



Manaaki Whenua  
Landcare Research

# **Assessing the value of soil information: results of a survey of S-map users**

Prepared for: Manaaki Whenua – Landcare Research

**December 2019**





# Assessing the value of soil information: results of a survey of S-map users

*Contract Report: LC3644*

Jane Richardson, Linda Lilburne, Sam Carrick

*Manaaki Whenua – Landcare Research*

Raymond Ford

*Consultant*

---

*Reviewed by:*

Stella Belliss

Researcher

Manaaki Whenua – Landcare Research

*Approved for release by:*

Gerard Grealish

Research Priority Area Leader

Manaaki Whenua – Landcare Research

---

## **Disclaimer**

*This report has been prepared by Manaaki Whenua – Landcare Research for internal use. If used by other parties, no warranty or representation is given as to its accuracy and no liability is accepted for loss or damage arising directly or indirectly from reliance on the information in it.*



# Contents

Summary .....	v
1 Introduction .....	1
2 Report structure .....	1
3 Objectives .....	1
4 Methods .....	1
4.1 Survey Design .....	1
4.2 Survey distribution.....	2
4.3 Collation of results, analysis and reporting .....	2
5 Results.....	2
5.1 General information.....	2
5.2 Detailed responses by question .....	3
6 Conclusions.....	24
7 References .....	24



# Summary

## Project

- Evaluating the benefits of S-map and soil information.

## Objectives

- Survey existing S-map users to determine how individuals and organisations use S-map and the Fundamental Soils Layer and how the information contributes to their work or business.
- Collect survey information to improve Manaaki Whenua – Landcare Research’s understanding of the value of soil information to end-users.
- Produce recommendations to support and inform the expansion and development of S-map.

## Methods

- Design and distribute a survey using the SurveyMonkey online survey tool.
- Collect and analyse data from survey respondents.
- Report results.

## Results

- A 20-question SurveyMonkey survey was distributed to all registered S-map users and responses collected between 24 June and 19 July 2019.
- Of the 1,026 people who responded, 71% completed the survey. The average time spent taking the survey was 8 minutes and 8 seconds.
- Most respondents considered they had some soil expertise, with 14% rating themselves as being very experienced.
- Just under half of survey respondents described themselves as working for a private business. The second largest group (16%) identified as landowners. The majority of respondents came from the horticulture, agriculture, professional, technical, and scientific sectors.
- S-map information is predominantly used for crop/pasture production management decisions or planning (including modelling). Private users (either private business or landowners) were the major users across almost all the applications listed in the survey.
- Private businesses were the most frequent users of soil information while landowners accessed the information less frequently than other types of user.
- Soil information is most frequently used in farm nutrient budget or management models, effluent or wastewater management and for providing professional advice.
- Most respondents agreed or strongly agreed that S-map saves their organisation time, enables a more complete analysis, and makes project work easier. The majority of respondents rated S-map as important to their work.

- The average charge-out rate for staff working with S-map is \$124 per hour. The total value of work over the last year that used S-map was estimated at a total value of \$29,868,417.
- Where S-map is not available, users obtain soil information from a range of different sources and there is no single strongly preferred category.
- Most users obtain the soil information from S-map via viewing soil maps from S-map online. On average over the last year S-map has been used by respondents 22 times for an average of 23 hours.
- Respondents estimated it would take 14 hours (on average) per project to collect soil information where S-map is not available.
- Respondents strongly supported expansion of the availability of soil survey information and articulated a need for improving the coverage and scale.
- Just over 70% of users agreed that having soil survey information would enable them to make better land management decisions

## **Conclusions**

- S-map is a valued and frequently utilised resource used for a large range of applications.
- Private users, landowners, and private business owners are the largest group of users.
- Users agree that S-map saves their organisation time, enables a more complete analysis, and makes project work easier.
- Respondents strongly supported expansion of the availability of soil survey information and articulated a need to improve the coverage and scale as this would enable them to make better land-management decisions.



## 1 Introduction

S-map and S-map Online web delivery service is Manaaki Whenua – Landcare Research’s (MWLR) programme to map New Zealand's soil resources. S-map has integrated existing soil survey information and new data to provide coverage across 34.7% of New Zealand. In terms of land use capability (LUC) ratings, the S-map covers 63.8% of LUC 1–4 land and 25% of LUC 5–8. There are regional differences in the amount of S-map coverage with, for example, excellent coverage in Hawke’s Bay but no coverage in Northland. S-map information plays a key role in supporting sustainable development and modelling within New Zealand, therefore there is value in increasing the coverage and harmonising mapped soil attributes and properties. This survey has been undertaken to improve MWLR’s understanding of the value of soil information to end-users in order to support a case for investment to expand the coverage of S-map.

## 2 Report structure

The report provides an overview of the survey methodology and a high-level summary of the responses received to each question. It has been prepared as a supporting document to a report produced by M.E Consulting titled ‘S-map Indicative benefits’ (McIlrath 2019).

## 3 Objectives

- Survey existing S-map users to determine how individuals and organisations are using S-map and the Fundamental Soils Layer, and how the information contributes to their work or business.
- Collect survey information to improve MWLR’s understanding of the value of soil information to end-users.
- Produce recommendations to support and inform the expansion and development of S-map.

## 4 Methods

### 4.1 Survey Design

The MWLR group (Linda Lilburne, Sam Carrick, and Jane Richardson) and Raymond Ford (consultant) designed and drafted the survey questions. The S-map users survey was then created on SurveyMonkey (<https://surveymonkey.com>) and circulated for testing.

The survey comprised 20 questions. The first four questions sought information about the respondents: their occupation, the main focus of their business or work, and their location. Question 5 asked respondents to rate their soil expertise. The following questions were designed to find out **where** the soil information is being used (which region of New Zealand), **what** purpose the data is being used for across 31 specified categories, and **how**

**often** the data are used for each of the different categories. Questions then sought information on the benefits and economic value of using S-map, and the use of alternative soil information sources. Finally, respondents were asked to comment on S-map coverage, what additional soil survey information would add value and any other general comments.

## **4.2 Survey distribution**

The survey was emailed to all registered S-map users who have been active within the last two years. This email was successfully delivered to 11,740 recipients on 26 June 2019. Survey responses were collected on SurveyMonkey from 26 June until 19 July 2019. A reminder email was sent out on 15 July 2019.

## **4.3 Collation of results, analysis and reporting**

All survey responses were exported from SurveyMonkey in an excel spreadsheet to enable individual responses and comments to be analysed for open-ended questions. Summary data displayed in tables and graphs were also exported from SurveyMonkey. Survey data were not audited for accuracy, duplications or errors.

# **5 Results**

## **5.1 General information**

The S-map Users survey comprised 20 questions, with an estimated time to complete of 17 minutes. We recognised the need to keep the survey short to increase the completion rate. However, this need was balanced against the requirement to gain detailed information so we can fully assess the value derived from S-map and soil information.

A total of 1026 responses were collected, giving a response rate of 8.7%. The majority of respondents (563) undertook the survey within the first 7 days; a further 363 people responded in the week of 15 July after the reminder email was sent. The completion rate for the survey was 71%, with 729 respondents fully completing it. The average time spent taking the survey was 8 minutes and 8 seconds. This was close to half the time initially estimated by SurveyMonkey. All respondents answered the first five questions. Most respondents who left the survey did so at Question 8 – when they were asked to rate six statements on how they benefit from the use of S-map or the Fundamental Soils Layer (FSL). Questions that required comments were answered by 55–90% of the remaining respondents. Just over 40% of respondents answered the final question seeking any general comments about soil survey information.

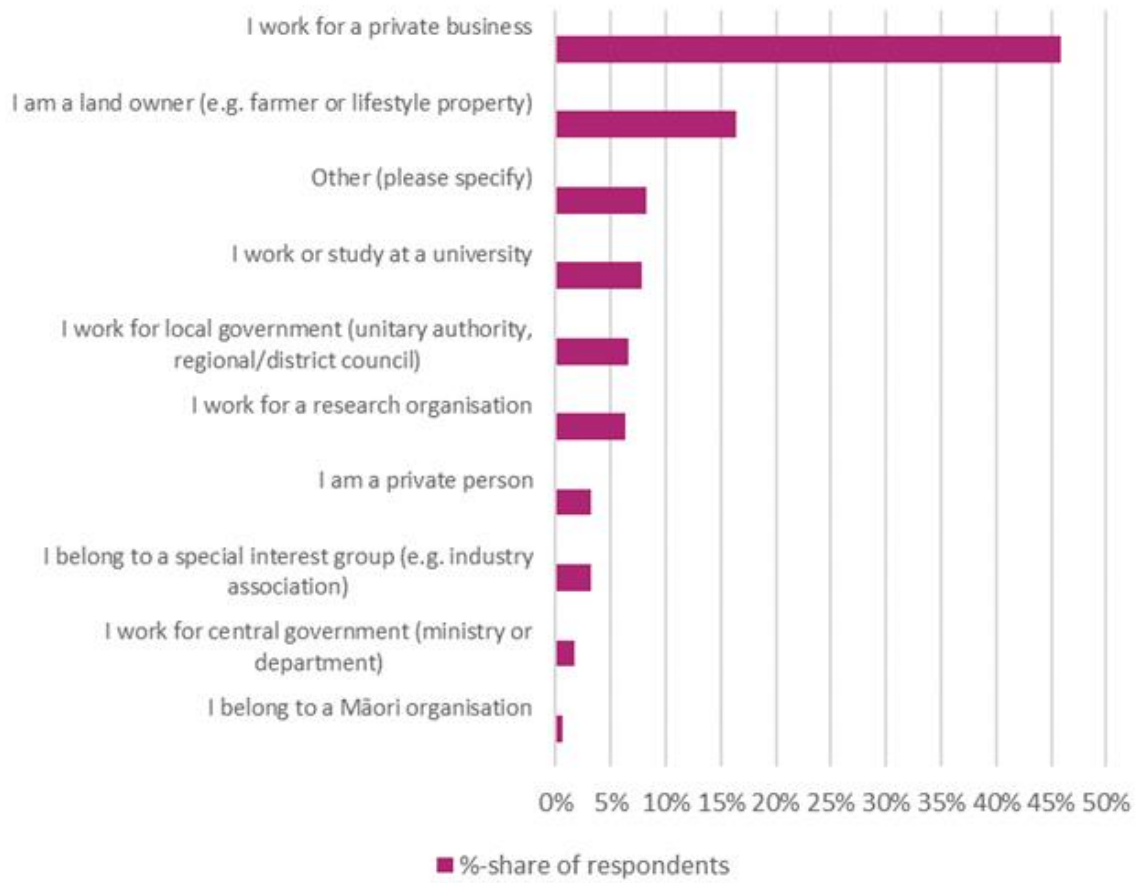
## 5.2 Detailed responses by question

### Question 1. What best describes you?

Just under half of survey respondents described themselves as working for a private business (Table 1). The second largest group, 16% of respondents, identified as landowners. Eighty-four respondents (8.19%) selected 'other' and added more information about their occupation. The majority of these 'other' responses were from private people and landowners, respondents working in private businesses, and tertiary organisations other than universities.

**Table 1. Type of S-map users**

<b>Answer choices</b>	<b>% respondents</b>	<b>No. of respondents</b>
I work for central government (ministry or department)	1.75%	18
I work for local government (unitary authority, regional/district council)	6.82%	70
I work for a research organisation	6.34%	65
I work for a private business	45.71%	469
I am a landowner (e.g. farmer or lifestyle property)	16.37%	168
I belong to a special interest group (e.g. industry association)	3.12%	32
I work or study at a university	7.80%	80
I am a private person	3.22%	33
I belong to a Māori organisation	0.68%	7
Other (please specify)	8.19%	84
	<b>Answered</b>	1026
	<b>Skipped</b>	0



**Figure 1. Breakdown by user type (McIlrath 2019).**

**Question 2. What is the main focus of your business or work? (If you are uncertain about the category, please add a short description in 'other'). Please click on the drop-down list and select a category**

**Table 2. Activity type of S-map users**

<b>Answer choices</b>	<b>% respondents</b>	<b>No. of respondents</b>
Horticulture and fruit growing	14.91%	153
Dairying	11.89%	122
Sheep, beef cattle or grain farming	10.04%	103
Forestry and logging	2.92%	30
Mining	0.00%	0
Electricity, Gas, Water and Waste Services	2.14%	22
Financial and Insurance Services	1.85%	19
Rental, Hiring and Real Estate Services	1.95%	20
Professional, Scientific and Technical Services	27.97%	287
Administrative and Support Services	0.29%	3
Public Administration and Safety (including government)	1.46%	15
Education and Training	4.68%	48
Other (please specify)	19.88%	204
	<b>Answered</b>	1026
	<b>Skipped</b>	0

The largest group of respondents (28%) worked in the professional, scientific, and technical service sector (Table 2). A further 37% worked in the horticultural and agricultural sector. Two hundred and four respondents identified as 'other' when asked what the main focus of their work was and supplied additional information. In many cases the answers would have fitted under the category of Professional, Scientific and Technical Services. Respondents also tended to answer 'other' when their focus involved activities in more than one category. Some 'other' activities included:

- Lifestyle owners, households and environmental interests
- Viticulture and winemaking
- Archaeology
- Architecture, landscape design, building and construction

**Question 3. Where are you located? If your company or organisation is based in different parts of New Zealand, please select the regions where you have an office**

The majority of respondents are located in the major populated regions. McIlrath's (2019) analysis of the spatial patterns of region of use versus location of use concluded that a large share of S-map usage is via contractors or consultants servicing the smaller regions.

**Table 3. Location of S-map users**

<b>Answer choices</b>	<b>% respondents</b>	<b>No. of respondents</b>
Auckland Region	18.32%	188
Bay of Plenty Region	14.33%	147
Canterbury Region	29.92%	307
Gisborne Region	4.48%	46
Hawke's Bay Region	13.35%	137
Manawatu-Wanganui Region	12.09%	124
Marlborough Region	6.63%	68
Nelson Region	6.43%	66
Northland Region	8.19%	84
Otago Region	11.31%	116
Southland Region	6.34%	65
Taranaki Region	5.26%	54
Tasman Region	3.61%	37
Waikato Region	19.69%	202
Wellington Region	11.99%	123
West Coast Region	3.31%	34
Other area (e.g. overseas - please specify)	3.31%	34
	<b>Answered</b>	1026
	<b>Skipped</b>	0

**Question 4. For which area are you using the soil survey information? Please state if it is either all of New Zealand or in a particular region(s) or other areas. Choose as many regions as appropriate**

**Table 4. Regions soil information use**

<b>Answer choices</b>	<b>% respondents</b>	<b>No. of respondents</b>
All of New Zealand	26.71%	274
Auckland Region	11.50%	118
Bay of Plenty Region	12.77%	131
Canterbury Region	21.35%	219
Gisborne Region	5.56%	57
Hawke's Bay Region	12.77%	131
Manawatu-Wanganui Region	10.23%	105
Marlborough Region	7.12%	73
Nelson Region	4.39%	45
Northland Region	7.60%	78
Otago Region	11.11%	114
Southland Region	6.43%	66
Taranaki Region	4.39%	45
Tasman Region	2.53%	26
Waikato Region	16.67%	171
Wellington Region	5.95%	61
West Coast Region	2.53%	26
Other area (e.g. overseas - please specify)	1.07%	11
	<b>Answered</b>	1026
	<b>Skipped</b>	0

**Question 5. How do you rate your soil expertise? Rate yourself from 1 – Limited knowledge (no formal training and no field experience) to 5 – Very experienced (university trained with more than 1 year of soil related courses and/or substantial field experience)**

Just over a third of survey respondents considered themselves as experienced in term of their soil expertise and a similar proportion rated their knowledge as limited.

**Table 5. Soil expertise**

	<b>1 – Limited knowledge</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 – Very experienced</b>	<b>Total</b>	<b>Weighted Average</b>
Soil expertise	17.74%	17.54%	28.75%	21.54%	14.42%		
	182	180	295	221	148	1026	2.97

**Question 6. What do you or your organisation use S-map information for? Select from the categories below. You can select more than one category**

The top ten applications account for 54% of all applications (highlighted in Table 6). An analysis of S-map application by user type (McIlrath 2019) found that the private sector were the major users across almost all applications (Fig. 2).



**Table 6. Applications of S-map**

<b>Answer choices</b>	<b>% respondents</b>	<b>No. of respondents</b>
Crop/pasture production management decisions or planning (including modelling)	37.09%	369
Farm nutrient budget or management models – e.g. OVERSEER®, MitAgator	30.75%	306
Managing nutrient losses	30.35%	302
Fertiliser applications	28.44%	283
Land use capability mapping	28.24%	281
Assessing soil erosion risk	27.64%	275
Irrigation management	25.93%	258
Farm operational management and planning decisions	25.13%	250
Environmental modelling research and reporting	23.02%	229
Effluent or wastewater management	22.81%	227
Managing sediment erosion or sediment runoff	20.20%	201
Preparing, updating or auditing farm environment plans	20.20%	201
Resource consent applications (preparing, auditing etc)	18.49%	184
Assessing the suitability of land for urban or rural residential development	18.09%	180
Catchment hydrological modelling	17.19%	171
Land and property sales (e.g. pre-purchasing assessments)	17.09%	170
Informing land use change processes (e.g. irrigation)	16.38%	163
Research (experimental, fundamental or student level)	15.48%	154
Providing professional advice (excluding the models mentioned earlier)	14.17%	141
Training, teaching or educational purposes (academic and vocational)	10.15%	101
Informing planning processes (e.g. subdivisions)	9.85%	98
Flood protection or catchment works	9.75%	97
Informing regulatory work or policy development (e.g. national policies, regulations, district plans)	9.15%	91
Other (please specify)	8.94%	89
Infrastructure planning (e.g. transport, utility)	8.74%	87
Geotechnical surveys	8.54%	85
Data mining or deriving new information	8.34%	83
State of environment monitoring	7.14%	71
Economic modelling and studies	6.33%	63
Transport or utility infrastructure planning	3.22%	32
Official statistics (National Greenhouse Gas Inventory, National System of Environmental & Economic Accounts)	1.31%	13
	<b>Answered</b>	995
	<b>Skipped</b>	31

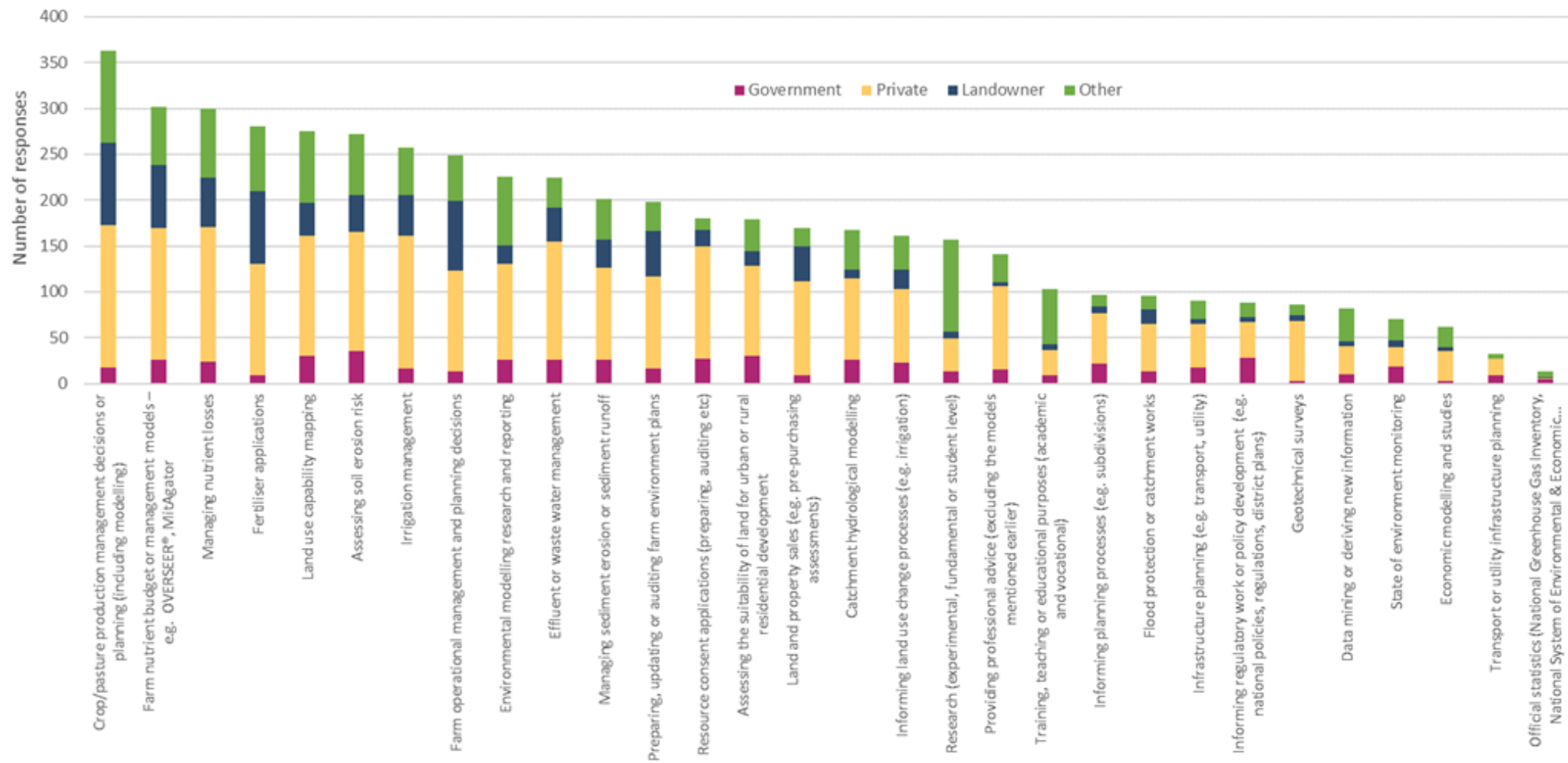


Figure 2. S-map applications (McIlrath 2019).

### Question 7. How often do you use or access soil information?

Landowners are the least frequent users of soil information with the majority accessing the information less than once every six months (Fig. 3). McIlrath (2019) suggests this reflects S-map being viewed as part of general business operation rather than core business. Private businesses were proportionally the highest group of frequent users. Soil information is most frequently used in farm nutrient budget or management models, effluent or waste-water management and for providing professional advice.

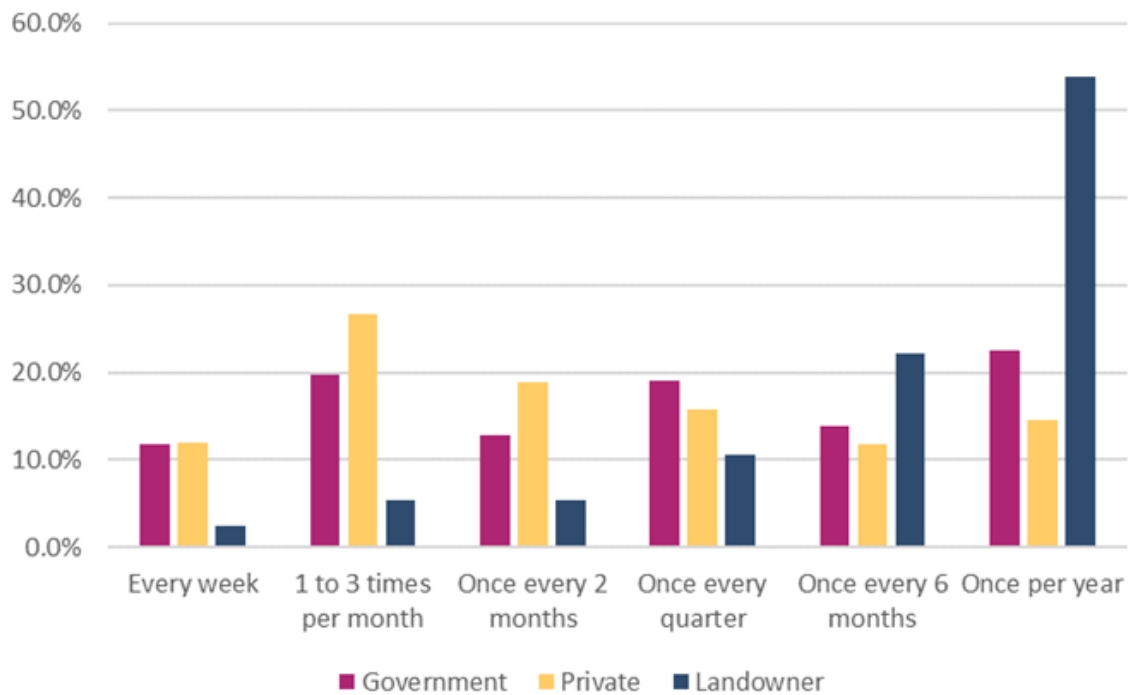


Figure 3. Frequency of use (McIlrath 2019).

**Table 7. Frequency of use of S-map applications**

	Every week	1–3 times per month	Once every 2 months	Once every quarter	Once every 6 months	Once per year	Total
Farm nutrient budget or management models – e.g. OVERSEER®, MitAgator	18.54% 56	20.86% 63	11.59% 35	12.91% 39	16.89% 51	19.21% 58	302
Managing nutrient losses	11.78% 35	20.54% 61	13.47% 40	17.85% 53	14.48% 43	21.89% 65	297
Crop/pasture production management decisions or planning (including modelling)	8.29% 30	18.51% 67	14.36% 52	17.68% 64	16.02% 58	25.14% 91	362
Fertiliser applications	10.43% 29	19.42% 54	13.31% 37	13.31% 37	15.47% 43	28.06% 78	278
Farm operational management and planning decisions	10.98% 27	18.29% 45	14.63% 36	16.67% 41	14.63% 36	24.80% 61	246
Effluent or wastewater management	11.66% 26	29.60% 66	15.25% 34	13.00% 29	12.11% 27	18.39% 41	223
Land and property sales (e.g. pre-purchasing assessments)	14.79% 25	26.04% 44	13.02% 22	14.20% 24	8.88% 15	23.08% 39	169
Preparing, updating or auditing farm environment plans	12.76% 25	15.82% 31	15.31% 30	10.20% 20	10.20% 20	35.71% 70	196
Managing sediment erosion or sediment runoff	12.12% 24	17.68% 35	16.67% 33	19.70% 39	14.14% 28	19.70% 39	198
Providing professional advice (excluding the models mentioned earlier)	16.43% 23	25.00% 35	15.71% 22	18.57% 26	14.29% 20	10.00% 14	140
Irrigation management	8.80% 22	23.20% 58	11.60% 29	20.00% 50	11.20% 28	25.20% 63	250
Environmental modelling research and reporting	9.33% 21	21.33% 48	13.33% 30	14.22% 32	21.78% 49	20.00% 45	225
	7.27%	19.27%	14.18%	21.09%	15.27%	22.91%	

	Every week	1–3 times per month	Once every 2 months	Once every quarter	Once every 6 months	Once per year	Total
Land use capability mapping	20	53	39	58	42	63	275
Catchment hydrological modelling	9.64%	15.66%	20.48%	15.66%	14.46%	24.10%	
	16	26	34	26	24	40	166
Assessing soil erosion risk	5.56%	17.04%	18.52%	18.15%	14.07%	26.67%	
	15	46	50	49	38	72	270
Resource consent applications (preparing, auditing etc)	7.78%	26.11%	23.33%	13.33%	9.44%	20.00%	
	14	47	42	24	17	36	180
Assessing the suitability of land for urban or rural residential development	7.43%	21.14%	16.00%	15.43%	17.14%	22.86%	
	13	37	28	27	30	40	175
Research (experimental, fundamental or student level)	7.19%	18.95%	17.65%	17.65%	24.18%	14.38%	
	11	29	27	27	37	22	153
Informing land use change processes (e.g. irrigation)	5.73%	26.11%	15.29%	14.01%	15.29%	23.57%	
	9	41	24	22	24	37	157
Other	10.23%	22.73%	12.50%	9.09%	14.77%	30.68%	
	9	20	11	8	13	27	88
Flood protection or catchment works	5.26%	22.11%	13.68%	16.84%	13.68%	28.42%	
	5	21	13	16	13	27	95
Geotechnical surveys	6.17%	20.99%	14.81%	20.99%	13.58%	23.46%	
	5	17	12	17	11	19	81
Informing planning processes (e.g. subdivisions)	5.15%	25.77%	16.49%	15.46%	14.43%	22.68%	
	5	25	16	15	14	22	97
Training, teaching or educational purposes (academic and vocational)	3.96%	21.78%	14.85%	20.79%	19.80%	18.81%	
	4	22	15	21	20	19	101
Informing regulatory work or policy development (e.g. national policies, regulations, district plans)	4.49%	19.10%	14.61%	15.73%	22.47%	23.60%	
	4	17	13	14	20	21	89
	4.23%	16.90%	14.08%	12.68%	16.90%	35.21%	

	Every week	1–3 times per month	Once every 2 months	Once every quarter	Once every 6 months	Once per year	Total
State of environment monitoring	3	12	10	9	12	25	71
Data mining or deriving new information	2.50%	17.50%	10.00%	23.75%	18.75%	27.50%	
	2	14	8	19	15	22	80
Infrastructure planning (e.g. transport, utility)	2.33%	16.28%	22.09%	13.95%	23.26%	22.09%	
	2	14	19	12	20	19	86
Economic modelling and studies	1.59%	17.46%	15.87%	19.05%	19.05%	26.98%	
	1	11	10	12	12	17	63
Transport or utility infrastructure planning	3.13%	18.75%	12.50%	25.00%	18.75%	21.88%	
	1	6	4	8	6	7	32
Official statistics (National Greenhouse Gas Inventory, National System of Environmental & Economic Accounts)	0.00%	23.08%	0.00%	15.38%	38.46%	23.08%	
	0	3	0	2	5	3	13
						<b>Answered</b>	978
						<b>Skipped</b>	48

**Question 8. How have you or your organisation benefited from the use of S-map or the Fundamental Soils Layer (FSL)? Please rate the following statements in terms of the degree to which you agree or disagree (from 1 – Agree, 3 – Neutral to 5 – Disagree) or if the question is not relevant please select 'N/A'**

Most respondents agreed or strongly agreed with statement supporting the benefit of S-map (~70%) to their businesses. Twenty percent indicated they were using the FSL because of the national coverage. Just over a quarter of respondents considered S-map information to be more accurate than FSL. This indicates a poor understanding of the accuracy of soil information – and the need to more clearly articulate the inaccuracy of the older coarser scale FSL.

**Table 8. Benefit of S-map**

	<b>1 – Agree</b>	<b>2</b>	<b>3 – Neutral</b>	<b>4</b>	<b>5 – Disagree</b>	<b>N/A</b>
Using S-map saves us or my organisation time	40.47%	27.98%	20.30%	1.65%	1.78%	7.82%
	295	204	148	12	13	57
Having S-map enables us to complete a level of analysis that would not be possible without the resource	46.50%	29.63%	14.54%	2.74%	2.06%	4.53%
	339	216	106	20	15	33
S-map makes our project-work easier as it provides a consistent data source that can be used across different teams or regions	39.92%	28.12%	17.83%	2.19%	1.78%	10.15%
	291	205	130	16	13	74
S-map has had little or no benefit to my work or interests	1.78%	3.43%	8.09%	15.91%	57.61%	13.17%
	13	25	59	116	420	96
We have to use FSL because it has national coverage	10.97%	9.19%	30.45%	4.66%	8.92%	35.80%
	80	67	222	34	65	261
S-map information is more accurate than FSL	13.99%	12.76%	38.27%	1.65%	1.37%	31.96%
	102	93	279	12	10	233
					<b>Answered</b>	729
					<b>Skipped</b>	297

**Question 9. To help us estimate the wider economic value of S-map, can you please give a high-level estimate of the following two areas (note whole numbers only should be entered e.g. 5)**

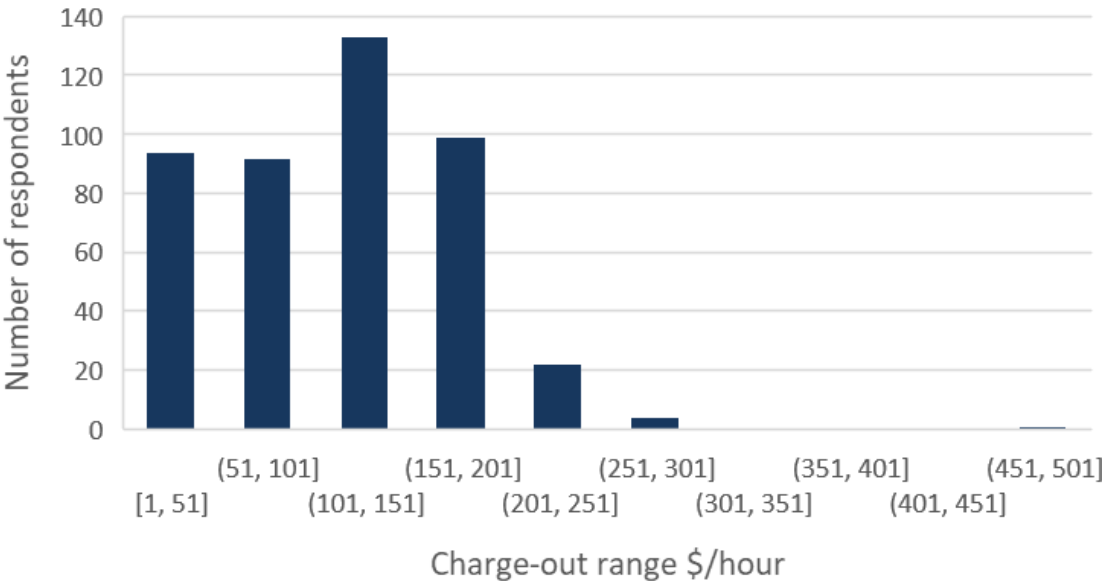
On average over the last year S-map has been used 22 times for an average of 23 hours.

**Table 9. S-map usage**

Answer choices	Average number	No. of respondents
How many times have you used S-map for your work over the past year? Please estimate (number of projects or tasks)	22	713
Of the total amount of time you spent on your work, how many hours did you spend working with the S-map data (hours)?	23	703
	Skipped	311

**Question 10. To help us estimate the value of S-map to your work, please provide either average hourly charge-out rate for the staff that normally work with S-map or total value of your work that used S-map as an input (note whole numbers only should be entered e.g. 100)**

Question 10 was formulated to assess the economic value of using S-map. Just over 60% of respondents (446) who completed the survey answered this question. The charge-out rate for staff working with S-map ranged from \$1–1000 per hour, with the average calculated to be \$124 per hour. The respondents (219) that answered this question estimated the value of their work over the last year that included the use of S-map to be in the range of between \$8,000,000 and \$1, with a total value of \$29,868,417.



**Figure 4. Hourly charge-out rate for staff working with S-map.**



**Question 11. How important is S-map as an input for your work? (1 – Not important, 3 – Neutral and 5 – Very important)**

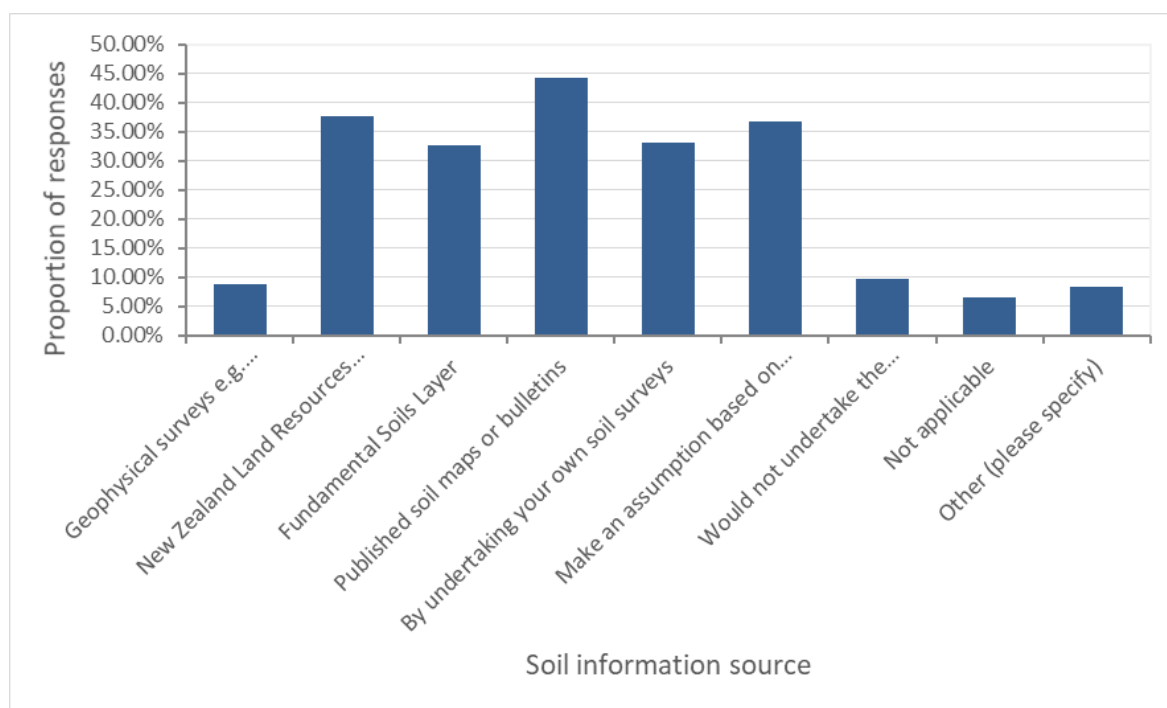
Sixty percent of respondents rated S-map as important to their work, with 15% considering S-map input as not important.

**Table 10. The importance of S-map**

	1 – Not important	2	3 – Neutral	4	5 – Very important
How important is S-map as an input?	6.00%	9.34%	23.99%	41.56%	19.11%
	43	67	172	298	137
				<b>Answered</b>	717
				<b>Skipped</b>	309

**Question 12. Where S-map is not available, how do you or would you obtain the soil information? Please select from the categories below; you can select more than one category**

Respondents obtain soil information from a range of different sources and there is no single strongly preferred category. Less than 10% would not undertake the work if S-map is unavailable.



**Figure 5. Use of alternative sources of soil information.**

**Table 11. Alternative soil information**

<b>Answer choices</b>	<b>% respondents</b>	<b>No. of respondents</b>
Geophysical surveys, e.g. electromagnetic induction survey	8.80%	64
New Zealand Land Resources Inventory – LUC maps	37.69%	274
Fundamental Soils Layer	32.74%	238
Published soil maps or bulletins	44.15%	321
By undertaking your own soil surveys	33.15%	241
Make an assumption based on similar soil types	36.73%	267
Would not undertake the analysis/work	9.77%	71
Not applicable	6.46%	47
Other (please specify)	8.39%	61
	<b>Answered</b>	727
	<b>Skipped</b>	299

**Question 13. Approximately how long would it take to collect the information using the alternative (average hours per project)?**

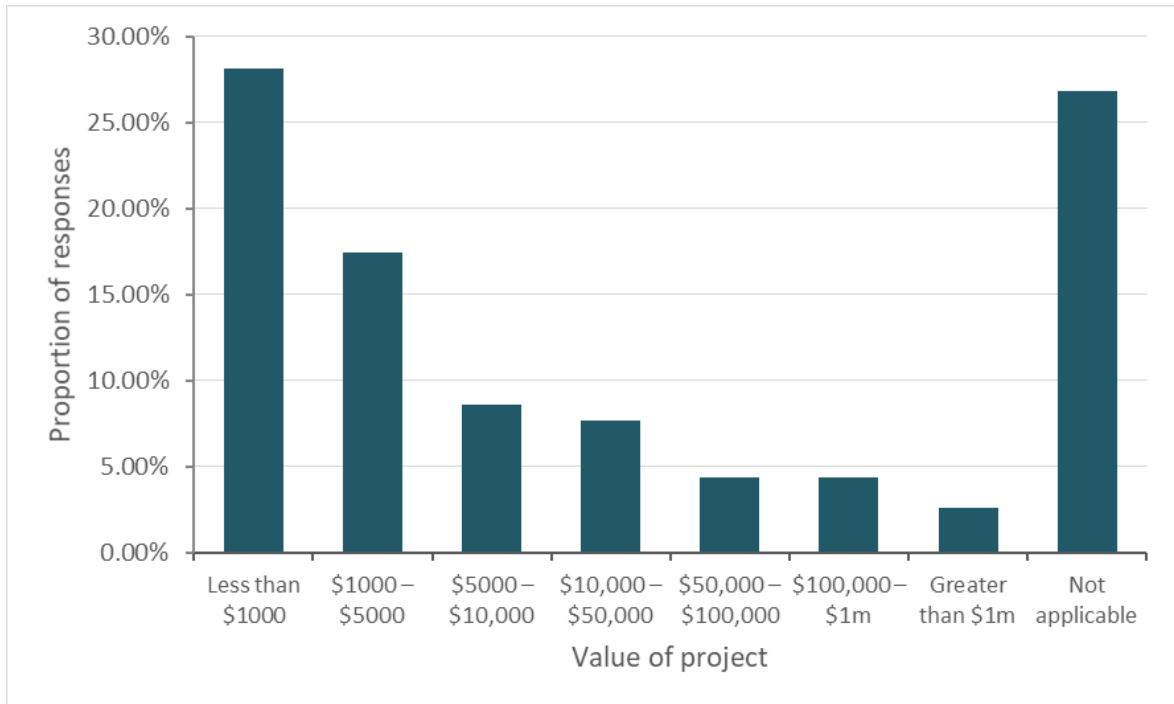
Respondents (517) estimated that it would take between no time and 12,000 hours per project to collect soil information where S-map is not available, with an average of 14 hours per project.

**Question 14. How many times have you used this alternative information for your work over the past year?**

A total of 657 respondents answered the question, with 57% using this alternative information once or more. For those who had used alternative soil information, the average was 19 times. A quarter of respondents did not use any alternative information and a further 8% commented that the question was not applicable or unknown, or entered a comment that was unable to be quantified.

**Question 15. Please provide an estimate of the total value of your most recent project that used this alternative soil information**

Users reported that just under half (46%) of the most recent projects that used alternative soil information were valued at less than \$5,000. Sixteen respondents had recent projects valued at greater than \$1 million using alternation soil information where S-map was not available.



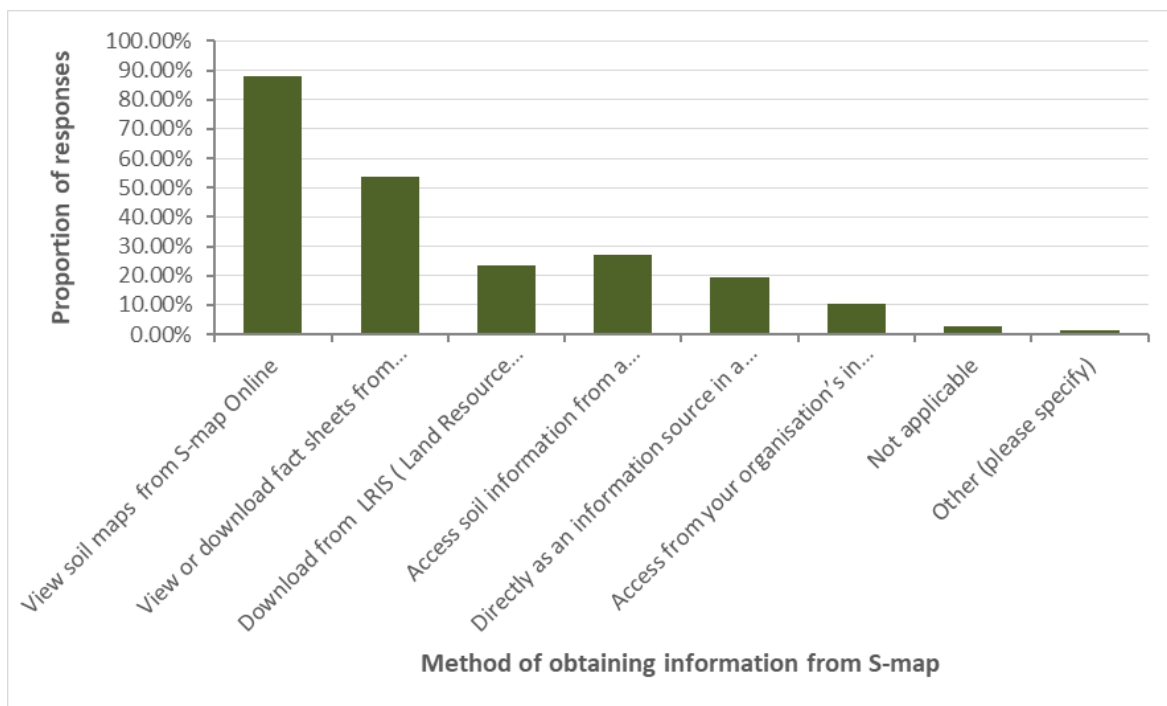
**Figure 6. Value of projects using alternative sources of soil information.**

**Table 12. Value of alternative soil information**

Answer choices	% respondents	No. of respondents
Less than \$1000	28.13%	173
\$1000-\$5000	17.40%	107
\$5000-\$10,000	8.62%	53
\$10,000-\$50,000	7.64%	47
\$50,000-\$100,000	4.39%	27
\$100,000-\$1m	4.39%	27
Greater than \$1m	2.60%	16
Not applicable	26.83%	165
	<b>Answered</b>	615
	<b>Skipped</b>	411

**Question 16. How do you obtain the soil information from S-map? Select all that apply**

Most respondents (88%) obtain the soil information from S-map via viewing soil maps from S-map online. Just over 50% of respondents view or download fact sheets from S-map online.



**Figure 7. Method of accessing S-map.**

**Table 13. Method of accessing S-map**

Answer choices	% respondents	No. of respondents
View soil maps from S-map Online	88.07%	642
View or download fact sheets from S-map Online	53.50%	390
Download from LRIS (Land Resource Information System) Portal	23.59%	172
Access soil information from a regional council website	27.02%	197
Directly as an information source in a model, e.g. Overseer®, Environment Canterbury's Farm Portal, MitAgator™, APSIM®	19.62%	143
Access from your organisation's in-house spatial databases	10.29%	75
Not applicable	2.74%	20
Other (please specify)	1.51%	11
	<b>Answered</b>	<b>729</b>
	<b>Skipped</b>	<b>297</b>

**Question 17. Do you have any other comments around the spatial extent/coverage of S-map?**

A total of 224 unique responses were received for this question. Comments could be broadly assigned to one of six categories. The greatest proportion of respondents (just under 60 comments) noted the need for improving national coverage and a further 40 respondents identified a need for complete S-map coverage for specific areas. Thirty-four comments related to improving the accuracy/detail of s-map and 46 respondents made comments on the current S-map coverage and detail. There were also several comments related to usability, access and S-map online; 17 suggestions on how S-map access and usability could be improved; and a further 15 comments on S-map online tools – of which eight were positive. A sample of the comments is listed below:

*'Complete coverage is essential for OVERSEER and policy development – current incomplete coverage is slowing informed environmental decision making'*

*'Improved coverage is essential, we need consistency. The cost of improving our coverage is horrendous and a major impediment to sustainable land use decision making'*

*'Would be good to cover all grazed land in NZ'*

*'It would be good to cover more of the North Island particularly the King Country where I have a reasonable number of clients'*

*'If farm/environmental plans are required in the future for the West Coast S-map will play a far larger part of my work'*

*'Does not cover all the areas we need and is not accurate enough but is a good guide for areas with uniform soil types'*

*'I'd love to see an overlay of GPS points of where each individual soil sample point was actually obtained so we can see it in relation to the site or soil unit'*

*'Great tool and needs to be marketed more widely to the general public who may not be aware of the value that S-map holds for them particularly when purchasing property. This tool should be an integral part of their due diligence'*

*'Appreciate that it is available'*

*'Very useful tool – even for relative novices with soil information'*

**Question 18. What soil survey information (including soil properties) that is currently not available or does not exist yet, would add value to your work?**

Just under a quarter of respondents provided comments. The majority of these comments (~25%) cited more coverage and detail as potential for adding value to their work. Twenty-seven comments noted that soil descriptions and properties would be of value. Providing more information on nutrient leaching, soil engineering or geotechnical data, soil chemistry and hydrology was also highlighted. A sample of the comments is listed below:

*'Relation to spatial attributes – like in old soil maps'*

*'Liquefaction risk, Slope failure risks, etc.'*

*'Hydrological properties, infiltration capacity'*

*'Soil Series names in the areas that are not covered currently'*

*'Indicative permeability as it relates to NZS1547'*

*'We need the most up to date information and we have not found anything to date that gets updated often enough'*

*'Trace Element Concentrations from aqueous extractions; Stable Isotope Assessments - These could be undertaken in conjunction with GNS who have limited data through PETLAB'*

*'Organic matter'*

*'Contour maps and FarmIQ integration'*

**Question 19. If this soil survey information was available, what would it enable you to do? Please indicate the degree to which you agree or disagree with these statements. Using better information would allow us to.....**

Respondents strongly agreed with statements supporting expansion of the availability of soil survey information. Just over 70% agreed that having soil survey information would enable them to make better land management decisions.

**Table 14. Value of more soil information availability**

	<b>1 – Agree</b>	<b>2</b>	<b>3 – Neutral</b>	<b>4</b>	<b>5 – Disagree</b>	<b>Total</b>
Meet increasing complex consumer demands	29.82% 167	22.86% 128	43.57% 244	1.79% 10	1.96% 11	560
Better meet regulatory/policy requirements and respond to regulatory/policy shifts	33.80% 193	28.90% 165	33.80% 193	2.28% 13	1.23% 7	571
Improve the service you provide to clients	38.68% 222	25.78% 148	31.71% 182	1.57% 9	2.26% 13	574
Make better land management decisions	44.73% 259	26.77% 155	25.22% 146	1.90% 11	1.38% 8	579
Assess land use options or potential investment (e.g. precision farming technologies)	36.27% 206	25.18% 143	34.51% 196	1.94% 11	2.11% 12	568
					<b>Answered</b>	596
					<b>Skipped</b>	430

## **Questions 20. Do you have any general comments about soil survey information?**

We received 174 unique responses to this question. Over half the comments expressed appreciation for S-map and were comments on its usefulness. Twenty respondents made suggestions on how to improve S-map online and there were 10 complaints about S-map. There were also comments addressing S-map coverage and scale and the need for S-map training. A sample of the comments follows:

*'Always good to have increasing levels of information. It however needs be made accessible only to suitably experienced practitioners and research persons who have capacity to interpret this information correctly within context of end use. Wide dissemination can prove problematic when in inexperienced or biased hands. Thanks''*

*'This is an incredible service, and is an easy way in for students when considering plant selection for a range of environments'*

*'Quite complex to use which can affect productivity with infrequent use or getting others to undertake the work. A short tutorial tab and tips would be useful'*

*'It is on the right track of what we need to do, need a lot more funding and research into getting it to a level that is accurate for land management decisions'*

*'It is incredibly valuable to have open access and consistent soil spatial information'*

*'Would be very useful to have aerial imagery as a layer and transparency tool'*

## **6 Conclusions**

The survey has highlighted that S-map is a valued and frequently utilised resource used for a large range of applications. Private users, landowners and private business owners, are the largest group of users. Users agree that S-map saves their organisation time, enables a more complete analysis and makes project work easier.

Respondents strongly supported expansion of the availability of soil survey information and articulated a need for improving the coverage and scale – which would enable them to make better land management decisions.

## **7 References**

McIlrath I 2019. S-map indicative benefits. ME Consulting report LCR006.19. 26 pp.