Food and Agriculture Organization of the United Nations

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Toward development of a national digital soil and spectroscopy library framework in Canada

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Centre for Sustainable Soil Management

DALHOUSIE UNIVERSITY 7th Meeting of the Global Soil Laboratory Network (GLOSOLAN)



Centre for Sustainable Soil Management

Members Projects About

Contact

CSSS 2023

Bringing Soil to Life

The Centre's academic and research objectives align with two of Dalhousie's core signature research clusters: **Food Security** and **Clean Tech**, **Energy**, the **Environment**, with broad applications through and towards the cross-cutting theme of **Big Data Science**.

Learn More

Explore Projects



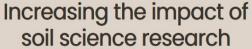


Photo credit: NRCS Soil Health

CSSM Mission <u>https://www.sustainablesoils.ca/</u>

- Established in 2020, the Centre is focused on the study of soils in managed landscapes.
- The Centre will:
 - i) advance scholarship and research;
 - ii) provide a focal point for education and training in the region; and
 - iii) serve as a national data hub for data intensive mapping, understanding, and use of soil-landscape information and the impact of management on those landscapes

The Goal is to *connect* researchers internal and external to Dalhousie (including graduate students), *partner* with government and industry partners and increase the *impact* of our research.



CSSM Outputs

- Hub for the study of soil science and soil management in *agriculture*, *forestry*, *urban land uses*;
- Graduate studies in soil science for Atlantic Canada;
- Undergraduate certificates in *Sustainable Soil Management* and noncredit certificates in *Nutrient Management Planning*;
- Short courses for Certified Educational Units for Professional Agrologists and Certified Crop Advisors;
- Data hub for soils information in Canada and lead national initiatives on digital soil mapping (DSM), regional/national soil spectroscopy, and the application of spatial analysis and modelling techniques (machine learning) to the development of value-added, soil information products and tools.



<u>2022 – 2023 Accomplishments</u>

- The Centre has attracted \$900,000 in operational support through collaborative agreements with NS Department of Natural Resources and Renewables and NS Department of Agriculture.
- The Centre hosted the Annual Meeting of the Canadian Society Soil Science. The theme was "Soils Go Digital". There were 257 attendees from across Canada, presented 157 oral presentations, 67 poster presentations, attended 3 workshops and 2 tours.
- The Centre has supported project proposals totalling over \$6 million in research funding from the Weston Family Foundation, NS Forest Innovation Transition Trust, Net-Zero Atlantic, Natural Resources Canada Forest Innovation Fund, and NSERC Sustainable Agriculture Alliance Grant.



Key Challenges in Data Management

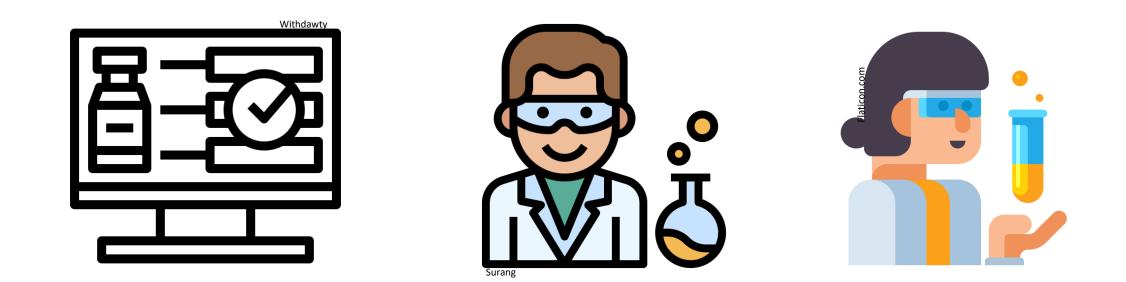
- Samples and data are dispersed across many different stakeholders (provincial/federal govts; academia; commercial);
- Data are housed in different software systems and/or are not uniformly organized in a way that enables easy sharing;
- Lack of standardization in requirement for LIMS and/or inadequate resources-training for data/sample storage;
- Sharing data may be constrained by need for confidentiality, anonymizing, or aggregation;
- Lack of legal structure in government requiring sharing of data acquired with public funds



Sample and Data Management

- Laboratory Information Management Systems (LIMS) are effective tools for large, established, and commercial labs;
- LIMS purchase or building will depend on complexity and quantity of samples and analyses;
- Academic labs may not have funding or scale to purchase LIMS, leading to more ad hoc building of different sample and data analysis tracking and storage;
- Provide some examples of individual academic laboratory and larger project based Excel templates.





Academic Laboratories





- Biosolids study (composted, alkaline, anaerobic digested)
 (2017 to present)
- 60 plots
- Sampling 5 to 6 times each year

 Measuring for: Total & Organic C Inorganic N Mehlich-3: P, K, Ca, Mg, Na, etc. pH Electrical conductivity Trace elements Genomic sequencing Ecological/biological indicators Soil health properties Crop yield





- 15 year alkaline treated biosolids study (2008 to present)
- 48 plots
- Sampling 5 to 6 times each year
- Measuring for: Total & Organic C Inorganic N Mehlich-3: P, K, Ca, Mg, Na, etc. pН **Electrical conductivity Pharmaceuticals** Trace elements Genomic sequencing Ecological/biological indicators Soil health properties Crop yield



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(Site	Year	Sampling	Plot	Sub Plot	Depth	Dried Soil	2.0M KCI	soil extract	Dilution Rate	in blank	undiluted soil	(mg/kg)	soil extract	Dilution Rate	in blank	undiluted soil	(mg/kg)		
1							(g)	(ml)	(mg/l)		(mg/l)	extract (mg/l)		(mg/l)		(mg/l)	extract (mg/l)			
11	1	8	1	10		A	10.0845	30	1.85	1.00	0.00	1.85	4.27	26.86	1.00	0.00	26.86	18.04		
12 13	1	8	1	11 12		A	10.0876 10.0463	30 30	1.82 1.99	1.00 1.00	0.00	1.82 1.99	4.20 4.61	20.10 26.86	1.00 1.00	0.00	20.10 26.86	13.50 18.11		
13	1	8	1	12		A	10.0463	30	1.99	1.00	0.00	1.82	4.01	20.00	1.00	0.00	29.20	19.61		
15	1	8	1	14		A	10.0000	30	1.71	1.00	0.00	1.71	3.98	25.99	1.00	0.00	25.99	17.59		
16	1	8	1	15		A	10.0052	30	2.02	1.00	0.00	2.02	4.70	26.32	1.00	0.00	26.32	17.82		
17	1	8	1	16		A	10.0986	30	1.84	1.00	0.00	1.84	4.24	26.66	1.00	0.00	26.66	17.88		
18	1	8	1	17		Α	10.0739	30	1.84	1.00	0.00	1.84	4.25	24.93	1.00	0.00	24.93	16.76		
19	1	8	1	18		Α	10.0103	30	1.17	1.00	0.00	1.17	2.72	54.87	1.00	0.00	54.87	37.13		
20	1	8	1	19		Α	10.0028	30	1.95	1.00	0.00	1.95	4.54	30.00	1.00	0.00	30.00	20.32		
21	1	8	1	20		A	10.0346	30	2.29	1.00	0.00	2.29	5.31	29.60	1.00	0.00	29.60	19.98		
22	1	8	1	21		A	10.0420	30	1.81	1.00	0.00	1.81	4.20	28.41	1.00	0.00	28.41	19.16		
23	1	8	1	22		A	10.0007	30	2.06	1.00	0.00	2.06	4.80	28.08	1.00	0.00	28.08	19.02		
24	1	8	1	23		A	10.0506	30	2.12	1.00 1.00	0.00	2.12	4.91	24.30	1.00 1.00	0.00	24.30	16.38		
25 26	1	0	1	24 25		A	10.0794 10.0332	30 30	1.83 1.70	1.00	0.00	1.83 1.70	4.23 3.95	23.99 30.14	1.00	0.00	23.99 30.14	16.12 20.35		
20	1	8	1	25		A	10.0532	30	1.81	1.00	0.00	1.81	4.19	24.41	1.00	0.00	24.41	16.43		
28	1	8	1	27		Δ	10.0203	30	1.88	1.00	0.00	1.88	4.13	29.44	1.00	0.00	29.44	19.90		
29	1	8	1	28		A	10.0812	30	1.78	1.00	0.00	1.78	4.11	35.16	1.00	0.00	35.16	23.63		
30	1	8	1	29		A	10.0828	30	1.48	1.00	0.00	1.48	3.42	19.20	1.00	0.00	19.20	12.90		
31	1	8	1	30		A	10.0174	30	1.79	1.00	0.00	1.79	4.16	22.50	1.00	0.00	22.50	15.21		
32	1	8	1	31		Α	10.0131	30	1.87	1.00	0.00	1.87	4.35	23.13	1.00	0.00	23.13	15.65		
33	1	8	1	32		Α	10.2370	30	2.84	1.00	0.00	2.84	6.46	19.59	1.00	0.00	19.59	12.96		
34	1	8	1	33		Α	10.5020	30	2.82	1.00	0.00	2.82	6.25	31.58	1.00	0.00	31.58	20.37		
35	1	8	1	34		Α	10.0906	30	1.33	1.00	0.00	1.33	3.07	39.32	1.00	0.00	39.32	26.40		
36	1	8	1	35		A	10.0209	30	2.12	1.00	0.00	2.12	4.93	15.61	1.00	0.00	15.61	10.55		
37	1	8	1	36		A	10.0800	30	2.99	1.00	0.00	2.99	6.91	19.91	1.00	0.00	19.91	13.38		
38	1	8	1	37		A	10.0360	30	2.00	1.00	0.00	2.00	4.64	25.31	1.00	0.00	25.31	17.08		
39	1	8	1	38		A	10.1040	30 30	5.36	1.00	0.00	5.36	12.35	21.26	1.00	0.00	21.26	14.25		
40 41	1	8	1	39		A	10.0183 10.0448		2.55	1.00 1.00	0.00	2.55 1.65	5.93 3.82	28.51 24.76	1.00 1.00	0.00	28.51 24.76	19.28 16.70		
41	1	8	1	40 41		A A	10.0448	30 30	1.65 3.29	1.00	0.00	3.29	7.64	32.51	1.00	0.00	32.51	21.98		
42	1	8	1	41		A	10.0210	30	1.82	1.00	0.00	1.82	4.21	21.58	1.00	0.00	21.58	14.52		
44	1	8	1	43		Â	10.0864	30	2.21	1.00	0.00	2.21	5.10	22.92	1.00	0.00	22.92	15.39		
45	1	8	1	44		A	10.0337	30	1.78	1.00	0.00	1.78	4.13	42.48	1.00	0.00	42.48	28.68		
46	1	8	1	45		A	10.0495	30	2.21	1.00	0.00	2.21	5.12	18.81	1.00	0.00	18.81	12.68		
47	1	8	1	46		A	10.0149	30	1.73	1.00	0.00	1.73	4.02	20.83	1.00	0.00	20.83	14.09		
48	(1	8	1	47		Α	10.01 7	30	2.19	1.00	0.00	2.19	5.09	23.06	1.00	0.00	23.06	15.60		
4	Bi	iomass an	d Grain Yield	Mineral N	pH MC	Samplin	g Dates Inp	outs Lime	+				: (

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2 id 3 g_p	Sample ID Good or Poor soil	\mathbf{h}		NB010G NB01FP	29-Aug	14.2 78	8.7 7.2 M 23	35 20 26	4 60 ####	100 76.6 100 45.7	90 443.97 55 358.02	25 3.8	60 8.7	70 #### 95	58.9 5 52.3 48.9 10 103.8	75 5 5 174	348	84 3.2 11 74 2.7 11	51 Low 49 Low	40 135 26 112	63 0.7	3.8 22 10	017 6.		18 63.2 9.4 36.2	14.9 50.4	2.2 82.9	-
4 fcan 5 sand	F. candida bioassay Percent sand						0.0 7.2 C 3 3.9 5.1 C 3	00 5 30 00 5 30		100 77.4 95 95.1	75 887.07 95 827.36				21.0 ## 48.1 33.6 30 46.5	75 6 100 344 70 6 65 207		30 1.3 56 28 1.4 56	77 High 71 High	25 48 22 77				9 14 0.9 9 11 1.1	21 68.5 16.1 70.7			1388 1369
6 silt 7 clay	Percent silt Percent clay			NB03FP	30-Aug	57.4 32	5.1 ### C 13 2.4 ### C 2	71 10 30) 55 ###	95 73.4 80 41.7	70 ###### 25 124.72	2 5 1.6		10 #### 5	#### 0 232.4 22.3 95 24.9	100 7 90 302 10 5 0 35	124	28 14.2 11 14 0.7 56	75 High 31 Very low	276 661 28 51	30 0.2	0.4 24 2	213 6.		9.5 83.7 4.6 16.8			2205
8 txt 9 c_	Texture class (medium, denotes Cornell score	, coarse)		NB04FP	31-Aug	30.4 59	8.2 ### M 2 9.2 ### M 3	00 <mark>5</mark> 30) 45 ###	85 75.9 100 42.0	90 503.86 55 480.17	30 3.5	40 8.5 45 6.6	40 #### 75	46.3 10 66.4 #### 0 91.3	90 6 40 195 100 6 65 237	234	89 1.5 11 28 7.8 56	48 Low 51 Low	23 106 21 233		3.8 15 18	804	9 12 1.4 7 11 2.1	13.2 74.9 17.4 79.7	9.7 0	0.8 99.2	1092 953
10 srf 11 subsrf	Surface Hardness Subsurface Hardness			NB05FP	31-Aug	57.9 35	I.9 8.2 C 19	73 10 30) 55 ###	60 48.6 75 90.2	55 679.53 90 703.87	85 4.8		65 #### 85	33.6 25 47.3 27.5 35 42.3	70 6 75 123 45 6 95 150	241 1	49 1.2 56 11 1.3 11	58 Medium 61 Medium	24 77 28 63	51 0.6	1.2 17 19	58 7.	1 11 1.2 1 11 1	9.7 88.2 11.1 86.9	0		1142
12 awc 13 wsa	Avail. Water capacity Water-stable aggregate	S		NB06FP		47.7 44	I.1 9.2 M 21 I.0 8.4 M 21 S.7 6.1 C 11	90 <mark>5</mark> 30) 45 ###	50 40.5 80 63.3	45 510.23 75 531.21 45 722.41	40 4.6	80 9.1	75 #### 100	#### 0 109.6 25.8 45 66.4 23.6 50 48.1	100 6 100 208 85 5 0 154 70 7 100 143	383	45 4.1 56 43 1.2 56 33 0.8 56	52 Low 57 Medium 68 Medium	24 447 46 59 22 54	80 0.4	1.9 19 10	19 6.	2 14 2 7 10 1.7 3 15 0.8	12.2 85.1 12.4 49.2 7.9 77.6	34.8	0.7 99.3 1.9 63.3 0.6 86.3	1192
14 act_c 15 om	Active carbon Organic matter ACE soil protein			NB07FP	01-Sep	42.9 45	5.7 5.1 C 13 5.8 ### M 10 5.9 5.1 C 2	67 <u>50</u> 29	3 45 ###	85 57.7 70 58.9 70 58.4	45 722.41 75 422.96 45 533.08	20 4.4	75 7.1	50 #### 100	23.0 50 48.1 8.7 ## 41.5 45.4 10 48.1	70 7 100 143 55 6 10 72 70 7 100 88		33 0.8 56 24 0.8 56 99 2.7 11	59 Medium 47 Low	22 54 21 20 27 104	50 0.4	0.7 13 14	73 6.	3 15 0.8 B 11 1 3 16 0.8	7.9 77.0 5.7 69.7 4.5 74	22.7	0.0 80.3 0.9 76.4 0.7 79.3	859
16 ace 17 resp 18 p	Soil respiration Phosphorus			NB08FP	02-Sep	79.6 16	0.3 4.1 C 2 7.8 4.1 C 2	95 <mark>5</mark> 30) 55 ###	65 76.0 70 75.2	75 598.98 75 568.60	65 5.3	90 12.3	75 #### 95 45 #### 65	#### 0 60.6 56.7 10 49.0	85 6 80 212 70 6 50 102	199	52 19.3 11 64 1.8 11	58 Medium 51 Low	37 419 27 130	73 0.5	4.2 23 12	27	7 8 1.9 7 8 1.6	21.5 74.6 10.5 86.5	0	2 98	1367 1072
19 k 20 ph	Potassium			NB09FP	02-Sep	49.6 42	2.2 8.2 M 10 8.9 4.1 C 20	60 50 28	5 55 ###	80 78.0 100 90.6	90 593.05 85 870.96	50 4.3		85 #### 100	39.7 15 43.2	60 6 50 95 100 6 65 150	320	92 1.9 11 95 8.9 11	60 Medium 68 Medium	39 91	52 0.5		530	7 9 1.3 7 11 3	9.1 87.7		1.9 98.1 1.5 98.5	1014
	Magnesium			NS01FP	11-Aug	56.0 41	1.0 3.1 C 20	85 10 30) 55 ###	100 93.0 100 26.8	85 825.03	90 6.4	95 17.8		62.9 5 180.1 51.5 10 98.0	100 6 75 136 100 7 100 463	303 1	01 6.9 11 99 2.5 11	68 Medium 47 Low	39 144 191 118	217 1.4	3.2 26 10	95 6.	9 11 4.1 4 16 1.6	9.9 74.1 24.8 55.2		1.5 88.1 5.3 81.6	1075
	Manganese			NS02FP	23-Aug	20.3 61	1.9 ### M 21	24 25 29	45 ###	100 57.7 50 52.2	70 ##### 40 798.83	100 19 90 4.6	100 26.4 1	100 #### 100	25.8 45 160.2 #### 0 94.6		474	30 4.7 56 84 3.4 11	71 High 63 Medium	337 59 31 540	193 2.2	2 144 19	35 6.	6 24 1.7 4 19 1.3	31 40.8 10.4 82.9		5.2 73.5 0.7 94.6	765
25 c_micr	Cornell micronutrients r Cornell score	ranking		NS03FP			0.4 1.0 C 2	26 25 30 00 5 30		50 62.1 100 62.7	55 621.01 80 528.49		70 11.2 90 8.1	65 #### 70 60 #### 100	29.7 35 54.8 53.2 10 126.2	60 6 80 71 100 5 0 398	157	65 1.6 11 32 1.7 56	54 Low 57 Medium	17 68 29 122	66 0.5 152 0.5			7 7 2 1 20 1.6	8.4 88.5 16.5 27.6	-		1394 1304
	Cornell ranking (very low	w, low, medi	um, high	NS04FP	25-Aug		7.2 3.0 C 1			35 67.1 25 25.3	65 649.10 10 352.04				51.1 10 30.7 #### 0 99.6	20 6 60 141 100 6 95 142		12 1.1 56 29 2.7 56	54 Low 38 Very low	20 117 15 689				7 10 0.8 7 8 3.3	12.1 48.9 15.1 80.8			1611 1806
29 p2o5_ 30 k2o_re	eP205			NS05FP			5.4 4.1 C 2 1.1 5.1 C			65 35.1 15 31.8	15 649.55 15 334.09				#### 0 253.2 ##### 0 273.9	100 7 100 283 100 6 80 160		45 4.3 56 54 5.7 11	57 Medium 43 Low	21 570 40 730		11.2 18 1 9 26 1		1 15 4.4 7 9 7.8	16.1 60.8 14.8 75.4			1689 1855
31 b_res 32 cu_res	Boron				25-Aug 26-Aug		0.2 7.1 C 2	95 5 30) 55 ###	45 11.6 60 18.1	5 462.74 5 188.11				#### 0 128.7 #### 0 118.7	100 6 75 205 100 7 100 219		49 4.9 56 81 4 11	41 Low 38 Very low	19 532 18 464				2 10 3.3 1 13 2.4	17.1 78.8 14.1 61.1		0.8 99.2 0.6 77.6	930 1226
33 s_res 34 ca_res	Sulphur		1				7.1 4.0 C 2 7.7 4.1 C 3			35 44.9 100 84.1	25 118.54 80 463.94		15 3.6 65 9.4		#### 0 166.0 53.2 10 78.0	100 7 100 156 100 5 5 148		62 3.1 11 81 1.8 11	33 Very low 52 Low	19 655 25 122				1 10 4.2 B 9 2.3	12.7 60.4 14.4 54.1	0 27.9	0.8 77.3 1.3 70.8	1843 805
35 buf_ph 36 cec	Buffer pH						7.7 7.1 M 3	00 6 30) 45 ###	100 89.5 90 88.6	95 378.62 90 540.73	2 15 4.3 55 4.1	70 9.3 75 11.2		25.8 45 49.8 60.2 5 146.9	75 5 0 126 100 6 10 132		20 1.4 11 27 2.6 11	53 Low 55 Low	24 59 16 138	60 0.4		73 6. 80	5 10 1.3 7 5 6.9	10.3 28.2 20.2 71.6	59.1 0	1 39.8 1.3 98.7	1297 1052
37 per_k	Buffer potassium Buffer Magnesium	/		NS09FP	08-Sep	47.4 45	5.5 7.1 C 18	80 <u>45</u> 30		90 64.7 100 87.9	55 446.76 95 444.52		50 7.4 55 7.9		13.1 ## 34.9 61.1 5 73.9	30 6 50 123 95 5 0 131		29 0.8 11 38 2.4 56	53 Low 53 Low	19 30 19 140				1 6 1.4 7 10 2	16.5 80.8 11.4 48.1	-	1.3 98.7 0.9 61.5	631 1096
39 per_ca	Buffer calcium Buffer hydrogen				09-Sep 09-Sep		0.0 5.1 C 20			95 84.1 100 96.8	80 610.94 90 790.99		85 11.3 100 16.2		#### 0 161.0 #### 0 147.8	100 7 100 209 100 7 100 193		63 9.6 11 62 14 11	63 <mark>Medium</mark> 72 High	23 550 27 417		2.8 25 23	314 7.	2 17 2.4 2 17 2.2	10.1 66.9 9.3 69.8	-	0.6 79.4 0.7 81.3	850 1270
41 per_na	Buffer sodium Total buffer percent						8.4 7.2 C 20			100 95.6 100 89.7	90 909.98 90 980.35	95 10 100 5.5			43.2 10 37.4	100 6 95 287 40 7 100 322		61 19.1 11 31 1.4 56	71 High 70 High	50 502 22 99		0.0 00 11		9 14 5.9 1 14 0.7	16.9 67.2 19.3 62.7			1298 1472
	Aluminum	/					7.8 4.1 C 23			100 92.7 70 70.2	90 576.50 70 492.67		70 10.5 35 7.8	55 #### 90 35 #### 40	30.6 30 25.7 83.4 0 73.1	10 6 50 160 95 6 55 67		26 0.6 56 47 1 56	56 Medium 49 Low	26 70 25 191			68 6. 68	971 754	20.3 58.6 11.9 81.8			1439 1497
45 46				PE01FP	15-Aug 16-Aug		8.6 6.6 C 20 7.2 6.1 C 18			70 70.2 95 58.1	70 498.51 50 546.65	50 3.1	55 9.0 60 9.0	50 #### 45 50 #### 65	75.9 5 37.4 #### 0 93.0	35 6 15 86 100 6 95 126	194 179	58 1.3 11 59 1 11	41 Low 57 Medium	20 174 17 346			74 6. 31 7.		12.6 41.8 12.3 84			1300 1329
47 48				PE03GG	16-Aug 16-Aug		I.3 8.2 M 2 I.7 5.6 C 2	78 10 30) 55 ###	100 53.9 100 86.5	65 532.57 85 599.55	65 4.4	50 8.4 80 12.0		#### 0 114.6 #### 0 49.0	100 6 50 100 75 6 75 111		63 1.1 11 89 3.9 11	47 Low 60 Medium	22 309 18 231	138 0.7 59 0.5		219 6. 279	9 9 3.5 7 8 1.7	9.8 71.5 12.3 85	14.1 0		1355 1132
49 50				PE04GG	16-Aug		5.6 5.1 C 20			95 65.3 100 89.6	55 523.62 90 690.29			75 #### 80		60 7 100 192 95 6 65 240		82 1.9 11 76 2.4 11	46 Low 63 Medium	19 248 37 197		4.9 18 10		9 9 2.1		13.3	1.8 85	1156 1367
51 52				PE04FP PE050G	18-Aug	48.9 43	I.5 9.2 M 2 B.1 8.0 M 1	02 80 30) 45 ###	90 46.3		65 4.4	75 15.2 1 75 10.8	90 #### 65		100 7 100 167	300	44 1.3 56 63 2.2 11	61 Medium 65 Medium	26 313	180 1.1	3.4 20 25	515 7.	3 17 2.3	14.8 38.5 8.2 74.3	0	1.3 54.8 0.7 84.8	973
53 54				PE05F P PE06G G	18-Aug		2.8 ### M 14 3.9 ### C 23						65 9.6 85 17.7		#### 0 99.6 99.5 0 95.5	100 7 100 133 100 6 55 153		46 2 56 37 1.2 56	59 Medium 63 Medium			3.5 22 22 0.5 26 10		3 14 1.8 B 9 2.6	7.9 80.4 13.5 57.6		0.7 90.1 0.9 73.7	
55 56				PE06FP PE07GG	18-Aug	65.0 30	1.6 ### C 20 0.4 4.6 C 2	77 10 30) 55 ###	65 38.7	20 398.08	30 2.3	40 6.6 30 6.0	25 #### 35	#### 0 87.2 #### 0 144.4	100 7 100 157	148	36 0.9 56 47 1.4 56	46 Low 44 Low	17 305 26 488	174 0.5		24 7.		14 81.4 11.7 63.9	0	1.1 98.9 1 78.9	1472
57 58				PE07FP PE08GG	19-Aug	49.8 38	4.8 7.6 C 28 3.8 ### M 14	41 65 29	3 45 ###	65 15.0	15 482.13	30 4.4	0 5.5 75 6.8	45 #### 25	#### 0 181.0 #### 0 171.0	100 7 90 162	184	61 1.3 11 62 1.9 11	35 Very low 47 Low	21 539 28 556	206 0.5		274 7.		6.8 64.5 10.2 85.6	0	1.1 77).9 99.1	1413
59 60				PE08FP PE09CG	19-Aug	63.3 30	1.0 9.4 C 30 0.0 6.7 C 2	35 25 30) 55 ###	80 51.8	35 603.57	65 3.8	55 7.7 65 11.6	70 #### 45	#### 0 217.5	100 7 100 121 100 6 95 211	294	67 1.7 11 47 8.1 56	47 Low 58 Medium	27 591 22 430	262 0.6	1.7 25 12	296 7.		7.4 74 19.8 72.9	0	0.9 84.6 1.1 99	1461
61 62				PE09FP PE100G			I.0 6.2 C 1						85 15.1 25 6.2		#### 0 115.4 #### 0 98.8			43 4.1 56 49 2.4 56	61 Medium 46 Low	24 308 15 412	119 0.9	1.4 26 2.5 11 10	33 7.	164		0	1 99	1772
63 64				PE10FP PE110G	15-Sep	63.2 28	8.1 8.7 C 1	58 55 30) 55 ###	95 28.7	10 370.43	25 2.5	35 7.0 40 8.4	35 #### 40	#### 0 101.3 #### 0 208.4	100 6 80 121	152	17 1.5 56 77 2.9 11	49 Low 55 Low	20 284 17 489	122 1.1	1.2 14 1 ⁻ 1.7 15 10	30 6.	9 8 3.2	12.3 68.9	14.6	1.1 84.4 0.6 79.4	
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6 NB02)-Aug veg	y_u	38 f	y V	20 n	y n	n	NB02F NB03G	2 2	2 4	2	4	2 4	2 4	2	4	4 4	4	4 4	4 11	6	0 65	35	0		
7 NB03)-Aug veg	y_u	38 f	y	2 n	y n	n	NB03P	0 (0 0	0	0	2 2	0 0	0	0	0 0	2	2 0	0 0	4	13 0	24	76		
8 NB04		I-Aug field_cro	•	60 m	-	40 y	у у	n	NB04G	4 4	4 4		4	4 4	4 4	2	2	2 4	4	4 2	4 12	4	0 75	25	0		
9 NB04		1-Aug field_cro		60 m		40 y	у у	n	NB04P	0 (0 4	_	2	2 4	2 4	2	2	2 2	2	2 0	2 3	10	3 19	63	19		
10 NB05 11 NB05		1-Aug dairy 1-Aug dairy	n n	35 m 35 m			n y n v	y	NB05G NB05P	4 4	4 2 2 2	4	2	4 2 4 2	4 2	2	2	2 2	2	4 2	2 6	11	0 35 4 12	65 65	0 24		
12 NB05		##### dairy	n	39 m	y V	9 n	v v	y n	NB05F	4 4	4 4	-	2	4 4	0 4	2	4	2 2	2	4 2	4 9	6	1 56	38	6		
13 NB06		##### dairy	n	39 m	y	9 n	y y	n	NB06P	0 4	4 4	4	4	2 2	2 0	2	2	2 2	4	2 2	2 5	10	2 29	59	12		
14 NB07		#### veg	y_u	47 f	у	18 y	у у	у	NB07G	2 4	4 4	4	4	4 4	4 4	2	2	2 2	4	4 2	4 11	6	0 65	35	0		
15 NB07		##### veg	y_u	47 f		18 y	у у	у	NB07P	0 (0 2		4	0 4	0 0	2	0	2 2	4	2	0 3	5	7 20	33	47		
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17 NB08 18 NB09		##### dairy ##### dairy	n n	34 m 66 m	-	13 n 48 n	n n v v	y n	NB08P NB09G	2 4	4 2	4	4	4 2	4 2	2	2	2 4	4	4 2	4 5	8	2 29 0 53	59 47	0		
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20 NS01	NS 11	1-Aug veg	y_u	40 m		12 n	y y	n	NS01G	2	4 4	4	4	4 4	4 4	2	2	2 2	4	4 2	10	6	0 63	38	0		
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26 NS04		5-Aug beef_sh		43 m	y	16 n	n n	n	NS04G	2 (0 2	2	2	2 4	0 2	2	0	2 4	4	4 4	4 6	8	3 35	47	18		
27 NS04	NS 28	5-Aug beef_sh		43 m	у	16 n	n n	n	NS04P	0 (0 0	4	4	0 0	0 0	2	0	0 2	2	0 2	2 2	5	10 12	29	59		
28 NS05		5-Aug veg	n	31 m	n	5 n	n y	n	NS05G	4 2	2 2	4	4	4 2	4 2	4	4	2 2	2	4 2	4 9	8	0 53	47	0		
29 NS05		5-Aug veg	n	31 m	n	•	n y	n	NS05P	0 2	2 4	2	0	2 4	2 2	2	2	2 2	2	2 2	2 2	13	2 12 0 59	76	12		
30 NS06 31 NS06		5-Aug veg 5-Aug veg	n n	55 m 55 m		30 n 30 n	y y v v	n n	NS06G NS06P	2 4	+ 2 1 0	4	4	4 Z	4 4 1 4	4	2	∠ ∠ 2 2	4	+ <u>2</u> 2 2	4 10	8	0 59 4 8	41 62	31		
32 NS07		6-Aug veg	n	27 m	n		y y n y	n	NS07G	4 4	4 4	4	2	4 4	4 2	2	4	4 2	2	4 2	4 11	6	0 65	35	0		
33 NS07		6-Aug veg	n	27 m	n	-	n y	n	NS07P	0 (0 0	4	2	4 0	4 0	0	2	2 2	2	2 0	2 3	7	7 18	41	41		
34 NS08		#### beef_sh	•	43 m		18 n	у у	у	NS08G	4 2	2 2	2	2	2 4	4 2	2	2	4 4	4	4 4	4 9	8	0 53	47	0		
35 NS08		#### beef_sh		43 m		18 n	у у	у	NS08P	0 2	2 2	2	2	0 4	4 0	0	0	2 2	4	2 2	2 3	9	5 18	53	29		
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37 NS09 38 NS10		##### veg	y_u y_u	53 f 64 f	n n	10 n 8 y	y y V V	n n	NS09P NS10G	2	2 2	2	4	2 4 4 2	0 2	2	2	→ <u>∠</u> 2 2	4	4 2 2	4 3	13	2 38 1 18	50 76	13		
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40 NS11		#### veg	y_c	61 m	n	45 n	у у	у	NS11G	2 4	4 4	4	4	4 2	4 4	2	4	4 2	4	4 4	4 13	4	0 76	24	0		
41 NS11	NS #	#### veg	y_c	61 m	n	45 n	у у	у	NS11P	2 4	4 4	4	4	4 2	4 4	2	4	4 4	4	4 4	4 14	3	0 82	18	0		
42 NS12	NS #	#### beef_sh	eep n	57 f	n		n n	У	NS12G		2 2	4	4	4 4	4 2		2	4 4	4	4 4	4 11	5	0 69	31	0		
		#### beef_sh 5-Aug field_cro		57 f 53 m	n n		n n v v	y n	NS12P PE01G	2	2 2 4 4	4	4	4 4	4 0		0	4 4 2 <i>1</i>	4	4 4	4 11 4 11	2	3 69 0 65	13 35	19 0		
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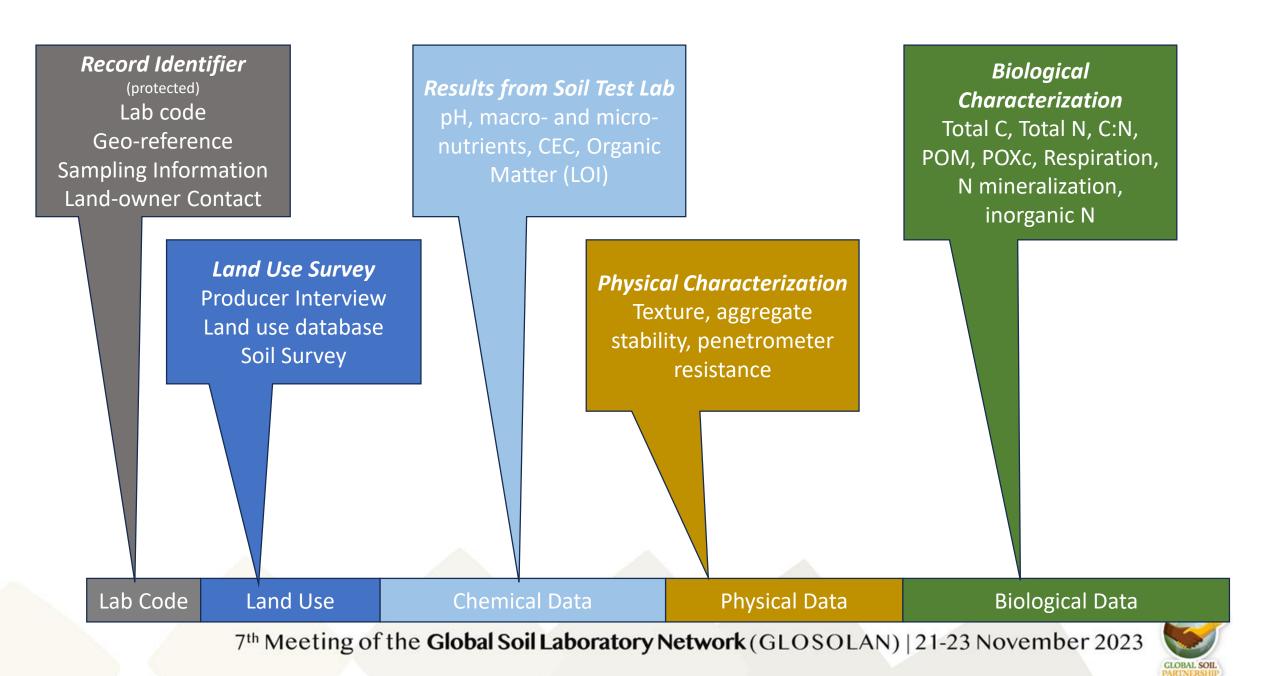


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2 19-056978 3 19-056978			TSOIL19_001_A_1_AN TSOIL19_001_B_1_AN				14.00 0.00 19.00 0.00		.50 11.10 46.70 .60 4.30 15.10	20.10 #### #### 9.80 9.80 #### #### ####		Coarse Fine	1.97 0.05 1.91 0.08		1 0.09 0.1 9 0.09 0.1			1.27 9.50 1.55 7.74	62 29	11.0 16.0
4 19-056978 5 19-056978			TSOIL19_001_C_1_AI TSOIL19_003_A_1_AN				26.00 0.00 15.00 2.10		.50 3.90 14.40 .30 7.20 12.80		,	Fine	1.93 0.07 1.66 0.06		0 0.10 0.1			1.49 10.21 1.57 8.45	41 32	15.0 19.0
6 19-056978	19-056978-00	2 TSOIL19_003_B_1	TSOIL19_003_B_1_AM	N 13.20 ######	105.00	275.00 1	12.00 2.60	3.80 6	.20 12.00 14.50	8.20 #### ####	# Loam	Medium	1.27 0.04	1.23 2.12 6	5 0.09 0.0	07 0.07 10.50 6.60	0 5.95	1.64 8.45	40	14.0
7 19-056978 8 19-057500			TSOIL19_003_C_1_AI TSOIL19_004_A_1_AN				15.00 0.60 17.00 0.70		.20 4.90 9.40 .30 7.60 20.30			Fine Fine	1.67 0.12 1.99 0.06	1.55 2.67 9 1.94 3.34 2	0.07 0.0 0.13 0.13 0.1			1.58 7.74 1.36 13.38	29 55	18.0
9 19-057500 10 19-057500			TSOIL19_004_B_1_A			377.00 1	16.00 1.00 17.00 0.80		.60 7.20 16.80 .20 7.20 15.30			Fine	2.40 0.07 2.33 0.07	2.33 4.02 4 2.27 3.91 4	5 0.11 0.0 1 0.11 0.0			1.50 17.60 1.48 22.18	71 83	
11 19-057500	19-057500-00	3 TSOIL19_005_A_1	TSOIL19_004_C_1_AI TSOIL19_005_A_1_AN	N 20.00 #######	166.00	470.00 1	19.00 4.60	5.10 5	.00 8.90 12.40	6.50 #### ####	# Clay loam	Fine	1.53 0.04	1.49 2.57 8	3 0.08 0.0	07 0.16 18.60 6.59	9 5.99	1.55 6.69	24	
12 19-057500 13 19-057500			TSOIL19_005_B_1_AM TSOIL19_005_C_1_AM			496.00 2 485.00 3			.60 7.10 10.80 .50 7.00 11.00		,	Fine	1.96 0.05 2.14 0.05		3 0.09 0.0 0 0.08 0.0			1.50 10.91 1.51 13.38	44 55	
14 19-056978	19-056978-00	3 TSOIL19_006_A_1	TSOIL19_006_A_1_AM	N 21.90 ######	234.00	481.00 6	60.00 2.80	1.80 4	.00 5.60 8.30	6.20 #### ####	# Clay	Fine	2.40 0.51	1.89 3.26 2	1 0.06 0.0	04 0.20 25.30 7.23	3 7.15	1.64 20.42	79	27.0
15 19-056978 16 19-056978			TSOIL19_006_B_1_AN TSOIL19_006_C_1_AN			549.00 3 560.00 3	39.00 3.70 35.00 0.90		.00 4.90 7.70 .90 5.40 9.60			Fine Fine	2.70 0.23 1.71 0.10	2.46 4.24 5 1.61 2.78 1	2 0.09 0.0 1 0.09 0.0			1.39 14.78 1.45 14.08	61 58	28.0 24.0
17 19-056978 18 19-056978	19-056978-00	2 TSOIL19_007_A_1	TSOIL19_007_A_1_AM	N 21.90 ######	167.00	518.00 3	30.00 2.10 31.00 0.90	1.80 3	.20 6.20 9.60 .10 6.90 11.30			Fine	1.79 0.42 2.12 0.13	1.36 2.34 5 2.00 3.45 2	5 0.08 0.0 6 0.07 0.0			1.63 5.63 1.58 8.45	19 32	14.0 19.0
19 19-056978			TSOIL19_007_B_1_AN TSOIL19_007_C_1_AN			450.00 3			.40 6.90 11.30		,	Fine	1.90 0.05		9 0.09 0.0			1.56 8.45	27	17.0
20 19-057500 21 19-057500			TSOIL19_008_A_1_AN TSOIL19_008_B_1_AN				32.00 1.00 25.00 1.20		.70 6.10 12.70 .40 5.10 11.50		and a reality	Fine Fine	1.57 0.04 1.63 0.04	1.54 2.65 9 1.59 2.74 10	0.11 0.0 0 0.10 0.0			1.70 8.45 1.47 8.45	32 32	
22 19-057500	19-057500-00	2 TSOIL19_008_C_1	TSOIL19_008_C_1_A	N 20.60 ######	163.00	512.00 2	23.00 0.60	0.60 1	.30 5.10 10.50	7.40 #### ####	# Clay	Fine	1.59 0.04	1.55 2.67 9	0.10 0.0	08 0.12 16.60 6.61	1 5.85	1.54 9.15	35	
23 19-056978 24 19-056978			TSOIL19_009_A_1_AN TSOIL19_009_B_1_AN				19.00 1.00 19.00 1.70		.50 8.50 14.90 .50 6.70 11.90			Fine	1.73 0.04 1.98 0.04		3 0.13 0.0 3 0.13 0.0			1.25 13.02 1.25 15.49	54 64	18.0 18.0
25 19-056978	19-056978-00	3 TSOIL19_009_C_1	TSOIL19_009_C_1_A	N 19.70 ######		427.00 2			20 10.60 18.40			Fine	2.22 0.04	2.18 3.76 3	6 0.11 0.0			1.11 17.60	71 54	21.0
26 19-056978 27 19-056978			TSOIL19_011_A_1_A TSOIL19_011_B_1_A			328.00 2 313.00 2			.70 7.00 13.30 .00 7.10 14.90		and) realin	Fine	2.06 0.05 1.93 0.04		7 0.11 0.0 1 0.10 0.0			1.41 13.02 1.43 8.45	54 32	20.0
28 19-056978 29 19-056978			TSOIL19_011_C_1_AI TSOIL19_012_A_1_AN				19.00 0.50 21.00 0.80		.00 7.40 14.50 .30 7.00 13.50			Fine	2.05 0.04 2.08 0.05		7 0.10 0.0 8 0.06 0.0			1.55 11.97 1.55 11.62	49 47	21.0 22.0
30 19-056978	19-056978-00	1 TSOIL19_012_B_1	TSOIL19_012_B_1_AM	N 23.10 #######	182.00	502.00 2	24.00 0.40	0.80 3	.30 5.90 11.70	5.40 #### ####	# Clay	Fine	2.18 0.05	2.13 3.67 3	3 0.09 0.0	07 0.17 7.40 6.37	7 5.74	1.37 12.32	50	28.0
31 19-056978 32 19-056978			TSOIL19_012_C_1_AI TSOIL19_013_A_1_AN				21.00 0.60 17.00 1.40		.10 5.70 10.10 .90 6.30 9.10		# Clay # Clay	Fine	2.02 0.04 2.32 0.24		5 0.08 0.0 0 0.10 0.0			1.43 10.21 1.39 19.01	41 75	22.0
33 19-056978	19-056978-00	2 TSOIL19_013_B_1	TSOIL19_013_B_1_AN	N 22.20 ######	267.00	444.00 1	18.00 1.00	0.90 3	.00 6.00 10.00	5.30 #### ####		Fine	1.96 0.19	1.76 3.03 1	6 0.08 0.0	05 0.15 27.40 7.80	0 7.16	1.50 7.74	29	20.0
34 19-056978 35 19-056978			TSOIL19_013_C_1_AI TSOIL19_014_A_1_AN			471.00 1 388.00 2	19.00 1.00 23.00 0.30		.70 5.90 10.70 .30 4.70 10.40			Fine Fine	2.00 0.09 1.98 0.04		2 0.11 0.0 3 0.09 0.1			1.43 15.84 1.63 10.56	65 42	17.0
36 19-056978 37 19-056978			TSOIL19_014_B_1_AM TSOIL19_014_C_1_AM				22.00 0.30 21.00 0.30		.10 3.70 8.50 .10 4.70 11.60			Fine	1.92 0.04 1.94 0.04		0 0.10 0.1 2 0.10 0.1			1.29 9.50 1.45 10.21	37 41	18.0 14.0
38 19-056978			TSOIL19_014_C_1_A			459.00 1	15.00 0.50	0.90 1	.70 4.40 9.80	5.10 #### #### ####	,	Fine	1.86 0.05	1.81 3.12 1	8 0.06 0.0	05 0.14 12.80 7.41	1 6.91	1.60 13.02	54	20.0
39 19-056978 40 19-056978			TSOIL19_015_B_1_AN TSOIL19_015_C_1_AN				15.00 0.30 16.00 0.60		.50 5.10 11.20 .00 4.40 11.50			Fine	1.74 0.06 1.78 0.04		3 0.06 0.0 5 0.07 0.0			1.59 13.38 1.51 12.67	55 52	23.0
41 19-057500	19-057500-00	0 TSOIL19_016_A_1	TSOIL19_016_A_1_AN	N 23.10 ######	212.00	448.00 2	20.00 0.20	0.20 1	.20 3.30 6.80	4.40 #### ####	# Clay	Fine	1.84 0.04	1.80 3.10 1	7 0.12 0.0	08 0.15 12.50 6.22	2 5.44	1.51 4.22	12	
42 19-057500 43 19-057500			TSOIL19_016_B_1_AN TSOIL19_016_C_1_AN				20.00 0.50 19.00 0.70		.00 3.20 7.50 .30 3.20 6.60			Fine Fine	1.89 0.04 2.02 0.04	1.85 3.19 1 1.99 3.43 2	9 0.13 0.0 6 0.15 0.0			1.55 8.45 1.54 9.15	32 35	
44 19-057500 45 19-057500	19-057500-00	0 TSOIL19_017_A_1	TSOIL19_017_A_1_AM TSOIL19_017_B_1_AM	N 22.40 ######	222.00	440.00 2 417.00 2	24.00 0.70 21.00 1.00	0.50 1	.50 3.30 6.00 .50 4.00 7.60			Fine	1.97 0.03 2.05 0.04	1.94 3.34 2 2.01 3.47 2	3 0.12 0.0 7 0.11 0.0			1.45 9.50 1.51 12.67	37 52	
46 19-057500	19-057500-00	0 TSOIL19_017_C_1	TSOIL19_017_C_1_A	N 22.40 ######	220.00	470.00 2	23.00 0.20	0.80 0	.90 3.80 8.70	5.20 #### #### ####	# Clay	Fine	1.82 0.03	1.78 3.07 1	6 0.11 0.0	07 0.13 17.60 6.40	5.60	1.34 9.15	35	
47 19-057500 48 19-057500			TSOIL19_019_A_1_AN TSOIL19_019_B_1_AN			106.00 1 209.00 1			.70 9.50 49.60 .20 5.50 33.30			Coarse Medium	1.63 0.19 1.98 0.04		2 0.06 0.0 4 0.12 0.1			1.52 11.26 1.68 13.02	70 61	
49 19-057500	19-057500-00	0 TSOIL19_019_C_1	TSOIL19_019_C_1_A	N 5.21 ######	97.20	77.50 1	10.00 0.00	0.00 1	.50 8.50 63.10	13.60 #### 5.00 8.30	0 Loamy fine sand	Coarse	1.33 0.03	1.30 2.24 2	5 0.07 0.1	10 0.05 33.80 6.76	6.09	1.19 7.74	54	
50 19-056978 51 19-056978			TSOIL19_020_A_1_AN TSOIL19_020_B_1_AN				20.00 0.30 13.00 0.30		.90 37.50 28.80 .50 41.00 26.80			Coarse Coarse	1.78 0.06 1.74 0.03		8 0.05 0.0 8 0.06 0.0			1.47 15.49 1.39 12.32	83 73	18.0 15.0
52 19-056978 53 19-056497	19-056978-00	1 TSOIL19_020_C_1	TSOIL19_020_C_1_A	N 13.10 ######					50 31.80 21.40	2.60 #### #### #### 29.40 #### ####		Coarse am Medium	2.20 0.03 3.54 1.23	2.17 3.74 7 2.32 4.00 8	6 0.07 0.0 2 0.03 0.0			1.37 20.42 1.49 7.39	91 52	22.0
54 19-056497	19-056497-00	4 TSOIL19_021_B_1	TSOIL19_021_A_1_AN TSOIL19_021_B_1_AN	N 21.50 ######	44.50	184.00 1	13.00 0.00	0.10 0	.70 2.10 27.80	28.90 #### ####	# Very fine sandy loa	am Medium	3.02 1.02	2.00 3.45 6	7 0.03 0.0	07 0.21 13.70 7.91	1 7.36	1.34 7.04	50	18.0
55 19-056497 56 19-056978			TSOIL19_021_C_1_AI TSOIL19_022_A_1_AN				13.00 0.00 16.00 0.00			36.10 #### #### #### 1.80 8.50 #### ####		am Medium Fine	3.46 1.19 2.48 0.05		0 0.04 0.0 1 0.08 0.0			1.25 7.74 1.51 22.53	54 83	21.0 29.0
57 19-056978	19-056978-00	0 TSOIL19_022_B_1	TSOIL19_022_B_1_AN	N 28.90 ######	281.00	637.00 2	24.00 0.00	0.00 0	.70 1.40 2.50	1.30 5.90 #### ####	# Clay	Fine	2.17 0.04	2.13 3.67 3	3 0.11 0.0	07 0.25 28.70 6.98	B 6.43	1.38 17.60	71	24.0
58 19-056978 59 19-056978			TSOIL19_022_C_1_AI TSOIL19_024_A_1_AN				18.00 0.30 15.00 0.00		.10 2.40 5.80 .20 1.70 14.80	1.50 #### #### #### 33.90 #### #### ####		Fine Medium	2.31 0.04 2.25 0.43		1 0.11 0.0 8 0.03 0.0			1.37 18.30 1.77 11.97	73 56	25.0 18.0
60 19-056978 61 19-056978	19-056978-00	0 TSOIL19_024_B_1	TSOIL19_024_B_1_AN TSOIL19_024_C_1_AI	N 19.40 ######	329.00	484.00 1	15.00 0.00	0.10 1	.00 1.50 24.00	34.80 #### #### #### 41.70 #### ####	# Sandy clay loam	Medium Medium	2.50 0.12 2.20 0.17	2.38 4.10 6	2 0.02 0.0 0 0.03 0.0	06 0.24 27.40 7.15	5 6.90	1.49 17.95 1.76 12.32	77 58	18.0 19.0
62 19-057500	19-057500-00	2 TSOIL19_025_A_1	TSOIL19_025_A_1_AM	N 39.30 ######	525.00	944.00 1	19.00 0.00	0.10 0	.30 0.70 0.70	0.30 2.10 #### #####	# Heavy clay	Fine	3.59 0.09	3.49 6.02 9	5 0.13 0.1	12 0.32 56.90 6.59	9 6.10	1.17 35.20	97	19.0
63 19-057500 64 19-057500			TSOIL19_025_B_1_AM TSOIL19_025_C_1_AM							0.90 5.10 #### ####		Fine Fine	3.86 0.07 3.64 0.09		8 0.11 0.0 6 0.09 0.0			1.17 26.75 1.22 45.76	91 99	
65 19-057500			TSOIL19_026_A_1_A		194.00	358.00 2	21.00 0.50	0.40 1	.60 1.90 1.30	0.90 6.20 #### ####	# Silty clay	Fine	3.57 1.72		9 0.04 0.0			1.52 8.80	34	
$\bullet \rightarrow \bullet$	SURVEY	SITE ANA	ALYTICAL MS	_Data_Heck	MS_I	Data_Des	cription	SUR	VEY_CODES	S SITE_CODES	ANALYT	ICAL_REFERENCES	5 TextureGroup	os LandCover	CropRotation	RotationReWork	c Crop	ppingSystemRevie	ew (+)	E 4 .



Atlantic Canada Soil Health Laboratory Initiative





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1	NCCLE		oil Health Sampled Cropping	Cropping	Cropping	Cropping Cro	opping		(LOI fer pH NSDA		K ₂ O Calc	Magnesi um um \$	Sodium Sul	Aluminu Ifur m	Boron Copper	r Iron	se Zi			Base satur	ation	n	CaCO3 on	Active Carbon P	ACE A Protein	um Nitra	Organic ate N	Nitrogen		nate Nmin s stable	Nmin Iabile Nmi	over 130 Nitr in days Su
2 3 NSSH - 34	NSSH# #	Sampleo . Corn Bi	ractice (if Date System 1 any) Date System 1 iosolids A ######### Field Crop	System 2 Field Crop	System 3 Field Crop	System 4 Sys	stem 5 Previous cro	PZ	(%)		(kg / ha) (kg /		kg / ha) (kg /		(ppm) (ppm)					(Ca %) (Mg %			(t/ha to pH 6.5) (mg/g) 0.03	(u 150	1.4	ng N/kg) (mg N 0.58 0.8	4/kg) (mg N/kg) 0 0.63	1.37	-4.6	0.15 19.72	(mg N/kg) (mg N -4.61 1	5.11 29.47
5 NSSH - 34	NSSH-346/F NSSH-346/F NSSH-347/C	orage		Forage Forage Field Crop	Forage Forage Field Crop			PZ 5.91 PZ 5.95 PZ 6.08		2.8 212 2.9 174 2.8 536		802 403 815 364 682 323	37 29 28	15 780 4 14 865 4 21 1002 4		16 269	62 41 30	2.68 8.3 1.48 8.5 1.49 7.5	3.8	54.5 20 53.2 17 56 17	.8 0.8	21.3 78.7 24.4 75.6 20.3 79.7	2 1.01 2 0.83 1 0.56	431	10.7 9.6 12.4	0.10 0.0 -0.03 0.1 0.15 -0.0	11 -0.19 18 -0.18 03 -0.21	0.11 0.15 0.13	8.7	0.24 31.46 0.23 30.26 0.23 29.40	8.71 3	2.56 82.99 1 18.97 76.00 5 14.82 67.89 5
8 NSSH - 34	8 NSSH-348/0 9 NSSH-348/0	Com	######### Field Crop ########## Field Crop	Field Crop Field Crop	Field Crop Field Crop			PZ 6.23 PZ 6.29	7.79 7.79	3 571 2.9 508	515 1	779 370 739 381	31 27	22 1090 « 23 1114 «	< 0.53 2.3 < 0.54 2.4	37 304 46 295	27 28	1.68 8.2 1.64 8.2			.8 0.8 .3 0.7	20.5 79.5 20.4 79.5	1 0.61	448	9.9 12.9	0.11 0.6	02 0.61	0.76	6.0 4.0	0.17 21.71 0.22 28.16	6.00 2 3.96 3	7.70 54.02 c 2.12 62.64 c
10 NSSH - 35	NSSH-350/F NSSH-351/F NSSH-352/0	orage	######### Forage ######### Forage ########## Field Crop	Forage Forage Field Crop	Forage Forage Field Crop			PZ 6.19 PZ 5.98 PZ 6.35		3.4 404 3.4 366 3 623	315 2	113 439 112 455 752 371	32 32 38	18 1172 4 21 1088 4 22 1129 4	0.56 2	.1 303	41 28 39	1.59 10 1.52 9.9 2.08 8.5	3.4 5.5	52.8 18 53.3 19 51.7 18		23.2 76.8 23.4 76.6 23.6 76.3	1 0.77 2 0.82 1 0.59	499	12.6 11.7 12.1	1.34 0.9 0.95 5.7 -0.04 2.0	2 2.13 9 7.90	2.26 6.73 2.01	12.5	0.27 35.03 0.29 37.05 0.24 31.79	12.46 4	2.29 82.47 5 19.51 96.55 1 18.53 75.13 5
12 NSSH - 35 13 NSSH - 35	NSSH-353/C NSSH-354/F	Corn Forage	######### Field Crop ########## Forage		Field Crop Forage			PZ 6.59 PZ 6.23	7.76 7.77	3 658 3.2 601	490 1 301 1	963 363 890 432	30 31	26 1379 4 26 1199 4	< 0.58 3.2 < 0.59 2.8	27 265 38 290	37 32	2.11 8.9 1.86 8.8	5.8 3.6	55 16 54 20	.9 0.7 .6 0.8	21.5 78.4 21 79	0.47	436 473	11.4 9.4	0.38 0.8 0.41 0.8	1 0.41 5 0.59	1.19 1.26	10.4	0.26 33.56 0.29 37.11	11.52 4 10.45 4	5.08 87.91 1 7.55 92.73 1
15 NSSH - 35	NSSH-355/F NSSH-355/C	Corn	######### Forage ########## Field Crop	Forage Field Crop	Forage Field Crop			PZ 6.46 PZ 6.31	7.82 7.72	3.1 448 3.2 745	490 2	697 399 029 390	24 28	18 1183 4 22 1317 4	0.61 2.	.7 224	55 43	1.48 7.9 1.7 9.5	5.5	53.3 17	.1 0.6	18.1 81.9 23.5 76.5	0.81	419	8.6 7.9	0.33 1.1	4 -0.28	1.50 0.22	9.3 3.5	0.25 32.85	9.29 4 3.48 3	2.13 82.16 1 07.25 72.63 3
17 NSSH - 35	7 NSSH-35717 8 NSSH-35817 9 NSSH-35517	Wheat	######################################	Field Crop	Field Crop Field Crop Field Crop			PZ 5.56 PZ 5.79 PZ 5.87	7.38 7.56 7.51	3.7 250 4 237 3.9 373	292 1	664 583 982 277 < 169 259 <		28 1328 4 27 1681 4 25 1656 4	0.50 0.9	92 130	31 33 23	1.39 14.4 1.03 10	2.2 3.1 3.6	49.7 11	.8 0.4 .8 0.3 10 0.2	34.4 65.6 35.3 64.7 36.2 63.9	0.97 0.83 1.07	554	12.2 9.8 11.1	1.18 0.6 1.27 -0.0 0.72 1.0	8 1.28 03 1.87 16 1.23	1.76 1.25 1.78	5.6	0.32 41.92 0.34 43.63 0.34 43.79	5.60 4	1.92 101.25 1 19.23 96.00 7 10.51 98.50 8
19 NSSH - 38	NSSH-36CEV NSSH-36CEV NSSH-361EV	Wheat	######### Field Crop ########## Field Crop	Field Crop	Field Crop Field Crop			PZ 5.78 PZ 5.35		4.1 252	343 2	223 235 < 109 550		28 1636 4 34 1404 4	< 0.50 0.6			0.87 11	3.3		.9 0.2	37.1 62.9 34 66	1.08	598		0.45 0.2	0 0.61	0.65	11.8	0.31 40.47 0.31 40.12	11.81 5	2.29 101.96 1 1.28 100.00 1
22 NSSH - 38	NSSH-3621V NSSH-3631V	Wheat	######### Field Crop	Field Crop	Field Crop Field Crop			PZ 5.87 PZ 5.75	7.61 7.51	3.7 729 3.9 710 3.2 283	318 2	299 798 344 573	20 17	24 1123 4 28 1466 4	0.50 0.8 0.50 0.6	36 255 38 177	28 32	2.19 15.1 0.87 12.5	2.2	54.8 22 48.7		20.7 79.4 31.3 68.7	1.08	631 489		0.43 0.2		0.67		0.31 39.87 0.24 31.25	10.38 5 9.90 4	0.24 97.96 1
24 NSSH - 38	NSSH-3641V NSSH-3651V	Wheat	########## Field Crop ################# Field Crop	Field Crop Field Crop	Field Crop Field Crop			PZ 5.73 PZ 5.56	7.68	2.9 376 2.8 507	162 1	845 475 596 279 <		22 1026	< 0.50 0.4 < 0.50 0.4	47 253 49 199	31	0.74 9.4 1.63 7.7		49 21 51.5	.1 0.4 15 0.3	27.2 72.8 31 69	1.05	441 276	6.9 12.9	0.33 0.0	0.08 01 0.57	0.35	7.9 6.8	0.22 28.50 0.25 32.15	7.86 3 6.79 3	8.38 70.90 8 18.94 75.94 8
26 NSSH - 36	NSSH-3661V NSSH-3671V	Wheat	######### Field Crop	Field Crop	Field Crop Field Crop			PZ 6.08 PZ 5.75	7.78	2.9 395 2.8 680	144 1	866 344 < 616 205 <	16	23 1434 33 1542 4	< 0.50 0.5	56 150	23 25	0.98 8.2 1.59 7.6	2	53 11	.2 0.3	21.5 78.5 33.6 66.5	0.66	413	11.2 7.6	1.46 0.6 1.10 0.2	5 1.83 0 1.85	2.11	5.2	0.21 27.15 0.26 33.20	5.21 3	2.66 63.69 8.41 74.90
	8 NSSH-3681V 9 NSSH-3651N	fustard	######################################	Field Crop	Field Crop Field Crop			PZ 5.78 PZ 5.8 PZ 5.83	7.78 7.59 7.64	2.9 590 3.9 444	310 1	339 540 < 923 247 < 021 270 <	16	18 812 4 25 1572 4 26 1552 4	0.50 0.6	37 109	28	1.5 10.2 1.34 9.5 1.66 9.6	2.6 3.5 5.1			17.3 82.6 34.6 65.4 30.1 69.9	0.92 0.78 0.69	572		0.37 0.0	16 -0.17 11 -0.40 18 0.53	0.44	7.2	0.22 29.21 0.31 40.71 0.34 43.97	7.22 4	15.49 69.20 6 17.93 93.46 15.24 107.72 1
30 NSSH - 37	NSSH-37010 NSSH-37110 NSSH-37210	fustard	########## Field Crop ########## Field Crop ########## Field Crop	Field Crop	Field Crop Field Crop Field Crop			PZ 5.83 PZ 5.64 PZ 5.82		3.9 529 3.9 377 3.7 388	227 1	747 232 < 979 294		26 1597 4 28 1597 4 19 1542 4	0.50 0.6	35 105	34	1.00 9.0 1.17 9.4 1.12 10.1			.3 0.3	40.1 59.8 35.7 64.3	0.98	570	12.2 10.3 9.0	0.55 1.5		2.12 4.01 1.25	7.2	0.30 39.21 0.33 42.65	7.21 4	i5.24 107.72 1 i8.42 90.51 1 i9.61 96.73
32 NSSH - 37	NSSH-37310	Dats + Vetch	######################################	Field Crop	Field Crop Field Crop			PZ 5.41 RG 5.38	7.26	4.5 261 4.3 246	371 2	898 642 071 679	36	29 1303 4 25 1218 4	0.50 1.3	33 222 .4 219	54 70	1.65 16.3 1.58 16.3	2.4	44.4 16	.4 0.5	36.3 63.7 32.9 67.1	1.36	551	12.6 12.3	0.29 1.7		2.09	13.0	0.40 51.92 0.37 48.07	12.99 6	4.91 128.57 1 1.93 120.78 1
34 NSSH - 37 35 NSSH - 37	NSSH-3751N NSSH-37610	Mustard Dats + Vetch	######### Field Crop ######### Field Crop	Field Crop Field Crop	Field Crop Field Crop			RG 5.45 RG 5.41	7.3	4.3 206 3.7 209	284 3	888 663 239 688	42 45	28 1228 4 26 1274 4	< 0.50 1. < 0.50 1.3	.2 213 35 216	91 101	1.25 16 1.46 16.3	2.1	45.1 17 49.6 17	.3 0.6 .6 0.6	35 65.1 30.4 69.6	0.87	505 463	13.6 11.8	0.32 0.5	1.70 1.26	0.87	15.4	0.38 48.76	15.38 6 10.71 5	4.12 125.03 1 i3.33 103.99 1
37 NSSH - 37	7 NSSH-3771F 8 NSSH-3781F	orage	24-Oct-17 Forage	Forage Forage	Forage Forage			RG 5.83 RG 5.45	7.56	4.7 271 4.7 173	179 2	514 841 348 731	120 117	19 650 <	< 0.50 1.	3 291 .3 321	34 39	3.59 13.5 3.26 12.9	1.5	45.6 23		23.8 76.2 27.3 72.8	2.53 2.43	642	8.5 7.7	0.23 0.0	8 5.46 7 2.58	0.31 0.24		0.50 64.38 0.49 63.64	26.26 8	7.20 170.04 2 19.90 175.31 2
39 NSSH - 38	 NSSH-3751F NSSH-3801F NSSH-3811S 	orage	24-Oct-17 Forage	Forage Forage	Forage Forage			RG 5.63 RG 5.49 RG 5.32	7.54 7.52 7.54	4.6 283	178 2	488 721 238 712 999 792	112 118	20 683 17 688 4		18 331	34 36 29	12.5 13.4 3.02 12.8 1.91 12.4	1.5	48.6 22 43.6 23 40.4 26	.1 2	27.6 72.4 29.9 70.2	2.82 1.55 0.98	379	6.7 6.3	0.22 0.0 0.20 -0.0 0.29 0.7	7 2.45 02 0.93 13 1.25	0.29	25.3 28.5	0.48 62.31 0.42 54.32 0.30 39.38	28.48 8	87.60 170.82 2 82.80 161.46 2 80.24 97.97 1
41 NSSH - 38	NSSH-38113 NSSH-38213 NSSH-38313	Soybean	24-Oct-17 Field Crop 24-Oct-17 Field Crop 24-Oct-17 Field Crop	Field Crop	Field Crop Field Crop Field Crop			RG 5.38 RG 5.6	7.57	2.9 266 3.3 355 3.1 395	252 2	399 827 603 870	65 74	19 700 4	< 0.50 0.8 < 0.50 1.2 < 0.50 1.4	28 289	34	2.33 13.3 2.67 13.9	2	45.1 25		29.7 70.3 25.9 74.1 24.1 75.8	0.80	469	12.6 11.8 13.0	0.29 0.7 0.04 0.9 0.36 1.4	2.28	1.03 0.94 1.82	12.4	0.30 39.38 0.34 43.61 0.32 41.88	12.38 5	0.24 97.97 1 5.97 109.15 1 57.57 112.25 1
43 NSSH - 38	NSSH-38413 NSSH-3851F	Boybean	24-Oct-17 Field Crop 24-Oct-17 Forage	Field Crop	Field Crop Forage			RG 5.39 RG 5.19	7.6	3.2 348 4.6 274	243 2	291 791 055 834	71	16 692		27 300		2.14 12.6 3.54 12.8	2	45.3 26		25.3 74.6 29.4 70.7	0.80	413	10.7	-0.03 2.4 0.06 0.1		2.38		0.31 39.88 0.48 62.88	8.68 4	8.56 94.69 1 8.57 172.71 2
45 NSSH - 38 46 NSSH - 38	NSSH-3861F NSSH-3871F	orage	24-Oct-17 Forage 24-Oct-17 Forage	Forage Forage	Forage Forage			RG 5.23 RG 5.23	7.58	4.9 253 3.3 170	354 2 192 2	282 855 051 760	77 83	14 609 4	< 0.50 1.4 < 0.50 1.2	43 305 25 274	36	4.89 13.6 2.33 12	2.8	42 28 42.6 26	.3 1.5	27.7 72.3 27.9 72.1	2.16 1.56	843 473	6.4 6.6	0.15 0.2		0.35		0.56 72.42	39.53 11 23.33 6	1.95 218.30 4 9.92 138.34 2
47 NSSH - 38 48 NSSH - 38	8 NSSH-3881F 9 NSSH-3881S	orage Soybean	24-Oct-17 Forage 24-Oct-17 Field Crop	Forage Field Crop	Forage Field Crop			RG 5.3 RG 5.01	7.62 7.53	3.6 200 3.6 172	216 1	205 669 900 673	77 74	15 559 4	< 0.50 1.1 < 0.50 1.	15 278 .1 295		2.32 11.7 2.33 11.7	1.8	47 23 40.6	24 1.4	25.9 74 32.1 68	1.44	563 591	7.3 7.4	0.43 0.1	6 1.29 3 0.12	0.59 4.27	26.4	0.33 43.06 0.42 54.74	14.83 5 26.36 8	7.89 112.88 1 11.10 158.14 3
50 NSSH - 39	NSSH-39019 NSSH-39119	Boybean	24-Oct-17 Field Crop 24-Oct-17 Field Crop 24 Oct 17 Field Crop	Field Crop	Field Crop Field Crop			RG 4.93 RG 5.16	7.51 7.56 7.65	3.8 253 3.5 238	193 2	853 617 147 656 207 828	75 58	16 584	< 0.50 0.8 < 0.50 1.0 < 0.50 0.9	09 274	43 43 48	2.13 11.5 2.27 12	1.7 1.7 1.5	40.3 22 44.9 22 48.9 23	.9 1.1	34.1 65.8 29.4 70.6 24.8 75.3	1.53	413	7.9	2.77 5.5 1.69 2.4 0.80 5.2	6 5.48 6 2.26	8.33 4.14	19.3	0.43 55.47 0.37 48.12 0.33 43.11	19.28 6	15.97 167.65 3 17.40 131.43 2 18.86 110.87 1
52 NSSH - 39	2 NSSH-39215 3 NSSH-39315 4 NSSH-39415	Soybean	24-Oct-17 Field Crop 24-Oct-17 Field Crop 24-Oct-17 Field Crop	Field Crop	Field Crop Field Crop Field Crop			RG 5.19 RG 5.03 RG 5.08	7.5	3.2 179 4.3 488 4.1 377	239 2	207 636 001 527 503 636	50 61	17 571 4	< 0.50 0.9 < 0.50 0.6 < 0.50 1.2	35 341	44	1.89 11.3 3.4 11.6 3.12 13.1	2.2	43.3	19 0.9	24.8 75.3 34.6 65.4 29.8 70.2	1.16 1.59 1.26	623	6.9 7.3 8.8	0.93 3.1	7 3.98 0 4.18	6.00 4.10 4.16	19.6	0.33 43.11 0.43 55.26 0.39 50.36	19.62 7	8.88 110.87 1 4.87 148.00 2 4.49 125.78 1
64 NSSH - 39	NSSH-39519 NSSH-39519 NSSH-39619	Boybean	24-Oct-17 Field Crop 24-Oct-17 Field Crop 24-Oct-17 Field Crop	Field Crop	Field Crop Field Crop			RG 5.05 RG 5.27		4.2 514 3.9 316	199 2	458 580 834 683	51	20 584 4	0.50 1.0		50	3.69 12.8 3.44 13.7	1.6	48 18	.9 0.9	30.6 69.4 25.1 74.9	1.19	600	6.8 7.7	0.25 1.3		1.54	14.3	0.40 52.42 0.39 50.08	14.34 6	123.70 1 18.76 130.18 1 12.81 122.48 1
66 NSSH - 39 67 NSSH - 39	NSSH-39715 NSSH-39815	Boybean Boybean	24-Oct-17 Field Crop 24-Oct-17 Field Crop	Field Crop Field Crop	Field Crop Field Crop			RG 6.15 RG 5.81	7.74	3.3 538 2.9 342	362 3 206 2	279 755 858 584	50 50	16 515 10 524 4	0.63 1.6	39 286	41 47	5.19 13.9 3.56 12.2	2.8		.6 0.8	14.9 85.1 19 81	0.91	621	9.0 11.6	-0.08 0.8 -0.01 0.8	7 0.69 6 0.98	0.79	43.4	0.43 56.15	43.41 9	9.56 194.15 4 3.22 103.78 1
68 NSSH - 39 69 NSSH - 40	 NSSH-3951S NSSH-4001S 	Soybean Soybean	24-Oct-17 Field Crop 24-Oct-17 Field Crop	Field Crop Field Crop	Field Crop Field Crop			RG 5.82 RG 5.78		2.9 393 2.3 282	220 2 258 2	746 612 823 635	49 59	16 561	< 0.50 1.2 < 0.50 1.4	27 262 43 288		3.49 12.1 3.21 12.3	1.9		.4 1	19.2 80.8 18.1 81.8	0.59	469 468	12.1 12.4	0.26 0.9	05 2.77 15 0.60	1.21 0.56	6.4 8.4	0.27 34.83 0.24 31.11	6.37 4 8.42 3	1.19 80.32 19.53 77.09
61 NSSH - 40	NSSH-401EP NSSH-402EP	Pasture		Pasture	Pasture Pasture			RG 6.24 RG 6.22	7.76	4.7 223 4.6 233	205 3	716 593 068 557	76 58		0.52 1.0	07 265	59 50	1.79 14 1.93 12.3	1.8	62.6 18	.9 1	13.2 86.8 15.7 84.3	1.66	693	11.2 11.9	-0.09 0.2 0.01 0.6	21 -0.04 38 -0.19	0.69	11.3	0.41 53.80 0.38 49.50	11.29 6	1.60 139.62 1 0.79 118.54 1
63 NSSH - 40	NSSH-4031 P NSSH-4041 P NSSH-4051 P	Pasture	25-Oct-17 Pasture	Pasture Pasture Pasture	Pasture Pasture			RG 5.76 RG 5.84 RG 6.22	7.63	4.6 231 5.2 463 4.2 197	423 2	600 552 371 490 425 836	40 32 34	29 829 4 33 1392 4 24 636	0.50 1.9	98 147	40 54 45	1.41 11.2 5.32 11.4 1.37 14.1	2.4	51.8 17	.8 0.6	18.5 81.5 25.9 74.1 12.5 87.5	1.26 1.52 0.81	679	8.9 17.1	1.81 0.1 1.44 1.5		1.92 2.95	22.6	0.41 53.44 0.50 65.30 0.37 48.02	22.61 8	18.35 129.38 1 17.91 171.42 2 11.95 120.80 1
65 NSSH - 40	NSSH-4061P NSSH-4061P NSSH-4071P	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture	Pasture Pasture Pasture			RG 6.22 RG 5.92 RG 5.49	7.78	4.2 197 5.3 252 4 166	280 3	425 836 672 412 609 445	56 42	29 501	0.57 0. 0.51 0.6 < 0.50 0.7	84 337 72 304		1.37 14.1 2.17 13.6 1.51 11.1		67.3 12		12.5 87.5 17 83 21.7 78.3	2.43	553	11.2 16.1 10.2	0.43 0.6 0.04 0.6 1.65 0.3	7 1.91 3 -0.04 5 2.78	1.10 0.66 2.00	13.9 27.7 20.0	0.37 48.02 0.48 61.88 0.41 52.66	27.70 8	120.80 120.80 1 19.57 174.66 2 12.64 141.65 2
67 NSSH - 40 68 NSSH - 40	NSSH-4081P	Pasture Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture Pasture	Pasture			RG 5.89 RG 6.01	7.71 4	4.8 335	477 2 271 3	245 489 879 1011	27 36	32 1268 4 29 634	0.50 0.9	94 153 73 281	47	1.85 11.2 1.3 16.6	4.5	50.2 18 58.4 25	.2 0.5	26.5 73.4 14 86	1.58	703 757	15.7 13.7	1.37 0.2 1.30 0.1	1 3.93 5 3.00	1.59	37.5 22.4	0.49 64.34 0.41 52.66	37.49 10 22.41 7	1.83 198.57 3 5.07 148.38 2
70 NSSH - 41	NSSH-41CEP NSSH-411EP	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture Pasture	Pasture Pasture			PZ 5.51 PZ 5.54	7.63	4.2 285 4.2 331	266 2 344 2	525 515 613 581	37 32 27	23 580 4 25 591 4	< 0.50 0.4 < 0.50 0.7	46 326	34 43 31	1.34 11.8 1.71 11.5	2.4	53.6 18 56.6 3	.2 0.7 21 0.6 .9 0.6	25.1 74.9 18.7 81.4	1.89	568 592	14.2 14.2	1.69 0.2 0.10 0.4	1.74 5 0.58	1.59 1.45 1.92 0.55 1.31 1.44 1.09 5.15 1.94 3.77 1.32 2.12 0.78 0.45 2.03	24.8	0.41 53.89 0.37 47.89	24.76 7 14.50 6	8.65 153.37 2 12.39 121.66 1
72 NSSH - 41	NSSH-4121F NSSH-4131F	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture Pasture	Pasture Pasture			PZ 5.59 PZ 6.12	7.62 7.86	2.9 515 4.2 431	287 2 173 2	040 386 917 628	25	30 1282 4 21 688 4	< 0.50 0.4	76 194 45 185	33	1.46 11.3	3	64.7 23	.2 0.5	30.1 69.9 9.9 90	1.42 1.43	660 744	14.6 17.6	0.98 0.3 1.14 0.3	1.85 0 0.81	1.31 1.44	22.1	0.40 52.11	22.06 7	9.88 138.27 2 4.17 144.63 2
74 NSSH - 41	NSSH-414EP	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture	Pasture Pasture			PZ 6.12 PZ 5.59 PZ 5.81 PZ 5.82 PZ 5.76 PZ 5.5 PZ 5.5		5 191 3.9 289	328 2	724 741 306 478	34 23 21	26 964	< 0.50 0.5 < 0.50 0.4	51 233 49 179	33 25 22 55	1.21 12.8 1.07 9.6	2.7	53.2 24 60.2 20	.8 0.5	19.4 80.6 15.9 84	1.94 1.34	827	17.1	0.86 0.2	1.42 4.09	1.09 5.15	28.0	0.49 64.34 0.41 53.02	27.97 8	14.34 203.45 4 10.99 157.92 3
76 NSSH - 41	NSSH-416EP	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture 25-Oct 17 Pasture	Pasture	Pasture Pasture			PZ 5.82 PZ 5.76	7.63	5.2 480	346 1	139 415 762 400	21 32 75	32 1346 39 1603 39 1603 30 1604 30 160	0.50 0.9	98 110	22 55 49	1.37 11 3.84 9.5	3.9	48.6 15 46.5 17	.6 0.7	31.3 68.6 31.3 68.7	2.07 1.67 1.75	929 879	20.4 20.9 16.4	1.75 0.1 3.60 0.1	5 5.14 7 4.21	1.94	24.5	0.41 52.92 0.45 59.09	24.48 8	17.67 131.97 1 13.57 162.96 2
78 NSSH - 41	8 NSSH-418 (P 9 NSSH-415 (P 0 NSSH-420 (P	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture	Pasture Pasture Pasture			PZ 5.5 PZ 5.86 PZ 5.34	7.61 5 7.77 4 7.45 4	5.1 302 4.3 172 4.3 96	149 2	449 246 418 204 353 285	218		0.50 1.5	53 311	154	5.82 8.1 2.59 9.4 2.16 12.2	2 1.7 1.6	44.8 12 64.5 9 48.4 9	.1 5.1	38.6 61.5 19.6 80.4 36.2 63.9	1.61	852 774 770	16.4 11.9 10.6 16.2	0.84 0.4 2.07 0.0	3.89 5 4.91	1.32 2.12 0.79	26.8 25.5 22.7	0.42 54.57 0.35 45.36 0.33 43.52 0.37 47.49	25.52 7	1.34 158.61 2 70.88 138.22 2 16.18 129.06 2
80 NSSH - 42	NSSH-4201P NSSH-4211P NSSH-4221P	Pasture	25-Oct-17 Pasture 25-Oct-17 Pasture 25-Oct-17 Pasture	Pasture Pasture Pasture	Pasture Pasture Pasture			PZ 5.86 PZ 5.34 PZ 5.53 PZ 5.63	7.69 4	4.3 96 4.8 266 4.6 185	210 2	353 285 913 505 704 521	227 52 51	30 666 <	< 0.50 1.	32 364 .4 305 59 264	45 78	2.16 12.2 3.4 12.2 2.85 12.1	1.0 1.8 1.8	59.7 17	.2 0.9	38.2 63.9 20.3 79.6 23.7 76.3	1.38 1.89 2.20	852 774 779 921 920	16.2 19.2	0.39 0.0	6 2.56 9 4.98	0.45	31.1 27.5	0.33 43.52 0.37 47.49 0.39 51.25	31.09 7	18 129.06 2 '8.58 153.24 3 '8.72 153.50 2
			ample summary			829 N		829_Selective				ed_File na	me		4-829_Cle			1-829_0	Cleane		+ :	4										•

<u>Chemical - Soil Test Lab Results</u>

А	С	D	E	F	G	Н	1	J	К	L	М	Ν	0	Р
	Soil Order	рН		Buffer pH		Organic Matter (LOI NSDA)		P205		K2O		Calcium		Magnesium
						(%)		(kg / ha)						
Min		4.1		6.9		1.5		16.0		54.0		24.0		7.0
Max		7.9		8.0		13.6		4421.0		3467.0		10374.0		1485.0
Mean		6.1		7.7		3.4		768.7		323.6		2726.0		392.4
25% Quartile		5.7		7.6		2.6		302.0		190.0		1982.5		246.8
75% Quartile		6.5		7.8		4.0		1085.3		383.0		3338.0		517.5
NSSH - 1	PZ	6.71	н	7.78	н	2.7	L	2317	н	486	Н	3745	н	549
NSSH - 2	PZ	6.57	н	7.8	н	2.7	L	3685	н	364	н	4652	н	520
NSSH - 3	PZ	6.59	н	7.77	М	2.4	L	2442	н	352	М	3086	М	816
NSSH - 4	PZ	6.47	н	7.76	М	2.6	L	2534	н	525	н	2858	М	510
NSSH - 5	PZ	6.37	М	7.72	M	2.5	L	2494	н	506	н	2369	Μ	467



Physical Characterization

A	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	C	CK	CL	CN
		Sand Hygrometer	Sand Rapid	Silt Hygrometer	Rapid Silt	Clay Hygrometer	Rapid Clay	Drainage Class	Surface Compaction		Sub-surface Compaction		Water Stable Aggregates (Rainfall Simulator)		Water Stable Aggregates (Slaking Method)		Available Water Content	
		(% w/w)	(% w/w)	(% w/w)	(% w/w)	(% w/w)	(% w/w)						(% w/w)		(% w/w)		(%w/w)	
Min		39.3	6.2	6.6	6.7	0.8	1.3		0.0		0.0		0.1		0.2		-44.2	
Max		90.2	89.4	48.7	74.2	18.0	44.9		4.0		4.0		1.0		0.9		33.5	
Mean		71.6	59.5	21.4	28.5	7.0	12.0		0.4		1.2		0.5		0.8		11.2	
25% Quartile		64.6	50.8	14.9	18.6	5.0	8.8		0.0		0.0		0.3		0.7		6.9	
75% Quartile		79.9	71.4	27.1	34.7	9.2	13.9		0.0		2.0		0.7		0.9		15.1	
ISSH - 1	н	72.8	68.8	21.0	19.6	6.2	11.6	w	0		1		55%	м	78%	м	14.0	н
SSH - 2	м	71.8			18.9		13.6		0		0		41%		77%		2.4	
ISSH - 3	м	73.3	69.3	17.0	19.4	9.8	11.3	R	0		4		60%	м	75%	м	12.8	H
ISSH - 4	н	84.3	78.1	7.5	13.1	8.2	8.8	w	4		4		88%	н	75%	М	13.3	H
ISSH - 5	н	80.5	78.5	12.9	13.7	6.6	7.8	R	0		1		61%	м	74%	м	11.8	M



Biological Characterization – Organic Matter

			1	1		1								T-+	ما 2منا			PO					
														lot	al Soil			POI	VI				
	Soil												Elementar				Elementar						
NSSH	· ·		Wt. of	Wt. of		Tin Wt.	Wt. of Silt		Wt. of				smp. wt.				smp. wt. mg				Mass of C		
Sample #		(Sand)	Sand + Tin			(Silt)	+ Tin	dried Silt			Silt	Clay	mg	N%	C%	CNRatio	Sand POM			CNRatio	in POM (g)		% of Soil C
	20.04	1.69	15.47	13.78	68.8	1.68	5.61	3.93	2.33	68.8	19.	5 11.6	1005.7	0.12	2 1.40	11.40 9.85	1004.80 1037.20	0.06	0.07	1.22 4.74	1.01 5.93	28.13 27.86	3.6 21.3
2																10.68			0.43	4.74	6.31	27.86	21.3
4																11.37	1049.50	0.10	0.49	6.27	7.91	31.07	25.4
5	H															10.87	1058.80		0.47	4.55	7.66	25.39	30.2
6				0			W and and									10.32	1012.00		0.44	5.25	7.20	22.74	31.7
7	П			Org	anic		Total									11.73	1006.50		0.44	5.05	7.40	17.53	42.2
8				Ma	atter		Organ	ic 👘	L T	otal				%0	f total C	9.33	1051.80		0.34	3.96	5.60	21.67	25.8
9																11.04	1046.20		0.54	5.80	7.81	20.34	38.4
10 11				(L	01)		Carbo	n	Niti	rogen		C:N Rat		Tror	n POM	9.49	1010.70 1002.40	0.09	0.32	3.60 0.83	4.57 1.25	14.29 14.72	32.0 8.5
11															(0.1)	9.75	1002.40		0.07	3.42	5.13	14.72	29.7
13				(% v	n/w)		_%w/v	V	(%	w/w)					(%)	9.90	1019.20		0.49	7.36	7.58	18.85	40.2
14																10.23			0.37	4.16	5.25	17.56	
	- I	Min		0.	.8		0.0			0.0		1.2			3.6								
															00 C								
	/	Мах		14	.3		7.7		(0.7		21.2			89.6								
															23.7								
	Ň	lean		3.	.0		1.9			0.2		10.5			23.7								
	25%	Quarti	le	2	.2		1.3		(0.1		8.8			16.9								
	75%	Quarti	lo		.5		2.4			0.2		11.8			28.3								
	2 2 2 2 2 2	cinas es						_					-										
	NSSH		м	3	78	8.4	1.40).12		11.40) н		3.	59							
	поси	- 1		-		M				1.12	L												
	NSSH	- 2	M	2.	.99	M	1.38	L.	0).14	L	9.85	N	L	21.	29							
	NSSH	- 3	M	2.	79	М	1.20	L	0).11	L	10.68	8 N	I [[25.	95							
	NSSH	- 4	M	3	04	м	1.51	М	().13	L	11.37	н		25.4	44							
				-					_					_									
	NSSH	- 5	M	2.	63	М	1.23	L.).11	L	10.87	<u>н</u>		30.	19							



Biological Characterization

А	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM
	Respiration		Active Carbon		ACE Protein		Ammonium		Nitrate		Soluble Organic N		Residual Soil Nitrogen		Biological Nitrogen Availability (BNA)		Estimate ks	Nmin stable	Nmin labile	Nmin	Estimated N mineralization over 130 days	Soil Nitrogen Supply
	(mg/g)				(ug/mL)		(mg N/kg)		(mg N/kg)		(mg N/kg)		(mg N/kg)		(mg N/kg)			(mg N/kg)	(mg N/kg)	(mg N/kg)	(kg N/ha)	(mg N/kg)
Min	0.0		9.1		1.1		-0.1		-0.3		-1.7		-0.3		-4.8			0.2	-4.8	0.6	1.1	-3.1
Max	5.2		1328.5		70.7		34.1		107.8		2471.0		111.5		10538.7			4274.5	10538.0	14812.5	28884.4	11546.8
Mean	0.8		462.4		8.5		0.9		4.0		9.7		4.8		64.6			55.9	64.6	120.5	235.0	78.1
25% Quartile	0.4		323.0		6.0		0.2		0.5		0.5		1.1		9.1			26.1	9.1	37.3	72.8	12.1
75% Quartile	1.0		593.4		9.9		0.9		4.2		3.4		5.0		27.5			47.5	27.5	73.6	143.5	36.3
NSSH - 1	0.85	м	444	м	6.9	м	0.47	м	1.10	м	0.51	L	1.57	м	26.9	н	0.24	30.58	26.88	57.46	112.05	30.2
NSSH - 2	0.54	м	443	М	6.5	М	0.94	н	0.65	м	1.16	М	1.58	м	24.8	м	0.25	32.43	24.75	57.19	111.52	28.1
NSSH - 3	0.42	L	409	м	6.1	L	1.28	н	0.42	L	0.37	L	1.70	м	16.4	м	0.19	24.68	16.42	41.10	80.15	19.9
NSSH - 4	0.45	L	435	м	7.3	М	1.21	н	-0.09	L	0.08	L	1.12	L	11.2	м	0.20	25.81	11.24	37.05	72.24	14.1
NSSH - 5	0.24	L	424	м	6.3	L	0.84	н	9.70	н	1.37	м	10.53	н	13.1	м	0.18	23.44	13.06	36.50	71.18	25.3



State of Soil Information

- Dispersion of soil scientists and data across sectors results in fragmented datasets
 - Lack of common data structure
 - Metadata and documentation protocols are ad hoc
 - Lack of data harmonization (methodologies)
 - Overlapping work
- Lack of capacity to update soil information systems or develop integrated and harmonized information management systems



<u>The Canadian Soil Data Portal - Transforming Canada's Soil Data</u> <u>Infrastructure to Facilitate GHG Reductions and Climate</u> <u>Change Mitigation</u>

Theme 1 - National Soil Data Inventory:

- Consolidate national soil datasets and archived samples
- Mining publicly-available private sector data from environmental impact assessment reports

Theme 2 – Soil Analysis & Chemometrics:

- Development and application of soil spectroscopy to soil properties
- Development of national global soil spectral libraries

Theme 3 - Digital Soil Assessment:

 Use pedometric techniques to develop high-resolution soil maps through statistical techniques, remote sensing, and machine learning

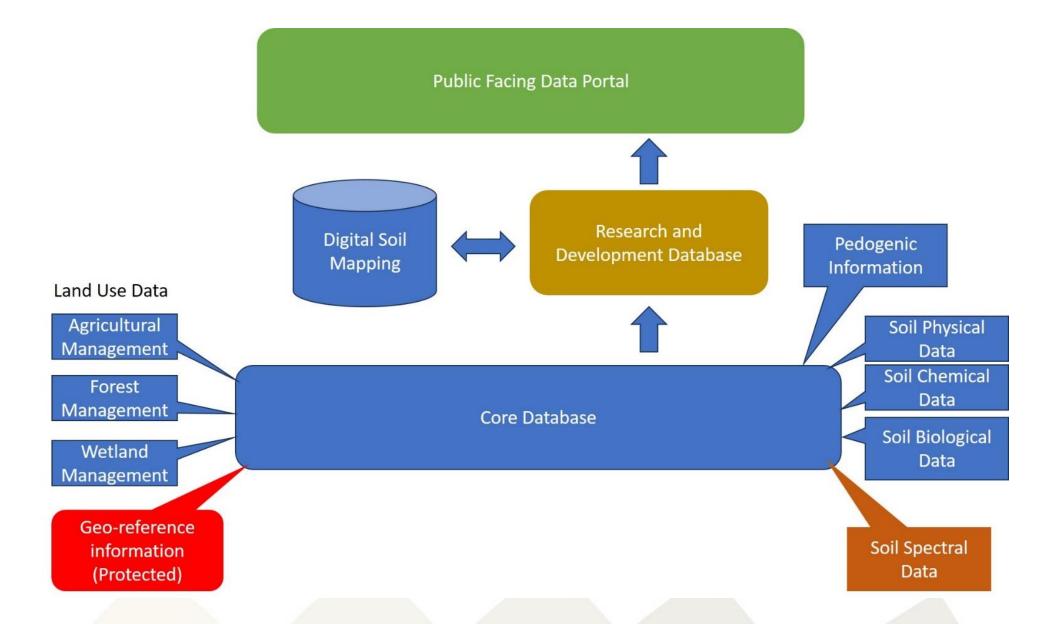
Theme 4 - Social Dimensions of Soil Data Sharing & Governance:

 Explore social aspects of soil data sharing and governance to understand the behavioural, legal motivations, and barriers to data sharing

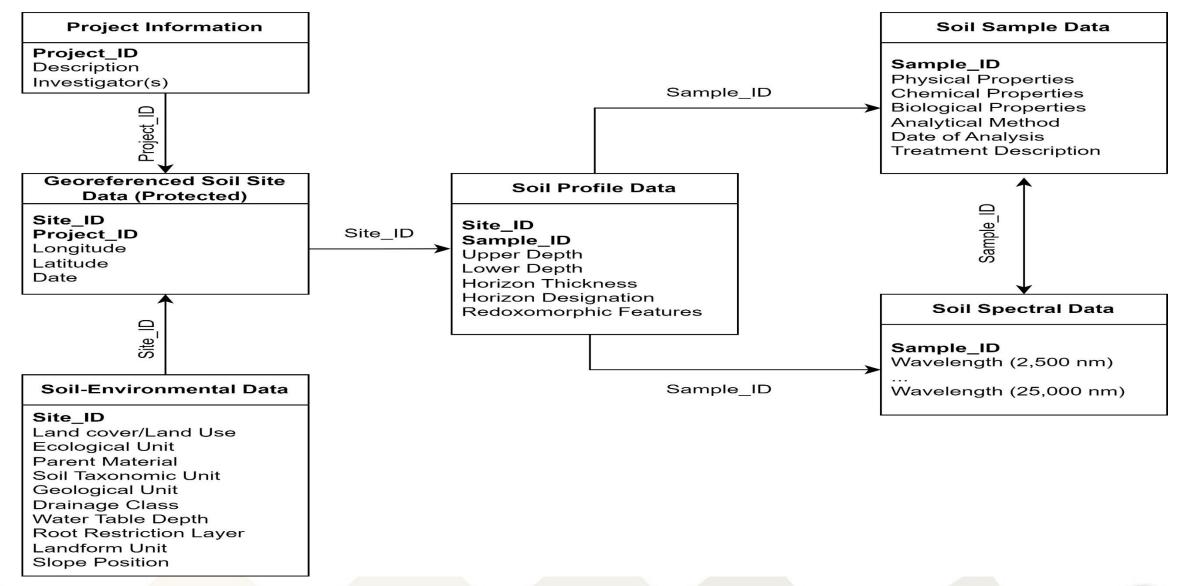
Theme 5 - Economic Valuation and Cost-Benefit Analysis of a National Soils Database:

• Build a cost-benefit analysis for long-term investment in a national digital soil database and spectroscopy library

CLOBAL SOIL PARTNERSHIP











Thank you for your attention!



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