LOW CARBON LIVING CRC

Mapping the CRCLCL Data Landscape

RP3003e1 Final Report

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Acronyms

ANDS	Australian National Data Service
ARDC	Australian Research Data Commons
AURIN	Australian Urban Research Infrastructure Network
CFRC	City Futures Research Centre
CRC	Cooperative Research Centre
CRCLCL	Cooperative Research Centre for Low Carbon Living

Executive Summary

The data assets created from research projects undertaken by the Cooperative Research Centre for Low Carbon Living were reviewed by City Futures Research Centre.

Options for management, archiving and publication were identified and arrangements put in place for datasets where appropriate.

No spatial data were identified through the survey, however two spatial datasets suitable for publishing and sharing were found through targeted discussions with researchers.

Six non-spatial data products were identified as suitable for archiving. Of these one has been published on CFRC's CityData platform which is interoperable with the AURIN portal. This means all users of CityData and AURIN can access this dataset for further research and policy-making purposes. Researchers agreed to lodge the other five datasets to their respective institutional data repositories.

Introduction

The *Mapping the CRCLCL Data Landscape* project set out to audit the data assets of the CRC for Low Carbon Living, identify those datasets of continuing value, ensure a plan is in place for their retention and capture metadata to ensure their ongoing discoverability.

Methodology

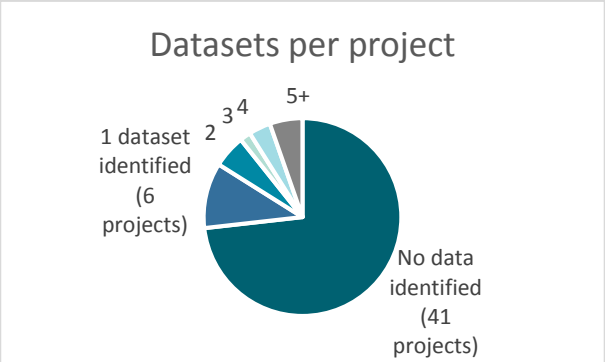
In October 2018, an online survey (Appendix 3 below) was emailed to 41 leaders of 64 CRCLCL projects and forwarded to a further five researchers.

After sending reminders, 24 responses were received.

Selected researchers received follow-up phone calls, emails and face-to-face meetings between December 2018 and April 2019.

Results

A total of 19 datasets were identified across 12 projects. (Appendix 2). In a further four projects, project leaders reported having more than five datasets, but did not respond to follow-up requests.



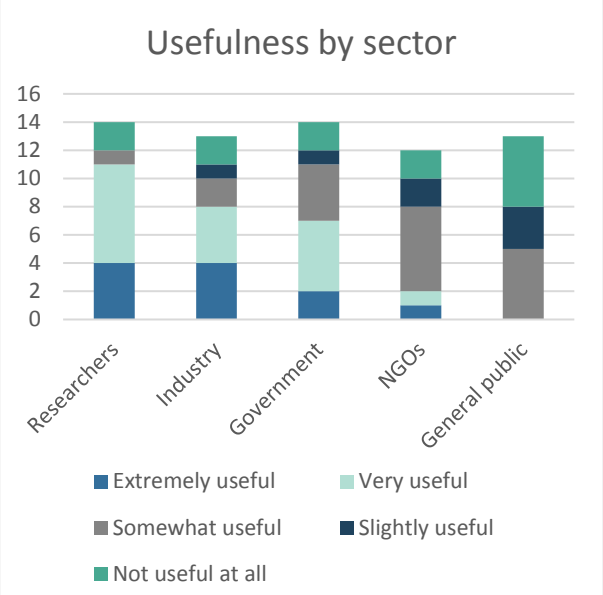
Usefulness

Researchers were first asked whether their projects had produced data that could be useful to others. Half of respondents (12) answered with a definitive yes, while 5 were lukewarm and 7 negative or unsure (Figure 1).

Figure 1 Useful data?

Researchers rated their project data in terms of usefulness to other researchers, industry, government, NGOs and the general public. Overall data was perceived as being most useful to researchers, industry and government (Figure 2).

Figure 2 Usefulness by sector



Commercial Value

Of 11 responses to this question, three datasets were identified as having commercial value and this was being explored by researchers:

- Household survey on water conservation behaviour in Sydney
- Household survey of 600 participants across Sydney on transport, energy efficiency and water conservation behaviours, as well as PV and battery adoption
- Australian national energy use efficiency of metropolitan wastewater treatment plants

Data Archive Plan

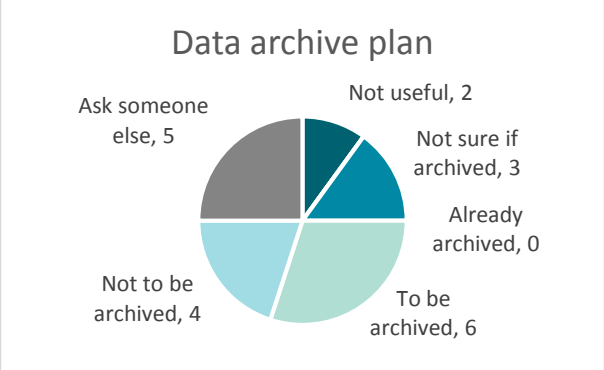
Researchers were asked about existing or planned arrangements to archive or publish their data (Figure 4). At the time of survey no data had been archived.

Four datasets could not be archived or published due to commercial, privacy or other restrictions. Another two were deemed not useful to others, while researchers were unsure of arrangements for three datasets.

However, six datasets were identified as suitable for lodging in an online archive. Of these, five arose from projects led by academic institutions with online research data repositories. Researchers agreed to publish these data to the repositories.

The remaining dataset (*Building Code Energy Performance Trajectory modelling files*) is owned by the Australian Sustainable Built Environment Council (ASBEC), which lacks its own data repository. This data was lodged to CFRC's CityData repository (citydata.be.unsw.edu.au/documents/822).

Figure 3 Data archive plan



Spatial Data

Spatial data was defined in the survey as follows:

> *"Does it relate to geographic features? E.g. contains geographic coordinates or names/identifiers of spatial features (such as postcodes)."*

None of the researchers surveyed identified any spatial data arising from their projects. This was unexpected as a number of projects have used and created spatial data products.

However, two spatial datasets suitable for publishing and sharing were found through targeted discussions with researchers: *Co-benefits of Low-Carbon Precincts* and *UNSW Sydney Campus Precinct Information Model*. At the time of writing, arrangements to publish these datasets were ongoing.

Discussion

It was originally proposed to capture metadata for datasets identified in this project and add it to the CRCLCL research catalogue at lowcarbonlivingcrc.com.au/research and/or the Knowledge Hub (builtbetter.org).

However, following discussion with librarians and data management professionals, it became apparent that secure data archive and access would be better achieved through existing research data repositories managed by the CRC partner institutions. All CRC academic partners have such repositories and existing arrangements to store research data, publish it where appropriate and make it discoverable through Research Data Australia at researchdata.ands.org.au.

This recommendation was incorporated into the survey and researchers agreed to follow this up with regard to five CRC research datasets:

- Adoption barrier data: Probabilities associated with barriers to adoption for commercial building owners. Based on interviews of owners.

- Greenhouse gas emissions from aerobic granular sludge-based wastewater treatment operations
- Life cycle inventory data for wastewater treatment and disinfection processes (cost and environmental performance)
- Integrated Carbon Metrics database on embodied greenhouse gas emissions
- Experimental survey data

It was anticipated that spatial datasets would be identified as candidates for publication via the AURIN Portal (portal.aurin.org.au) or the CityData platform (citydata.be.unsw.edu.au).

Two spatial datasets were identified through one-to-one discussions. However, no survey respondents identified spatial datasets as an outcome of their research. Many projects were focused on developing and testing small scale models or methodologies rather than applying them on a wider scale and publishing their output.

Conclusion

The data assets of CRCLCL research projects were audited and options for data archive and publishing were considered.

Two spatial datasets and six non-spatial datasets were identified as candidates for archiving (Table 1). One of these has been loaded to the CityData platform. One spatial dataset will be loaded directly into the AURIN portal. Five non-spatial datasets will be archived or published to institutional portals.

The project succeeded in identifying potential pathways and facilitating a more active data management approach for Low Carbon Living research projects.

The project also demonstrated that data can be shared via a data hub (CityData) and made interoperable to a national facility (AURIN) for further utilisation.

Future work is recommended to encourage researchers to share data products produced through CRC investment and it is hoped that future CRCs will take these lessons on board to support an open data landscape for research data across Australia.

Table 1 Datasets identified for archiving/publication

Dataset	Status
Building Code Energy Performance Trajectory modelling files	Published
Adoption barrier data: Probabilities associated with barriers to adoption for commercial building owners. Based on interviews of owners.	To be archived
Greenhouse gas emissions from aerobic granular sludge-based wastewater treatment operations	To be published
Life cycle inventory data for wastewater treatment and disinfection processes (cost and environmental performance)	To be published
Integrated Carbon Metrics database on embodied greenhouse gas emissions	To be published
Experimental survey data	To be archived
Co-benefits of Low-Carbon Precincts*	To be published
UNSW Sydney Campus Precinct Information Model*	Unpublished

*Spatial datasets

Appendix 1 CRCLCL Projects surveyed

Cross-Program

Project No	Project Title
SP0016	ASBEC Trajectory Project
SP0018	Policy Scenario Utilisation milestone activities
SP0017p1	EEDM in the NSW Social Housing Sector
SP0017p2	EEDM in the NSW Transport Sector
SP0017p3	EEDM - BASIX

CRC Program 1: Products and materials

Project No	Project Title
RP1006	Viable integrated systems for zero carbon housing
RP1009	Closing the Loop on Evidence-based Low Carbon Design of non-residential buildings
RP1010	Monitoring and modelling the CSR Low Energy House
RP1013	Enabling better utilisation of distributed generation with distributed storage
RP1015	Combining a building integrated PVT system with a low temperature desiccant cooler to drive affordable solar cooling
RP1017	Validating and improving the BASIX energy assessment tool for low-carbon dwellings
RP1017e1	Validating and improving the BASIX energy assessment tool for low-carbon dwellings - Ph 2
RP1020	Reducing Barriers for Commercial Adaptation of Construction Materials with Low-Embodied-Carbon
RP1023	Forecasting and home energy analysis in residential energy management solutions (Algorithms)
RP1033	Mainstreaming High Performance Commercial Building HVAC
RP1034	Carbon Value Engineering
RP1037	Driving Increased Utilisation of Cool Roofs on Large-Footprint Buildings
RP1001	Air handling solutions, integration approaches and building design considerations for Photovoltaic Thermal (PV-T) roofing
RP1002	Concentrated solar thermal systems and absorption HVAC systems
RP1007	Intelligent automated monitoring of commercial photovoltaic (PV) systems.
RP1008	Industry support mechanisms for renewable heating and cooling
RP1011	Sustainable and Affordable Living through Modular, Net Zero Energy, Transportable, and Self-Reliant Homes and Communities
RP1014	Impact of energy efficient pool pumps on peak demand, energy costs and carbon reduction
RP1014u1	Energy efficient swimming pools - engagement and utilisation
RP1019	Advanced Comfort Index for Residential Homes
RP1022	Investigation of innovative sustainable low-carbon products for the built environment

Project No	Project Title
RP1022u1	Prototyping, testing, optimising and demonstrating the industrial scale production of composite engineered stone from reclaimed glass
RP1024	Facilitating the transition to low carbon housing (NatHERs)
RP1026	Evaluation of next-generation automated fault detection and diagnostic tools for commercial building energy efficiency
RP1031	Dev/Optimise LC medium-rise modular structures using innovative connections

CRC program 2: Precincts

Project No	Project Title
RP2002	Integrated ETWW demand forecasting and scenario planning for precincts
RP2005	Urban Micro Climates: Comparative study of major contributions to the Urban Heat Island effect in three Australian cities (Sydney, Melbourne, Adelaide).
RP2006	Action research to examine and demonstrate how to mainstream low-cost and low carbon housing in Western Australia. FredZED
RP2007	Integrated Carbon Metrics (ICM) – a multi-scale life cycle approach to assessing, mapping and tracking carbon outcomes for the Built Environment
RP2007u1	Integrated Carbon Metrics (ICM) – Tool alignment with National Carbon Offset Standard for Precincts
RP2015	Carbon reductions and co-benefits: literature and practice review of Australian policies relating urban planning and public health
RP2016	Assessing the Impact of Solar PV, Electricity Prices and Dwelling Energy Efficiency on Domestic Electricity Consumption in Sydney: Exploring the Prospect of Rebound Effects
RP2017	Energy benchmarking for efficient, low-carbon water recycling operations
RP2017u1	Operationalising Australian energy benchmarking for efficient, low-carbon wastewater treatment
RP2018	Retrofitting urban precincts to create low carbon communities - Broadway, AECOM
RP2019	Carbon reductions from composting food waste for food production – fitting recycling models to urban forms
RP2021	Greening Suburban Travel
RP2021e1	Carbon Neutral Adelaide - Greening Inner-Urban Travel
RP2023	Microclimate and UHI Mitigation Decision-Support Tool
RP2028	Co-benefits Calculator development & trial
RP2008	Beneficial reuse of solids from Wastewater Treatment Operations

CRC program 3: Community

Project No	Project Title
RP3012	Transformation to Low Carbon Living: Social Psychology of Low Carbon Behavioural Practice
RP3016	Enhancing the market for low-carbon homes at point of sale (Prog 1/3)
RP3017	Adelaide Living Laboratory Hub – Lochiel Park, Bowden and Tonsley
RP3021	Media and communication strategies to achieve carbon reduction through renovation of Australia's existing housing
RP3028	A "virtual market" for analysing residential housing policy interventions

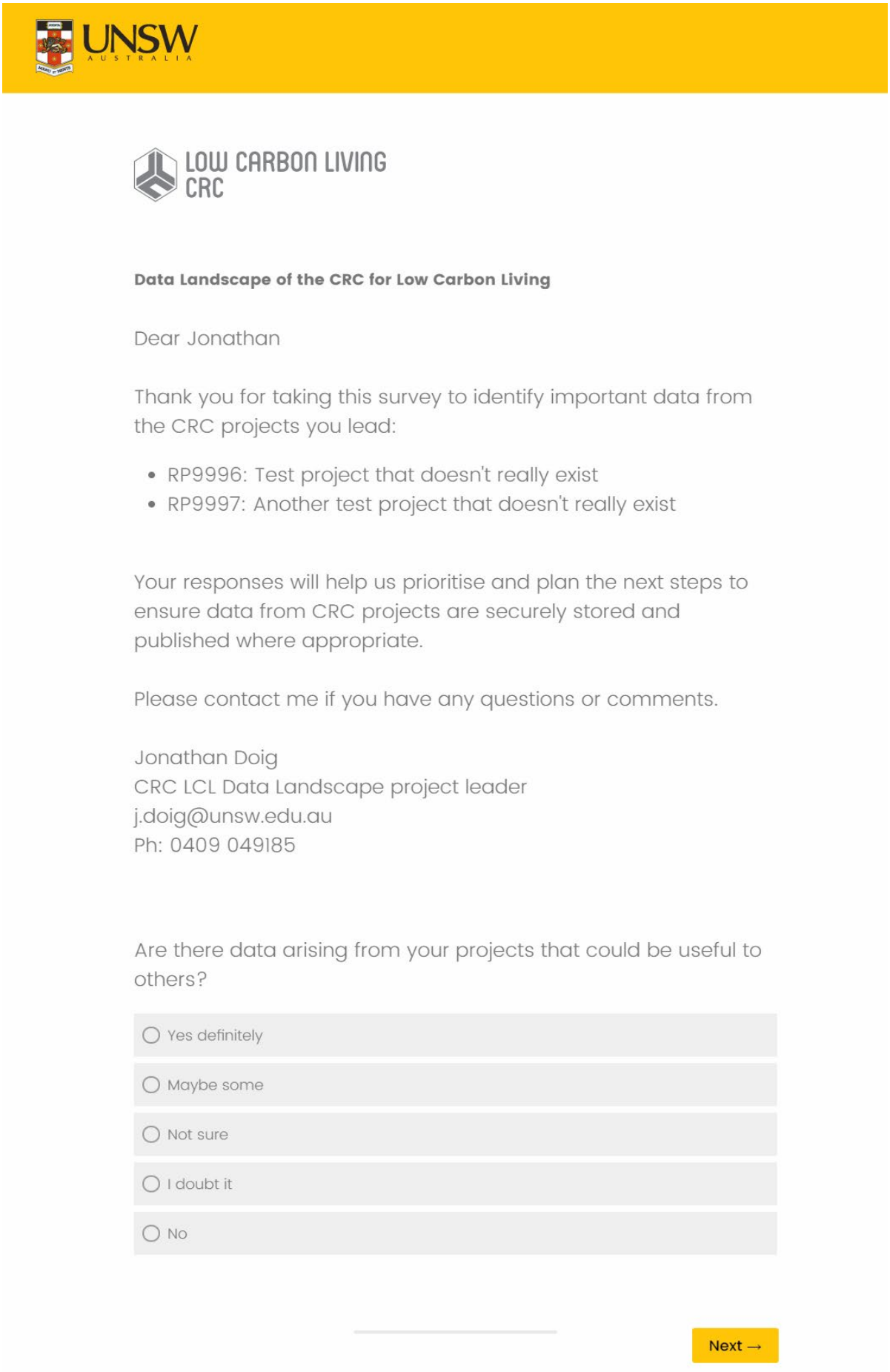
Project No	Project Title
RP3029	Driving a National Social Media Conversation on Energy Efficient Housing- Stage 1
RP3029e1	Project extension: Driving a National Social Media Conversation on Energy Efficient Housing- Stage 2
RP3035	Sydney Water Diffusion Modelling project
RP3038	Lower income barriers to low carbon living
RP3044	Mainstreaming Low Carbon Retrofits in Social and Community Housing
RP3001	Resource consumption and Household affordability; the changing nature of utility costs and the distributional implications
RP3002	A Framework for Low Carbon Living Community Policy & Program Development
RP3006	Education Scoping Study: Survey and gap analysis of existing low carbon education programs
RP3019	Pathways to achieve low carbon living outcomes through collaborative urban development planning in Australia
RP3020	Carbon Tools and Frameworks for Institutional Precincts: Stage 1 – Low Carbon Schools Scoping Study
RP3020e1	Influencing Change through Low Carbon Schools community program
RP3020u1	Mainstreaming Low Carbon, High Performance Schools and classrooms
RP3039	Liveability Real Estate framework training and professional development

Appendix 2 Datasets and projects

		ASBEC Trajectory Project	Policy Scenario Utilisation milestone…	EEDM in the NSW Social Housing…	Carbon Value Engineering	Investigation of innovative sustainable low-carbon…	Integrated Carbon Metrics (ICM)…	Energy benchmarking for efficient, low-carbon…	Operationalising Australian energy benchmarking…	Greening Suburban Travel	Transformation to Low Carbon Living: Social Psychology…	Enhancing the market for low-carbon…	Sydney Water Diffusion Modelling…
#	Dataset	SP0016	SP0018	SP0017p1	RP1034	RP1022	RP2007	RP2017	RP2017u1	RP2021	RP3012	RP3016	RP3035
1	Interview transcripts			•									
2	Measurement and monitoring data			•									
3	Lifecycle carbon and cost impact of design decisions				•								
4	Household survey data to help analyse water conservation behaviour in Sydney												•
5	Household survey of 600 participants across Sydney. Exploring adoption processes for residential transport, energy efficiency and water conservation behaviours, as well as PV and battery adoption.		•										•
6	Adoption barrier data: Probabilities associated with barriers to adoption for commercial building owners. Based on interviews of owners.		•										
7	Technology parameterisation data: Values on technology attributes based on expert judgment and literature.		•										•
8	Information source parameterisation data: Values on information source attributes based on expert judgments and literature		•										•

		ASBEC Trajectory Project	Policy Scenario Utilisation milestone…	EEDM in the NSW Social Housing…	Carbon Value Engineering	Investigation of innovative sustainable low-carbon…	Integrated Carbon Metrics (ICM)…	Energy benchmarking for efficient, low-carbon…	Operationalising Australian energy benchmarking…	Greening Suburban Travel	Transformation to Low Carbon Living: Social Psychology…	Enhancing the market for low-carbon…	Sydney Water Diffusion Modelling…
#	Dataset	SP0016	SP0018	SP0017p1	RP1034	RP1022	RP2007	RP2017	RP2017u1	RP2021	RP3012	RP3016	RP3035
9	Final Technical Report - Costs and benefits of energy efficiency and PV for new buildings	●											
10	Australian national energy use efficiency of metropolitan wastewater treatment plants							●	●				
11	Greenhouse gas emissions from aerobic granular sludge-based wastewater treatment operations							●					
12	Life cycle inventory data for wastewater treatment and disinfection processes (cost and environmental performance)							●					
13	Integrated Carbon Metrics database on embodied greenhouse gas emissions						●						
14	Stated preference surveys									●			
15	Experimental survey data											●	
16	Waste as resources					●							
17	Reforming waste into high value products					●							
18	State and Revealed Preference survey data									●			
19	Validating the LCRI (cross-sectional dataset)										●		

Appendix 3 Survey form



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LOW CARBON LIVING CRC

Data Landscape of the CRC for Low Carbon Living

Dear Jonathan

Thank you for taking this survey to identify important data from the CRC projects you lead:

- RP9996: Test project that doesn't really exist
- RP9997: Another test project that doesn't really exist

Your responses will help us prioritise and plan the next steps to ensure data from CRC projects are securely stored and published where appropriate.

Please contact me if you have any questions or comments.

Jonathan Doig
CRC LCL Data Landscape project leader
j.doig@unsw.edu.au
Ph: 0409 049185

Are there data arising from your projects that could be useful to others?

- ◯ Yes definitely
- ◯ Maybe some
- ◯ Not sure
- ◯ I doubt it
- ◯ No

Next →

Please list up to five datasets from your projects that may be useful to others. We'll confirm contact details and ask you a few questions about each one.

- [ ] Dataset 1:

- [ ] Dataset 2:

- [ ] Dataset 3:

- [ ] Dataset 4:

- [ ] Dataset 5:

Any comments about your list (e.g. about other possible datasets):

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Dataset: Example Dataset

Which CRC project(s) is this dataset associated with?

- [ ] RP9996: Test project that doesn't really exist
- [ ] RP9997: Another test project that doesn't really exist

Are you the right person to answer questions about this data?

- (•) Yes
- ( ) No, better to ask:

How useful do you think this data is to the following groups?

	Not useful at all	Slightly useful	Somewhat useful	Very useful	Extremely useful
Researchers	○	○	○	○	○
Industry	○	○	○	○	○
Government	○	○	○	○	○
NGOs	○	○	○	○	○
General public	○	○	○	○	○
Other:	○	○	○	○	○

Why do you rate its usefulness that way?

Does its usefulness have an expiry date?

- ○ No
- ○ Yes:

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Dataset: Example Dataset

Which organisation owns the data?

Note: The CRC LCL winds up in June 2019 and will not be the ongoing custodian of any data.

- CSIRO
- Curtin University
- Swinburne University
- University of Melbourne
- University of South Australia
- UNSW Sydney
- University of Wollongong
- Other
- Don't know

Any further comments about the ownership of the data?

Is the data potentially of commercial value?

- ◯ Yes
- ◯ No
- ◯ Not sure

Any comments regarding commercial value:

Has the dataset been lodged in an archive or repository?

- ◯ Yes here (URL or description):
- ◉ No but it probably should be (either now or later)
- ◯ No. It shouldn't be:
- ◯ Not sure (comment):

When should this data be lodged in an archive?

- ◯ Now or soon
- ◯ When the data or project is complete (estimated date as **dd/mm/yyyy)**:
- ◯ Not sure:

Is this a spatial dataset? In other words, does it relate to geographic features? E.g. contains geographic coordinates or names/identifiers of spatial features (such as postcodes).

- ◯ Yes
- ◯ No (comment):
- ◯ Not sure:

Could this data be made publicly available online?

- ◯ Yes
- ◯ No (comment):
- ◯ Not sure:

What is the approximate file size (data volume)?

	Size	Units				
	e.g. 3	KB	MB	GB	TB	PB
		○	○	○	○	○

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Any final comments:

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