

Table S1. Cation Exchange Capacity, Phosphorus, and pH for each field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Cation Exchange Capacity (cmol+/kg)	Extractable Phosphorus (mg/kg dry)	pH
Field 1	22.9	57.0	7.7
Field 2	22.8	26.6	7.8
Field 3	16.1	13.9	7.8
Field 4	17.8	29.5	7.8
Field 5	24.2	24.8	7.8
Field 6	23.9	17.1	7.6
Field 7	33.7	45.9	7.4
Field 8	31.1	68.7	7.3
Field 9	18.3	39.3	7.5
Field 10	22.5	22.3	7.9
Field 11	16.1	25.9	7.7
Field 12	23.0	58.6	7.8
Field 13	17.3	50.5	7.7
Field 14	24.6	94.5	7.6
Field 15	21.4	20.2	7.8
Field 16	24.2	39.5	7.6
Field 17	24.9	21.5	7.4
Field 18	18.8	41.9	7.6
Field 19	24.2	21.1	7.5
Field 20	25.3	73.7	7.3

Table S2. Carbon for each field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Total Carbon (% dry)	Inorganic Carbon (% dry)	Organic Carbon (% dry)
Field 1	3.16	0.445	2.71
Field 2	3.45	0.829	2.62
Field 3	4.17	2.430	1.74
Field 4	6.58	3.990	2.60
Field 5	3.86	0.908	2.96
Field 6	4.28	1.220	3.06
Field 7	4.52	0.195	4.32
Field 8	5.35	0.173	5.18
Field 9	2.53	0.398	2.13
Field 10	4.16	1.550	2.61
Field 11	4.33	2.360	1.97
Field 12	4.84	1.190	3.65

Field 13	5.76	2.840	2.92
Field 14	3.74	0.860	2.88
Field 15	2.89	0.502	2.39
Field 16	4.64	1.390	3.26
Field 17	4.24	0.932	3.31
Field 18	3.97	2.090	1.89
Field 19	4.22	1.240	2.98
Field 20	3.56	0.419	3.14

Table S3. Heavy metals for each field (1/2). Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Arsenic (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Lead (mg/kg dry)
Field 1	4.1	0.25	19	5.4	10	13
Field 2	3.9	0.33	21	6.0	16	12
Field 3	2.5	0.23	14	4.4	8.9	13
Field 4	2.2	0.24	10	4.0	10	8.4
Field 5	3.4	0.38	17	5.2	11	12
Field 6	2.6	0.33	16	4.4	17	9.6
Field 7	3.2	0.76	23	5.6	27	13
Field 8	3.2	0.43	15	4.8	15	15
Field 9	1.4	0.18	17	3.9	13	9.2
Field 10	3.7	0.28	19	6.1	11	12
Field 11	3.3	0.22	16	5.3	11	9
Field 12	2.5	0.44	13	5.0	10	11
Field 13	2.3	0.34	10	3.6	11	10
Field 14	3.3	0.38	9.9	4.6	12	21
Field 15	2.9	0.60	17	3.9	16	43
Field 16	8.8	1.60	26	6.6	25	210
Field 17	7.2	1.10	15	5.3	19	140
Field 18	8.5	1.40	17	6.4	20	160
Field 19	8.6	1.50	12	6.5	21	200
Field 20	7.6	0.95	19	8.3	23	100

Table S4. Heavy metals for each field (2/2). Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Zinc(mg/ kg dry)
Field 1	0.026	0.39	11	0.36	60
Field 2	0.049	0.36	13	0.40	64
Field 3	0.020	0.23	9.4	0.23	81
Field 4	0.020	0.67	8.6	0.23	53
Field 5	0.050	0.28	11	0.50	64
Field 6	0.073	0.39	9.9	0.54	54
Field 7	0.100	0.46	13	0.96	93
Field 8	0.066	0.42	9.9	0.48	84
Field 9	0.045	0.26	11	0.27	44
Field 10	0.040	0.29	12	0.30	58
Field 11	0.030	0.27	11	0.26	51
Field 12	0.060	0.28	7.4	0.43	62
Field 13	0.050	0.29	6.7	0.34	58
Field 14	0.030	6.90	7.7	0.25	81
Field 15	0.048	0.26	9.9	0.53	160
Field 16	0.084	0.84	15	0.41	560
Field 17	0.060	0.80	12	0.32	450
Field 18	0.049	0.80	16	0.34	620
Field 19	0.060	0.92	13	0.33	450
Field 20	0.040	0.71	16	0.38	300

Table S5. NH₄-N and NO₃-N for each field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Soil Moisture (%)	NH ₄ -N in sample (mg/kg dry)	NO ₃ -N in sample (mg/kg dry)
Field 1	30.19	0.00	6.98
Field 2	27.64	1.94	7.09
Field 3	24.34	1.52	8.9
Field 4	23.55	2.22	18.2
Field 5	29.02	9.96	4.10
Field 6	30.62	0.848	6.01
Field 7	36.89	0.00	7.01
Field 8	38.77	0.00	7.88
Field 9	23.19	0.00	4.54
Field 10	29.16	0.00	18.8
Field 11	25.15	3.30	28.1
Field 12	26.80	0.00	15.5
Field 13	24.47	0.00	13.1

Field 14	23.27	0.00	14.7
Field 15	26.33	1.13	4.67
Field 16	24.87	22.9	16.5
Field 17	26.18	1.51	8.45
Field 18	19.58	3.11	5.37
Field 19	24.20	0.00	30.0
Field 20	27.18	0.64	17.0

Table S6. Organic Matter LOI for each field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Organic Matter Loss on Ignition (% dry)
Field 1	5.46
Field 2	5.06
Field 3	3.83
Field 4	4.74
Field 5	5.64
Field 6	6.08
Field 7	8.27
Field 8	8.63
Field 9	3.76
Field 10	5.22
Field 11	3.78
Field 12	5.94
Field 13	4.94
Field 14	6.18
Field 15	4.90
Field 16	6.39
Field 17	6.73
Field 18	4.54
Field 19	6.37
Field 20	6.75

Table S7. Particle size for each field (1/2). Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Gravel (%)	Sand (%)	Very Fine Sand (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Very Coarse Sand (%)
Field 1	7.0	21.9	8.7	5.9	3.6	1.9	1.8
Field 2	1.1	22.0	8.2	5.8	4.3	2.8	0.9
Field 3	8.7	42.6	12.2	15.4	8.4	4.8	1.8
Field 4	7.4	48.7	9.2	14.2	11.7	8.1	5.5
Field 5	0.4	21.2	9.0	5.5	3.4	2.6	0.7
Field 6	1.4	26.5	9.5	7.0	4.6	3.3	2.0
Field 7	0.0	15.8	6.4	4.3	3.0	1.3	0.7
Field 8	0.0	15.0	7.6	3.6	2.2	1.2	0.4
Field 9	0.0	31.9	12.8	11.3	5.3	2.3	0.2
Field 10	1.4	23.3	9.4	6.1	3.8	2.9	1.3
Field 11	3.7	35.8	10.5	12.4	7.6	3.8	1.6
Field 12	19.6	38.6	9.6	11.0	7.9	6.6	3.6
Field 13	22.4	54.2	8.9	14.2	13.6	9.9	7.6
Field 14	1.6	40.9	14.0	14.8	7.9	3.3	0.9
Field 15	0.8	41.7	14.2	16.2	8.3	2.8	0.2
Field 16	3.6	39.1	12.4	10.4	6.5	5.9	4.0
Field 17	0.7	45.4	14.1	15.2	7.4	5.4	3.3
Field 18	6.0	42.0	12.6	13.0	7.2	5.8	3.4
Field 19	2.9	42.6	13.5	15.1	7.5	4.5	2.0
Field 20	2.7	43.2	11.2	15.0	10.0	5.2	1.8

Table S8. Particle Size for each field (2/2). Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields.

Field	Silt (%)	Clay (%)	Texture
Field 1	60.9	17.2	Silt loam
Field 2	59.4	18.7	Silt loam
Field 3	41.1	16.3	Loam
Field 4	33.0	18.2	Loam
Field 5	59.5	19.3	Silt loam
Field 6	55.1	18.4	Silt loam
Field 7	62.2	21.9	Σιτ λoαμ
Field 8	66.9	18.1	Silt loam
Field 9	54.1	14.0	Silt loam
Field 10	57.3	19.4	Silt loam
Field 11	49.8	14.4	Loam
Field 12	44.1	17.3	Loam
Field 13	32.5	13.3	Gravelly sandy loam
Field 14	43.6	15.4	Loam
Field 15	41.7	16.5	Loam
Field 16	43.7	17.1	Loam
Field 17	36.7	17.9	Loam

Field 18	43.3	14.7	Loam
Field 19	43.5	13.9	Loam
Field 20	37.0	19.9	Loam

Table S9. Recovery rates of microplastics from control soil collected at the Elora research station (Elora, Ontario) spiked with ten polyethylene microspheres ($962.75 \pm 21.83 \mu\text{m}$), ten polyester microfibrils ($860.65 \pm 129.65 \mu\text{m}$), and ten polypropylene fragments ($508.82 \pm 56.91 \mu\text{m}$).

Replicate	Polyethylene Recovery (%)	Polyester Recovery (%)	Polypropylene Recovery (%)
1	80.0	40.0	80.0
2	80.0	80.0	90.0
3	100.0	60.0	60.0
4	60.0	90.0	40.0
5	100.0	90.0	100.0
6	90.0	70.0	70.0
7	100.0	80.0	80.0
Average	87.1 ± 13.8	72.9 ± 16.6	74.2 ± 18.4

Table S10. Microplastic morphology frequency for each field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields

Field	Fragment (%)	Fibre (%)	Film (%)	Foam (%)	Sphere (%)
Field 1	37.77	58.52	0.87	1.53	1.31
Field 2	49.52	46.03	2.13	1.35	0.97
Field 3	52.76	41.40	1.72	0.34	3.79
Field 4	67.93	28.03	1.19	1.43	1.43
Field 5	61.68	35.51	0	0.93	1.87
Field 6	52.15	42.06	3.86	0.64	1.29
Field 7	61.85	34.14	3.61	0.40	0
Field 8	52.47	42.74	3.29	0.41	1.10
Field 9	44.18	53.85	0.99	0.59	0.39
Field 10	82.07	14.48	1.38	2.07	0
Field 11	65.63	34.37	0	0	0
Field 12	71.43	27.55	1.02	0	0
Field 13	55.34	36.89	4.85	2.91	0
Field 14	72.00	26.29	1.71	0	0
Field 15	41.94	54.41	1.51	0.22	1.93
Field 16	42.46	55.08	1.54	0.62	0.31
Field 17	16.70	81.04	1.35	0.34	0.56
Field 18	52.05	41.32	3.15	1.36	2.21
Field 19	64.44	32.59	1.48	1.48	0
Field 20	72.34	24.11	2.84	0.71	0

Table S11. Microplastic morphology frequency for each amendment.

Amendment	Fragment (%)	Fibre (%)	Film (%)	Foam (%)	Sphere (%)
Biosolids	46.36 ± 3.83	49.50 ± 4.11	1.96 ± 0.33	0.80 ± 0.04	1.39 ± 0.35
Other	67.42 ± 2.63	29.55 ± 2.40	1.88 ± 0.54	0.94 ± 0.34	0.21 ± 0.21

Table S12. Microplastic size classes for each Field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields

Field	Above 1000	900 - 1000	800 - 900	700 - 800	600 - 700	500 - 600	400 - 500	300 - 400	200 - 300	100 - 200	10.81 - 100
Field 1	51	13	23	13	26	28	30	42	56	92	80
Field 2	59	10	7	12	18	24	31	35	48	98	172
Field 3	35	6	6	5	11	5	19	19	36	67	77
Field 4	32	2	2	11	5	9	13	20	36	79	208
Field 5	17	1	3	5	5	7	11	14	39	75	35
Field 6	37	9	8	9	13	22	20	39	58	126	119
Field 7	14	7	3	2	4	6	10	21	74	87	18
Field 8	50	13	8	15	22	36	28	58	96	250	151
Field 9	73	9	9	10	10	24	28	45	62	117	113
Field 10	18	2	6	6	9	10	11	12	15	25	29
Field 11	14	5	1	2	6	4	6	10	19	23	38
Field 12	7	0	3	2	4	8	5	8	11	14	36
Field 13	17	3	2	8	2	5	12	13	13	10	15
Field 14	13	1	4	1	6	8	11	17	42	48	24
Field 15	60	14	13	10	16	23	36	44	64	91	93
Field 16	62	14	7	20	18	19	35	28	52	45	19
Field 17	166	32	45	44	65	55	95	87	110	97	85
Field 18	28	3	6	4	8	15	15	31	65	71	67
Field 19	13	1	0	2	7	4	14	15	28	27	21
Field 20	7	2	1	2	4	8	8	17	29	38	23

Table S13. Microplastic size class percentages (%) for each Field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields

Field	Above 1000	900 - 1000	800 - 900	700 - 800	600 - 700	500 - 600	400 - 500	300 - 400	200 - 300	100 - 200	10.81 - 100
Field 1	11.14	2.84	5.02	2.84	5.68	6.11	6.55	9.17	12.23	20.09	17.47
Field 2	11.41	1.93	1.35	2.32	3.48	4.64	6	6.77	9.28	18.96	33.27
Field 3	12.07	2.07	2.07	1.72	3.79	1.72	6.55	6.55	12.41	23.1	26.55
Field 4	7.6	0.48	0.48	2.61	1.19	2.14	3.09	4.75	8.55	18.76	49.41
Field 5	7.94	0.47	1.4	2.34	2.34	3.27	5.14	6.54	18.22	35.05	16.36
Field 6	7.94	1.93	1.72	1.93	2.79	4.72	4.29	8.37	12.45	27.04	25.54
Field 7	5.62	2.81	1.2	0.8	1.61	2.41	4.02	8.43	29.72	34.94	7.23
Field 8	6.85	1.78	1.1	2.05	3.01	4.93	3.84	7.95	13.15	34.25	20.68

Field 9	14.4	1.78	1.78	1.97	1.97	4.73	5.52	8.88	12.23	23.08	22.29
Field 10	12.41	1.38	4.14	4.14	6.21	6.9	7.59	8.28	10.34	17.24	20
Field 11	10.94	3.91	0.78	1.56	4.69	3.12	4.69	7.81	14.84	17.97	29.69
Field 12	7.14	0	3.06	2.04	4.08	8.16	5.1	8.16	11.22	14.29	36.73
Field 13	16.5	2.91	1.94	7.77	1.94	4.85	11.65	12.62	12.62	9.71	14.56
Field 14	7.43	0.57	2.29	0.57	3.43	4.57	6.29	9.71	24	27.43	13.71
Field 15	12.9	3.01	2.8	2.15	3.44	4.95	7.74	9.46	13.76	19.57	20
Field 16	19.08	4.31	2.15	6.15	5.54	5.85	10.77	8.62	16	13.85	5.85
Field 17	18.74	3.61	5.08	4.97	7.34	6.21	10.72	9.82	12.42	10.95	9.59
Field 18	8.83	0.95	1.89	1.26	2.52	4.73	4.73	9.78	20.5	22.4	21.14
Field 19	9.63	0.74	0	1.48	5.19	2.96	10.37	11.11	20.74	20	15.56
Field 20	4.96	1.42	0.71	1.42	2.84	5.67	5.67	12.06	20.57	26.95	16.31

Table S14. Microplastic size classes for each morphology.

Morphology	Above 1000	900 - 1000	800 - 900	700 - 800	600 - 700	500 - 600	400 - 500	300 - 400	200 - 300	100 - 200	10.81 - 100
Fragment	23	6	13	16	32	58	90	191	488	1051	1285
Fibre	737	136	143	163	220	251	328	359	420	383	68
Sphere	0	0	0	0	0	0	0	0	0	5	64
Foam	1	0	0	0	0	3	6	3	16	18	3
Film	12	5	1	4	7	8	14	22	29	23	3

Table S15. Morphology for each size class (%)

Size Range	Fragment	Fibre	Sphere	Foam	Film
Above 1000	2.98	95.34	0.00	0.13	1.55
900 - 1000	4.08	92.52	0.00	0.00	3.40
800 - 900	8.28	91.08	0.00	0.00	0.64
700 - 800	8.74	89.07	0.00	0.00	2.19
600 - 700	12.36	84.94	0.00	0.00	2.70
500 - 600	18.12	78.44	0.00	0.94	2.50
400 - 500	20.55	74.89	0.00	1.37	3.20
300 - 400	33.22	62.43	0.00	0.52	3.83
200 - 300	51.21	44.07	0.00	1.68	3.04
100 - 200	71.01	25.88	0.34	1.22	1.55
10.81 - 100	90.30	4.78	4.50	0.21	0.21

Table S16. Microplastic size classes for each amendment.

Field Amendment	Above 1000	900 - 1000	800 - 900	700 - 800	600 - 700	500 - 600	400 - 500	300 - 400	200 - 300	100 - 200	10.81 - 100
Biosolids	12.13	2.32	2.49	2.84	3.94	4.83	6.5	8.32	12.69	21.05	22
Other	8.65	1.59	1.66	2.16	3.39	4.32	6.34	9.15	19.45	25	17.22

Table S17. Size class of MPs from 20 agricultural fields (n = 6759). 10.81µm represents the smallest MP detected in this study.

Size Class (µm)	Frequency	Percentage (%)
10.81 - 100	1423	21.05
101 - 200	1496	22.13
201 – 300	966	14.29
301 – 400	581	8.60
401 – 500	442	6.54
501 – 600	324	4.79
601 – 700	263	3.89
701 – 800	185	2.74
801 – 900	158	2.34
901 – 1000	148	2.19
>1000	773	11.44
Total	6759	100

Figure S1. Relationships between log-transformed microplastic counts and field characteristics in unamended fields. Panels (A) – (D) show the relationships with LS-factor, slope ratio, topographic wetness index, and relative elevation respectively.**Table S18.** Abundance (%) of FTIR matches for each Field. Green = Location 1, Pink = Location 2, Blue = Location 3. Darker colours are biosolid amended fields

Field	Plastic (%)	Organic Matter (%)	Cellulose-based Fibre (%)	Mineral (%)	Inconclusive (%)
Field 1	54	8	24	12	2
Field 2	58	14	20	4	4
Field 3	64	12	10	10	4
Field 4	58	12	8	20	2
Field 5	66	10	6	10	8
Field 6	68	16	10	6	0
Field 7	60	12	14	12	2
Field 8	62	6	4	16	12
Field 9	50	2	10	22	16
Field 10	58	30	6	4	2
Field 11	50	20	10	8	12

Field 12	58	18	10	8	6
Field 13	60	14	12	6	8
Field 14	54	12	4	22	8
Field 15	78	6	4	8	4
Field 16	82	4	12	2	0
Field 17	50	0	36	8	6
Field 18	70	16	10	2	2
Field 19	54	24	6	12	4
Field 20	66	14	4	10	6
Biosolids	63.1 ± 3.21	9.60 ± 1.60	13.5 ± 2.89	10.0 ± 2.07	5.78 ± 1.65
Other	58.4 ± 1.79	17.1 ± 2.19	8.00 ± 1.20	10.2 ± 1.71	6.22 ± 1.08

Table S19. Total identified plastics in biosolid-amended and non-amended soil (Part 1).

Field Amendment	Polyester	Polyethylene	Polypropylene	Polyacryla- mide	Polyamide	Polystyrene
Biosolids	88	78	62	25	20	16
Other	42	32	52	17	21	28

Table S20. Total identified plastics in biosolid-amended and non-amended soil (Part 2).

Field Amendment	Biodegradable Plastics	Alkyd Products	PVC	Rubbers	PTFE	Polycarbonate
Biosolids	12	11	8	8	7	7
Other	2	1	32	14	10	9

Table S21. Total identified plastics in biosolid-amended and non-amended soil (Part 3).

Field Amendment	Polyurethane	EVA
Biosolids	4	1
Other	1	2

Table S22. Microplastics abundance (%) in biosolid-amended and non-amended soil (Part 1).

Field Amendment	Polyester (%)	Polyethylene (%)	Polypropylene (%)	Polyacryla- mide (%)	Polyamide (%)	Polystyrene (%)
Biosolids	25.3	22.4	17.9	7.20	5.76	4.61
Other	16.0	12.2	19.8	6.46	7.98	10.6

Table S23. Microplastics abundance (%) in biosolid-amended and non-amended soil (Part 2).

Field Amendment	Biodegradable Plastics (%)	Alkyd Products(%)	PVC (%)	Rubbers (%)	PTFE (%)	Polycarbonate (%)
Biosolids	3.46	3.17	2.31	2.31	2.01	2.01
Other	0.76	0.38	12.2	5.32	3.80	3.42

Table S24. Microplastics abundance (%) in biosolid-amended and non-amended soil (Part 3).

Field Amendment	Polyurethane (%)	EVA (%)
Biosolids	1.15	0.29
Other	0.38	0.76

Table S25. Total identified “Rubbers” in biosolid-amended and non-amended soil.

Field Amendment	Epichlorohydrin Rubber (ECO)	Ethylene Propylene Rubber (EPR)	Nitrile Butadiene Rubber (NBR)	Silicone Rubber	Fluoroelastomer (FKM)
Biosolids	0	1	0	1	6
Other	1	0	2	0	11

Table S26. Estimated MP load added to each field via biosolid application.

Table S27. Total identified “Biodegradable Plastics” in biosolid-amended and non-amended soil.

Field Amendment	Cellulose Acetate	Cellulose Propionate	Ethyl Cellulose	Polybutylene Succinate (PBS)	Polylactic Acid (PLA)	Polyvinyl Alcohol (PVA)
Biosolids	3	2	3	1	1	2
Other	2	0	0	0	0	0

Field	V _{Biosolid} (m ³)	p _{Biosolid} (kg/ m ³)	M _{Biosolid} (kg)	[Biosolid] (MP/kg)	MP	V _{Soil} (m ³)	P _{Biosolid} (kg/ m ³)	M _{Biosolid} (kg)	[Soil] (MP/kg)
Field 1	19.77	1000	19770	114331	2260323870	3000	1450	4350000	519.614683
Field 2	19.77	1000	19770	114331	2260323870	3000	1450	4350000	519.614683
Field 3	19.77	1000	19770	114331	2260323870	3000	1550	4650000	486.091155
Field 4	19.77	1000	19770	114331	2260323870	3000	1550	4650000	486.091155
Field 6	16.66	1000	16660	114331	1904754460	3000	1450	4350000	437.874589
Field 8	63.71	1000	63710	114331	7284028010	3000	1450	4350000	1674.4892
Field 9	63.71	1000	63710	114331	7284028010	3000	1450	4350000	1674.4892
Field 15 (2015)	105.8	1040	110032	8428	927349696	3000	1550	4650000	199.430042
Field 15 (2017)	95.16	1040	98966.4	8428	834088819.2	3000	1550	4650000	179.37394
Field 15 (2019)	107.91	1040	112226.4	8428	945844099.2	3000	1550	4650000	203.407333
Field 15 (2021)	100.66	1040	104686.4	8428	882296979.2	3000	1550	4650000	189.741286
Field 16	80.13	1040	83335.2	8428	702349065.6	3000	1550	4650000	151.04281
Field 17	100	1040	104000	8428	876512000	3000	1550	4650000	188.497204
Field 18	100	1040	104000	8428	876512000	3000	1550	4650000	188.497204