendance constraints and representatives
- Our name

Policy and institutional challenges
- Coordination with the Advocate for Soil Health
- The Australian Soil Assessment Program
- Scope (e.g. NRM, NCST)

Advocacy and funding
- Developing a strong narrative and investment plan
- Securing a formal mandate
- Strategy for advocacy

Summary

- Soil management in Australia has improved but is not yet sustainable
- Profitability can increase through better soil management
- Significant benefits are possible from patient investment into research, development and extension
- We must solve the investment and mandate issues to ensure progress

Achieving sustainable soil management has the potential to be a great Australian success story
AGENDA Paper

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<td>Planning Forum Action 1: Updated capability audit</td>
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### Background

The capability audit undertaken during the formulation of the Soil RD&E Strategy provided a valuable baseline for understanding the scale of investment and structure of the workforce involved in soil research, development and extension.

The Soil RD&E Implementation Committee needs to have a clear understanding of trends in investment and workforce structure to fulfil its function. It is more than five years since the first capability audit and anecdotal evidence suggests that significant changes are occurring.

Other primary industry RD&E strategy teams have undertaken audits during the last 12 months (e.g. Sugar) and these provide potential template for an updated capability audit for soil RD&E.

### Key issues

- The capability audits undertaken by other primary industry RD&E strategy teams have been prepared by external consultants at significant cost (i.e. > $60K per audit).
- Several Implementation Committee members heavily involved in the first Soil RD&E Stocktake and initial discussions suggest that a useful update can be done by drawing on staff and capability within member agencies. Several member agencies have been involved in recent capability assessments (e.g. higher education evaluations) and these provide a valuable resource for an updated audit.

### Required action

- Members are requested to review the original Soil RD&E Stocktake and identify core components of an updated audit.
- Members are asked to determine whether they have available staff capability within their agencies and an interest in making a proposal to update the Soil RD&E national capability audit. If the Committee decides to proceed with this option, then it is suggested that a small selection panel is convened from the membership to assess proposals.
- If there are no proposals from member agencies then a consultancy should be commissioned to gather the required information and analyse the results. A Working Group would be required from the Committee to manage the process including preparation of terms of reference for the consultancy. If the Committee decides to proceed with this option then interested members are asked to volunteer for this Working Group.
- Agreement on the preferred course of action is required. If an updated audit is to proceed, then the project team needs to be identified, resources allocated and delivery
dates agreed.

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<tr>
<th>Resource implications</th>
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<td>● A maximum allocation of $35K from the Soil RDE Budget is proposed during the 2016/2017 financial year.</td>
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### Background

The five national Soil RD&E priorities are central to our activities. At the 2016 Planning Forum it was agreed that a prospectus should be prepared with a compelling value proposition for investment (with hard analytics) for each of these priorities. This was referred to in several sessions as either the business plan, the decadal plan for soil RD&E, or more generally as the prospectus. Preparation of the prospectus is not starting from scratch and there are significant activities relevant to each priority. These include the following.

- **Priority 1: Soil-based constraints** - Significant investments addressing this priority are being made by RDCs (particularly GRDC) and other agencies.
- **Priority 2: Water and nutrient-use efficiency** - Major programs relating to this priority have been recently completed including the National Soil Carbon Program (NSCP) and the National Agricultural Nitrous Oxides Research Program (NANORP). In each case, final reports and other outputs provide guidance on future directions.
- **Priority 3: Better soil information** - The ASAP proposal provides a full analysis and clear recommendations for this priority (see also Agenda Item 6.7).
- **Priority 4: Innovation capture and communication** - A proposal relating to this priority is the 100 Case Studies (Item 6.8) proposed by the National Advocate for Soil Health.
- **Priority 5: More effective policy** - Most soil and land-use policy in the form of legislation exists at the state and territory level. A formal national soil policy has not been declared despite previous efforts (e.g. Campbell 2008). International policy is starting to emerge through the endorsement of the Revised World Soil Charter, the proposed Voluntary Guidelines on Sustainable Soil Management, and the Sustainable Development Goals (see SDGs 2.4 and 15.3).

An important task is to prepare a compelling description of the work that has to be done to achieve each priority. This then requires an analysis of the necessary investments and likely returns. The options for undertaking this analysis of the economic case for investment into soil RD&E is addressed separately in Item 6.6. The development of the prospectus for the five national soil RD&E priorities will achieve considerable progress towards a national plan for soil RD&E. Once the prospectus is developed then it will be a logical next step to consider selecting an appropriate investment vehicle and institutional model for supporting the work. At the Planning Forum, several such investment vehicles were discussed including CRCs. It was clear that some agencies are not in favour of the CRC model. The Implementation Committee will need to revisit selection of a preferred investment vehicle once the prospectus is developed. However, it is timely for the Implementation Committee to discuss the CRC option now because of the submission by the University of Newcastle to establish the CRC for High-Performance Soils.

Various member agencies were approached to participate at a late stage in the bid development. Some members communicated their reason to decline this invitation to the Implementation Committee. There continues to be significant concern about the soil RD&E community appearing...
fractured and uncoordinated due to CRC bid proposals developed in isolation from major national soil RD&E funders and providers and outside of the national coordination role of this Committee. After becoming aware of this latest CRC bid there was communication between the strategy leadership and the bid team emphasising:

- the need for a coordinated CRC bid that had the full support of the leading soil institutions in Australia; and
- the need for any bid to have the full support of the Soil RD&E Implementation Committee even if our member organisations were not formal participants.

Facilitation of a meeting between the CRC proponents and the Implementation Committee was offered but was not taken up. It was made clear that the CRC bid was going ahead and that our input was not viewed as critical to its success. There has been no further correspondence with the bid team. The approach of the strategy leadership has been to try to facilitate a more nationally inclusive and coordinated process, in keeping with our committee function.

Arguably the current lack of a major national soil RD&E plan and program contributes to the situation where CRC proposals to undertake soil RD&E emerge in isolation from our soil RD&E strategy implementation process. The completion of the prospectus for the five national soil RD&E priority areas will be a major step towards filling the void and providing direction for coordinated national investment in soil RD&E.

It is suggested that members consider:

- How our agencies responded to the CRC invitation and who is participating in the proposed CRC.
- The response made on behalf of this committee to the CRC bid team and how we can exercise our role of national coordination in such circumstances.
- The alternative for a major nationally coordinated soil RD&E initiative.

**Key issues**

A process for developing the prospectus needs to be agreed. It is proposed that a Working Group is formed from the committee membership that would engage a consultant to do most of the work. This would involve several steps including specifying terms of reference, managing the procurement process and providing oversight. If members agree on this approach then volunteers are sought to participate on the Working Group.

**Required action**

- Initiate an agreed process for developing the prospectus.
- Consider agreement in principle for the use of Soil RD&E strategy funds for the purpose of commissioning a consultancy for writing the prospectus.
- Agree the membership of a Working Group to oversee and manage development of the prospectus.
- Review the recent experience of the CRC for High-Performance Soils bid and consider any actions that should be taken as a result.

**Resource implications**

- An allocation from this financial year’s budget will be necessary to support the preparation of the prospectus. An allocation of $50K is suggested.
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AGENDA Paper

ITEM 6.6

Planning Forum Action 3: Economic case for investment into Soil RD&E

Background

At the Planning Forum it was recognized that a strong economic case for investment has to be developed to support the Prospectus for Soil RD&E in Australia. However, there was no clear consensus on how to prepare this case and some of the previous claims for returns on investment (e.g. the headline figures in ASAP) were questioned. In theory, the return on investment for the activities outlined in the prospectus could be analysed using a formal benefit cost analysis (BCA). This analysis could be reduced to a deceptively simple set of steps. For example:

- Specify the soil projects and decide on whose costs and benefits count (e.g. farmers, governments)
- Identify the impacts, select measurement indicators and then predict their timing
- Consider the technical feasibility and required adoption levels to reach desired outcome
- Attach dollar values to the impacts and discount future costs and benefits to obtain net present values for each project
- Perform sensitivity analysis and reach a conclusion.

However, the details of the assumptions and methods at each step are often debatable and can give rise to conflicting results. The success of BCA depends very much on the nature of the systems in which interventions are proposed. In general, it fails in complicated or complex economic, social or environmental systems. Issues include uncertainty about the projected outcomes, pricing non-market values and specifying the cause of change (i.e. to what extent is any outcome due to the intervention of interest).

Alternatives to BCA are available and some of these were discussed at the Planning Forum. For example, analysing the feasibility and attractiveness of opportunities and then setting priorities for future investment. CSIRO’s internal methods for estimating the expected impact of different investment pathways is another example. It was also suggested by Stuart Kells (PPB Advisory) that the focus needs to be on ensuring the following are in place:

1. champions and high-level support
2. an evidence base about the problem and the solution
3. a simple description – in stories, pictures and numbers – of the problem and how it might be solved
4. clear accountabilities to solve the problem.

The advice from Toss Gascoigne and Associates (see Attachment Four, Item 6.10) was similar. Whatever methods are adopted, it is clear that the Implementation Committee has to provide a more compelling case for investment in soil RD&E than has been done in the past.
### Key issues
- An economic case for investment into soil RD&E has to be prepared to secure future funding and to provide clarity about the most appropriate source of this funding.
- The methods for undertaking such an analysis need to be identified.
- The completion of the prospectus on the five national soil RD&E priorities will provide some of the specification for the economic case for investment into soil RD&E and should therefore be completed first.
- A pathway for completing the economic case for investment into soil RD&E needs to be identified and implemented. It is suggested that a first step is to facilitate some initial expert advice on methodology from a suitable person such as Prof. David Pannell (UWA). Subsequently a suitable approach could be to form a Working Group of the Committee to plan, commission and manage a consultancy to prepare a comprehensive case for investment.

### Required action
- Members are requested to support the preparation of an economic case for investment into soil RD&E.
- If supported, members are requested to agree on a process for preparing the case.
- Members are asked to consider agreement in principle for the use of Soil RD&E strategy funds for the purpose of commissioning a consultancy for writing the investment case.

### Resource implications
- Suggested initial allocation of $50K recognizing that credible analyses are likely to require a further $100K to $150K.

### Preparation and consultation
- Soil RD&E Secretariat.

### Attachments
- None
## Planning Forum Action 4: Building the soil information infrastructure to meet public and industry needs

### Background

The Soil RD&E Implementation Committee has previously considered a comprehensive plan for the Australian Soil Assessment Program (ASAP) which was prepared by the National Committee on Soil and Terrain (NCST). ASAP aims to support Australia’s sustainable future through improved knowledge of Australian soils and their responses to land management. The institutional and resourcing issues involved in the implementation of ASAP are significant and until now the Implementation Committee has not been able to proceed despite the general support for the program (refer to Meeting 1 and 4). A staged approach to implementation has been suggested and this is the focus of this agenda item.

One stream of ASAP involves a major overhaul of the existing Australian Soil Resource Information System. In essence, a new generation of technologies is available to build the ICT infrastructure to ensure soil information is readily generated and accessible. This is integral to the Big Data revolution in agriculture and a useful recent overview was provided by Mick Keogh at [Outlook 2016](#).

A large quantity of soil data is being collected every year but it is difficult to integrate these data with other data streams (e.g. on weather, management practices, crop yield) and most soil data are used only once despite the potential for re-use. A major challenge is to integrate data sources and systems managed by different sectors (e.g. governments, research agencies, industry groups, companies and individual farmers). Australian and New Zealand scientists and technologists have been at the forefront in developing the required ICT systems and there is an opportunity for this community to build the necessary soil data infrastructure.

Preliminary discussions between the relevant specialists and stakeholder groups have been positive. On the technology provision side, specialists from state agencies, several universities, New Zealand Landcare Research and CSIRO have a clear understanding of what is involved. Stakeholders also have clearly defined applications and opportunities (e.g. Grain Growers, SST, John Deere, Birchip Cropping Group, Australian Farm Institute). A major task is to link government maintained data and infrastructure with local/farm specific data (e.g. paddock soil tests, yield maps, precision agriculture equipment dynamics etc). This can be used to develop new site specific information to guide soil management. It can also open a completely new way to collect, harmonize and reuse data, especially those that are being generated by proximal and remote sensing systems.

Facilitating the development of the necessary national infrastructure is a core task for the Soil RD&E Implementation Committee and entirely consistent with the purpose of the National
Primary Industries RD&E Framework. At the Annual Planning Forum, several members expressed interest in finding a way to support ASAP Steam 4 (Information systems and data management). The purpose of this agenda paper is to enable this action.

### Key issues
- Stream 4 as outlined in the ASAP proposal (see Agenda Items 1.6 and 3.8) can form the basis for the required activities although its scope needs to be expanded to ensure the private sector components are fully integrated.
- A team is required to prepare the revised project proposal along with a budget identifying current expenditure and options for new expenditure. The full cost of the Stream Four proposal (which included current staff and ICT systems was $11.2 million pa).

### Required action
- If supported, a project team to develop the proposal should be established and funded. A maximum allocation of $20K from the Soil RD&E budget is proposed with the proposal being finalized by September 30th 2016.
- A viable investment model is required with low overheads and transaction costs.
- Members are requested to indicate their willingness to participate in the process and identify other potential contributors.

### Resource implications
- Potential expenditure of $20K from the existing Soil RDE Budget.
- Potential long-term investment by some member agencies and other organizations with an interest in soil information provision and use.

### Preparation and consultation
- The agenda paper is based on discussions at NCST 20 held in Sydney on April 6th and 7th 2016.
- Soil RD&E Secretariat in consultation with the NCST.

### Attachments
- None
### Soil RD&E Implementation Committee

**Meeting Number:** 6  
**Location:** Sydney  
**Date:** 10th May 2016

### AGENDA Paper

**ITEM 6.8**

**Update from the National Advocate for Soil Health**

#### Background

The mission of the Advocate for Soil Health, General Michael Jeffery, is to ‘provide strong leadership and advocacy on the importance of healthy soil, water and vegetation and the benefits thereof for all Australians.’ A specified task in the terms of reference for the Soil Advocate is to ‘work towards ensuring that existing and new soils research meets the needs of Australia’s farmers and other soil managers.’ The related implied task outlined in the terms of reference is to ‘engage with the National Implementation Committee for the National Soil Research, Development and Extension Strategy through regular meetings and correspondence.’

General Michael Jeffery has been appointed for a new term as the National Advocate for Soil Health through until 2017. This appreciation and affirmation of General Jeffery’s role by the Australian Government is a significant achievement.

#### Key issues

- The Prime Minister through the Deputy Prime Minister, the Minister for Agriculture and Water Resources, the Hon. Barnaby Joyce MP, has extended the appointment of General Michael Jeffery as the National Advocate for Soil Health until December 2017.
- The extension of the appointment emphasises the need for a focus on educating the Australian community and influencing researchers and land managers, regarding the importance of maintaining and sustaining soil health and condition.
- Developing/continuing linkages with CSIRO (John Manners – CSIRO Agriculture), ANU (Brian Schmidt) and Sydney University (Prof Ivison) for joint action on the 100 case studies, Soils for Life Resilient Landscapes program.
- Discussion and linkage with the new Chief Scientist Dr Alan Finkel to reinforce soil, water and vegetation as national research priorities.
- Application for the National Stronger Regions Fund for a grant to extend the case studies and formal mentoring program, beginning with improvements to farm based infrastructure, production practices and farm gate results leading to resilient and sustainable landscapes, healthier soils and better outcomes for local communities and regions.

#### Required action

- General Jeffery will provide an outline of his proposed priorities and planned activities for his next term.
- Members are requested to consider these priorities and activities and identify actions and mechanisms that will ensure coordination with the priorities of the Soil RD&E Strategy.
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<td>● Soil RD&amp;E Secretariat and General Jeffery</td>
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**Committee name change**

The Soil RD&E Implementation Committee is part of the development and implementation of the National Primary Industries RD&E Framework but we don’t need to be bound by the same nomenclature with respect to the working name of our group and activity. As a title ‘Soil RD&E Implementation Committee’ is unwieldy, uninspiring, and has a bureaucratic overtone. The name ‘Australian Soil Partnership’ gives a much clearer indication of the intent of our activity and objectives, it indicates national level cooperation, and it has a generally more positive connotation. The acronym ‘ASP’ is workable and the small number of other occurrences (American Society of Primatologists; Australian Society of Periodontology; Affiliation of Superannuation Practitioners; Association of Software Professionals) are not likely to be confused with our function.

The name also has a degree of consistency with the terminology of the Global Soil Partnership and the Pacific Soil Partnership but without inferring any formal relationship between the three initiatives. Within the National Primary Industries RD&E Framework (e.g. the R&I Committee), reference to us as the Soil RD&E Implementation Committee could continue if required, concurrent with our adoption of the working or public name of ‘Australian Soil Partnership’. Other RD&E strategy implementation committees have adopted new names (e.g. the Cotton Innovation Network).

**Key issues**
- Adoption and communication of the change of name.

**Required action**
- For decision – it is proposed that the Soil RD&E Implementation Committee adopts the working name of ‘Australian Soil Partnership’.

**Resource implications**
- None

**Preparation and consultation**
- Soil RD&E Secretariat.
Attachments

- None
Communication strategy

**Background**

The Planning Forum considered a wide range of strategies for increasing the visibility and support for soil RD&E. A summary of the issues is provided by the Forum Facilitator in his statement of advice (Attachment 3). In that advice, proposals for achieving media coverage, establishing a strong narrative, organizing a national workshop on a high priority issue, and ensuring better collaboration were outlined. An essential step to support all of these activities is to prepare a communication plan. This document needs to set out:

- who the Soil RD&E Implementation Committee wants to communicate with (need to prioritise)
- why do we want to talk with them
- what do these identified groups/individuals think of the Soil RD&E Strategy
- what messages has the Implementation Committee got
- what are the best mechanisms (e.g. newsletter/website/workshop)
- who is responsible for each identified action and what is the deadline and costing
- how will the Implementation Committee know if it’s successful.

The Plan needs to be a short working document, action oriented, frequently revised as projects move forward, not too ambitious, heavily prioritised to hit the main targets, and very clear on actions (who will do them, what the costs are, what is the deadline?). The preparation of a communication plan has been on the action list for the Implementation Committee but a new lead person for the task is needed because of the departure of Prof Iain Young, along with identifying other volunteers.

**Key issues**

The options for communication identified during the Planning Forum range from activities that are a normal part of operations for many members through to far more proactive measures. The Implementation Committee needs to determine whether it is both ready and prepared to take on this more public role, bearing in mind Toss Gascoigne’s observation that the soil community ‘has a recent history of raising issues but not knowing how to build on the initial interest to convert it into policy action. This failure to attract and retain policy interest in soils means the [Implementation Committee] can’t afford any one-off sky-rockets with no follow-up substance.’

**Required action**

- Agree on a process for preparing the communication plan as outlined above
- Allocate resources from the Soil RD&E budget to ensure the plan is completed within the agreed timeframe
- Determine whether the Implementation Committee should proceed with the actions
identified by Toss Gascoigne during the Planning Forum

<table>
<thead>
<tr>
<th><strong>Resource implications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Funds are required to support the preparation of the communication plan and other activities if agreed. Members are requested to nominate the level of resourcing required after the scope of the plan is agreed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Preparation and consultation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soil RD&amp;E Secretariat.</td>
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<table>
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<tr>
<th><strong>Attachments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Attachment Four: Annual Forum of the Soil RD&amp;E Committee - Advice on outcomes and actions provided by Toss Gascoigne</td>
</tr>
</tbody>
</table>
Attachment Four: Annual Forum of the Soil RD&E Committee - Advice on outcomes and actions provided by Toss Gascoigne
Annual Forum of the Soil RD&E Committee

Advice on outcomes and actions provided by Toss Gascoigne

1. Outlook Conference

The central thrust of the presentation at Outlook 2016 must be clear. It’s the first step in a longer campaign, and there will be subsequent opportunities to develop and extend these arguments. Think of this speech as setting down a marker and be clear on the messages. For example, it could:

- warn of the consequences of not acting (It’s a job half-done, top soil gone in 60 years)
- speak positively about the condition of Australian soils in relation to the rest of the world (but we could do better)
- discuss the role of soil in contributing to the existing National Agenda (e.g. jobs and growth, innovation, food bowl to Asia, Big Data, defence/food Security)
- describe soil as an opportunity for investment and highlight the returns to Australia (but if the returns are so good, why isn’t private industry doing this already?)
- address Big Data and how increased computing power opens up new opportunities to monitor/measure soil and provide more useful information to farmers (NZ example on monitoring is also relevant).
- give the historical perspective (what we did, when we did it, and why), and outline the opportunities that present themselves now
- present the case for co-investment (identify where the benefits arise and where there can be co-investment) including the evidence base
- talk through the lens of ‘Jobs and Growth’
- frame our challenge or to paraphrase Cameron Allan, can we double the production out of half the area without degrading the land or hitting animals with sticks?

There needs to be a planned sequence of events and actions that follow, in essence, a decadal plan. Soil has a recent history of raising issues but not knowing how to build on the initial interest to convert it into policy action. This failure to attract and retain policy interest in soils means the Consortium can’t afford any one-off sky-rockets with no follow-up substance.

2. Media coverage

There are several elements to the media strategy.

- Having written the speech it’s only a small step to convert it into 800 words for the Australian, AFR or Fairfax (in that order). This needs a few days to organise although they will only need the actual text a day or so prior to release.
- Aim to secure a radio interview on ABC RN Breakfast, AM or both.
• A carefully crafted media release is essential. It will help reduce all your ideas down to a few key points and get them straight in the mind of the person being interviewed. It also helps journalists to understand the issues quickly and accurately.

• Rural media will also be interested. You could consider an interview on the Country Hour, an article for a major print outlet, and an article in an industry magazine.

• Note that one effect of media coverage is that those doing the media coverage could quickly become regarded as the national spokespeople for Soil, with their numbers in every journalist’s iPhone.

3. In whose name?

The Soil Research, Development & Extension Strategy Implementation Committee (long-winded and bureaucratic) needs a better name. Possibilities include the Soils Consortium (or Group or Partnership) or the Australian Soil Partnership (or Consortium). Members would be the current committee members and or it could be expanded through a simple exchange of letters, MOU or more formal incorporated association.

It would allow the group to act on behalf of all parties interested in soils rather than speaking on behalf of one organisation (e.g.CSIRO, an individual RDC, a State Government Department, a University). And when a leader of the group spoke at Outlook, they would be doing so with the authority of broad soils interests rather than one section.

An easy initial step would be for the partners in the enterprise to agree to adopt "The Soil Consortium" as a working title, without any change in the existing arrangements. Eventually it would be logical to give the group sufficient legal standing for it to manage money, commission work, hire people, run a web site, organise events and so forth. Perhaps the MCV might provide a model? The Consortium has an ambitious agenda, requires resources, commitment and strong leadership.

If the above proceeds then you will need to decide on which other groups can join.

It will be challenging to make significant progress under the current arrangements.

The workshop also spent some time looking at a way of allowing and managing co-investment in Soils projects. The CRC model was discounted because the transactional costs are too high. In the end the prevailing view was that designing projects comes first, then consider the nature of a suitable vehicle, but we would recommend the executive group might give this further consideration and draft an options paper to explore different models.

4. A Communication Plan

This document needs to set out:

• who the Soils Consortium wants to communicate with (need to prioritise)

• why do you want to talk with them

• what do these identified groups/individuals think of the Soils Consortium perception

• what messages has the Soils Consortium got

• what are the best mechanisms (e.g. newsletter/website/workshop)
• who is responsible for each identified action and what is the deadline and costing
• how will the Soils Consortium know if it’s successful

The Plan is a short working document, action oriented, frequently revised as projects move forward, not too ambitious, heavily prioritised to hit the main targets, very clear on actions (who will do them, what the costs are, what is the deadline?).

The great benefit of a plan is that it helps narrow down a bewildering array of possible actions and groups into a manageable sequence of activities and events. Each activity is costed, simply but with costs in terms of organisational costs and time factored in. On the basis of the knowledge we have from the Workshop and working in this area over 25 years, it would be a relatively simple process to draft a communication plan.

5. The Narrative

The idea of a “narrative” came up frequently in the workshop. All the ingredients are there, but it needs to be pulled together. Components include:

• The historical perspective
• The international situation, where Australia is doing relatively well
• The benefits Australia could gain
• New opportunities opened up by Big Data
• The dangers of inaction
• Some really good examples to illustrate the points the doc aims to make
• The steps that need to be taken

The narrative needs to be tweaked for different audiences: politicians, policy-makers, the public, industry, researchers, investors and other relevant groups.

6. Workshop

Identify one specific topic where the ambition is realistic, measurable, and where achievement would encourage all involved parties. The data sharing example or the monitoring project have potential. Do the projects identified by the Federal Government form a good starting point?

Cameron suggested a model process:

• Consultation phase – priorities and deliverables (this could be a commissioned project)
• Then someone puts all this (consultation, priorities) together into functional work areas – identified opportunities turned into narratives
• Who do we want to work with – alignment with everyone’s core business (follows consultation and market research)
• Common objectives defined
• Business case built – this is the space we are working in
• Iterative planning with technical experts to provide inputs
• Plan that we all co-invest in – outlines where we are going to work
7. Working parties/possible workshop

The idea of the RDCs working together to commission projects raised interest, and would be a great way to demonstrate the capacity of the Soils Consortium to demonstrate it can get organizations to work together and potentially eliminate duplication to great national benefit. The MCV Program offers a good model if the arrangements were to be formalized. What is a topic of common interest to all (or some) RDCs?

The process identified at the Workshop was:

- Identify joint R&D priorities
- RDCs to nominate preferred timing for identification of specific priorities
- Identify sweet spot for co-investment, and engage with co-investors
- All agencies to participate in an investor forum (shark tank)
- Agencies to determine quantum of investment
- Once priorities are identified, consider investment vehicle or other opportunities to collaborate
- Possibly run workshops on high-level issues eg soil constraints

The key step is to choose a convenor for a small working group. The convenor needs to be expert in the area and with the capacity to devote time to this.

8. The COAG paper

A paper asking State and Federal Ministers to act on a particular issue (perhaps on data-sharing) should be a medium-term aim. It may take some time (18 months?) to develop the paper together with recommendations the Consortium wants the Ministers to act on.

9. Other opportunities/activities

- Prepare an updated capacity audit
- Investigate options via the CRCP program
- Outline how can soils contribute to the Innovation Agenda?
- Prepare a "Cullen Top 100 list" for soils
- Consider presenting a luncheon address at the National Press Club, to outline the Soils agenda to a stakeholder audience in the room and 120,000 members of the public watching the live broadcast on TV
- Organise a small group to apply the Theory of Change process of each of the 5 objectives in Securing Australia’s Soil (or subsequent revised version)
- Survey farmers and land-use people to discover their soil data needs
Soil RD&E Implementation Committee

Meeting Number: 6
Location: Sydney
Date: 10th May 2016

AGENDA Paper

ITEM 6.11

Budget Update

Background

The strategy requires an operating budget of approximately $150,000 a year. Funding has been sought from members of the implementation committee. Table 1 provides a summary of the initial cash contributions. The following tables provide an update to the initial budget which was tabled at Meeting Two. Table 2 is the report on expenditure for 2014/15. A summary of cash contributions received to date for 2015/16 is provided in Table 3. Expenditure to date for 2015/16 is shown in Table 4. Proposed budget expenditure for 2015/16 is presented in Table 5 – activities to be discussed under other agenda items in this meeting.

Table 1: Cash contributions for 2014-15 paid by member agencies

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Cash contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Agriculture</td>
<td>15,000</td>
</tr>
<tr>
<td>NT DLRM</td>
<td>5,000</td>
</tr>
<tr>
<td>DAFWA</td>
<td>15,000</td>
</tr>
<tr>
<td>GRDC</td>
<td>35,000</td>
</tr>
<tr>
<td>Dairy Australia</td>
<td>15,000</td>
</tr>
<tr>
<td>MLA</td>
<td>10,000</td>
</tr>
<tr>
<td>GWRDC</td>
<td>10,000</td>
</tr>
<tr>
<td>SRA</td>
<td>15,000</td>
</tr>
<tr>
<td>CRDC</td>
<td>15,000</td>
</tr>
<tr>
<td>CSIRO</td>
<td>20,000</td>
</tr>
<tr>
<td>UNE</td>
<td>9,092</td>
</tr>
<tr>
<td>Rollover from strategy development budget</td>
<td>$35,616</td>
</tr>
<tr>
<td>Total funds available*</td>
<td>$239,708</td>
</tr>
</tbody>
</table>

* Includes forward payment of $40,000 from CSIRO ($20,000 p.a. for years 2 and 3).
** The initial rollover amount received by CSIRO from DoA was $224,708; the DoA 2014/15 contribution of $15,000 was paid later to CSIRO as a separate transaction.
### Table 2: Report on expenditure (as at 30/06/2015)

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic travel fares and expenses</td>
<td>2,179</td>
</tr>
<tr>
<td>General operating (meeting catering and room hire)</td>
<td>1,231</td>
</tr>
<tr>
<td>Subtotal</td>
<td>3,410</td>
</tr>
<tr>
<td>Remaining funds balance</td>
<td>$236,298</td>
</tr>
</tbody>
</table>

### Table 3: Cash contributions received for 2015-16 by member agencies (NB: CSIRO contributions of 20,000 for 2015-16 were prepaid in 2014-15).

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Cash contribution ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRDC</td>
<td>35,000</td>
</tr>
<tr>
<td>Dairy Australia</td>
<td>15,000</td>
</tr>
<tr>
<td>MLA</td>
<td>10,000</td>
</tr>
<tr>
<td>SRA</td>
<td>15,000</td>
</tr>
<tr>
<td>CRDC</td>
<td>15,000</td>
</tr>
<tr>
<td>RIRDC</td>
<td>15,000</td>
</tr>
<tr>
<td>DAWR</td>
<td>15,000</td>
</tr>
<tr>
<td>Carry forward from 2014-15</td>
<td>236,298</td>
</tr>
<tr>
<td>Total funds available</td>
<td>$356,298</td>
</tr>
</tbody>
</table>

### Table 4: Report on expenditure (2015-2016 year, as at 31/3/2016)

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic travel fares and expenses (exec officer, strategy leadership)</td>
<td>2,231</td>
</tr>
<tr>
<td>Operating (meeting catering, document preparation)</td>
<td>715</td>
</tr>
<tr>
<td>Executive Officer salary (0.4FTE, 12 months from 23 Feb 2016)</td>
<td>60,000</td>
</tr>
<tr>
<td>Annual forum (venue, accommodation, catering)</td>
<td>8,447</td>
</tr>
<tr>
<td>Annual forum consultant costs</td>
<td>19,566</td>
</tr>
<tr>
<td>Website development</td>
<td>1,927</td>
</tr>
<tr>
<td>Activity</td>
<td>Cost ($)</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Executive Officer (full year)</td>
<td>60,000</td>
</tr>
<tr>
<td>Meeting costs (committee and executive)</td>
<td>5,000</td>
</tr>
<tr>
<td>Annual forum – remaining consultant costs (Kells)</td>
<td>5,258*</td>
</tr>
<tr>
<td>Outlook 2016 sponsorship</td>
<td>9,000*</td>
</tr>
<tr>
<td>Updating capacity audit</td>
<td>25,000</td>
</tr>
<tr>
<td>Writing the prospectus of Soil RD&amp;E priority areas</td>
<td>50,000</td>
</tr>
<tr>
<td>Economic case for investment into Soil RD&amp;E</td>
<td>50,000</td>
</tr>
<tr>
<td>Investor forum/workshop</td>
<td>TBC</td>
</tr>
<tr>
<td>ASAP implementation</td>
<td>20,000</td>
</tr>
<tr>
<td>Communication plan</td>
<td>TBC</td>
</tr>
<tr>
<td>Total</td>
<td>$224,258</td>
</tr>
</tbody>
</table>

**Key issues**
- There is funding for significant activities proposed from the February Soil RD&E Forum.
- Consideration needs to be given to the amount of funds approved to support each of those activities.
- Member contributions will be sought for activity in the 2016/17 financial year.

**Required action**
- Note the current budget and expenditure.
- Indicate to the secretariat if you have a preference to be invoiced for 2016/17 contribution to the strategy in the 2015/16 financial year.

**Resource implications**
- As shown above

**Preparation and consultation**
- Secretariat and members.

**Attachments**
- None
International update on sustainable soil management, soil carbon and the Pacific

Background
A range of international initiatives arising from the International Year of Soils, the Global Soil Partnership and the COP21 climate outcomes are relevant to the work of the Implementation Committee. Updates will be provided on:

- The agenda for the forthcoming Global Soil Partnership Plenary at the FAO in May which includes consideration of the proposed Voluntary Guidelines on Sustainable Soil Management.
- Outcomes of COP21 including progress with the 4 per 1000 initiative proposed by the French Government and supported by others including Australia.
- Planned collaboration between the Intergovernmental Technical Panel on Soils (ITPS) and the Intergovernmental Panel on Climate Change (IPCC) in the lead-up to the sixth assessment.
- The Pacific Soil Partnership and outcomes from its most recent meeting (see Attachment Five).

Key issues
- Australian public and private sector organizations are involved in several international developments and significant opportunities may arise in the next year or two.

Required action
- For information

Resource implications
- None

Preparation and consultation
- Soil RD&E Secretariat.

Attachments
- Attachment Five: Nadi communiqué from the Pacific Soil Partnership.
Attachment Five: Nadi communiqué from the Pacific Soil Partnership.
Nadi Communiqué on the 2nd Pacific Soil Partnership Meeting

Nadi, Fiji, 18-19th April 2016

Background statement

We, the members of the soil community that make up the Pacific Soil Partnership (PSP) have met for the second time to advance the priorities and activities that we agreed on in October 2014 and to connect those activities with the five pillars of the Global Soil Partnership (GSP). We met in Nadi, Fiji for two days and reviewed our priorities and planned activities along with the developments that have occurred in the GSP.

Credits, acknowledgements and hosting

The PSP is hosted by the Pacific Community and held this meeting in Nadi, Fiji with direct financial support from the Pacific Community, CSIRO (Australia), EU-PAPP1 and Landcare Research (New Zealand).

Representatives

The attendees of the meeting represented the major soil institutions and soil-related strategies across the countries within the PSP. The meeting built on the momentum developed during the International Year of Soils (IYS) and it considered new strategies, plans and activities directed towards achieving sustainable soil management. These included a detailed discussion on the proposed Voluntary Guidelines for Sustainable Soil Management (VGSSM).

We bring knowledge and experience of the soil and land use in this large and diverse portion of the globe that we share, and we have a history of working in partnership in the region. We recognize the benefits to be gained from further sharing our concerns, progress, science, information and data on the use and protection of the soil, improvement in its management and productivity, and in our programs for capacity development.

What we agreed

During our discussions, we highlighted the many challenges our communities face in soil management and food production. The region’s soils are diverse and vulnerable. Through joint activity and connections with the activities of the GSP, we intend to improve productivity and share resources and information, in order to increase local food production and food quality, achieve climate change mitigation and adaptation, control land degradation and improve environmental management. After reviewing the status of soils and their management in each member country, we agreed on three major areas of focus.

1. Improving nutrient and water management in both high volcanic islands and low lying atolls

1 EU-PAPP-European Union Pacific Agriculture Policy Project
2. Proceeding with the development of the Pacific Soil Portal originally proposed by the Pacific Community and Landcare Research NZ and incorporating recent developments in information and computing technology
3. Promoting innovation in capacity building and training with a particular focus on extension services for smallholder farmers

These priorities will be addressed as part of a project proposal for consideration by prospective donors. The draft project proposal will be distributed to members for comments by May 12th 2016.

There are other priorities beyond these three that include land degradation (especially erosion) and the appropriate use of agricultural inputs.

The other major topic was the preparation of the regional implementation plan for the PSP. A working group was established to prepare the draft plan for discussion by members prior to the GSP plenary at the end of May 2016.

What we observed

Across the region, there is substantial variation in soil resources, threats to soil function, information, capacity, investment and environmental challenges. By working together, we intend to improve soil security and benefit from enhanced regional cooperation.

We noted that soil issues were already explicitly identified in thirteen out of seventeen national agriculture and land use policies.

The PSP will use the five GSP pillars as they intersect with the region’s priorities to reduce disparities and focus investment and collaboration on the PSP needs.

Reaffirmation of the PSP focus

We reaffirm the priorities of the PSP identified in the Suva Communiqué:

1. Sharing and developing appropriate soil management solutions noting the particular challenges for atolls
2. Increasing soil literacy
3. Building local and regional capacity grounded in our cultural context
4. Designing efficient and effective methods for soil analysis that are locally appropriate and robust
5. Enhancing coverage of soil information, collating legacy data and developing more usable forms
6. Ensuring soil information security to protect regional data assets against loss
7. Sharing capacity including laboratories, portals and extension resources

The Pacific Community continues to host the PSP and the countries of the Pacific continue to support the goals and aspirations of the GSP.
Nadi Communiqué on the Pacific Soil Partnership
List of signatures

Vili Canjioco
Ministry of Agriculture & Livestock
Solomon Islands

N. S. Siewnorly
COM-FSM

Mill Wilde
CSIRO AUSTRALIA

Pali Nausi
MINISTRY OF AGRAICULTURE
Fiji

S. W. Taqo
Pacific Community

Naumezie
CSIRO Australia

Balasva
(Siosina Halavatua)

Luseane Tauca
MINISTRY OF AGRICULTURE, TONGA.

Jean-Marie
LANDCARE RESEARCH, NZ

M. S. Federer
T YILES I MATERODI
CSIRO-LOR

S. S. Colley
CSIRO AUSTRALIA

Hutak
SROS Samoa

Ben Moedlin
CSIRO Australia

Pau
IUCN ORO

G. F. Bopp
LANDCARE RESEARCH, NZ

M. A.
DEPARTMENT OF AGRICULTURE,
Tuvalu

A. Kabu
3PC-LOR