

Supplementary material

Lability of Pb in soil: effects of soil properties and contaminant source.

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The following Tables provide additional details for the Rural Roadside, Sewage Farm and London archive soils, including; selected soil properties, Pb content and lability, and the isotopic ratios $^{206}\text{Pb}/^{207}\text{Pb}$ and $^{208}\text{Pb}/^{207}\text{Pb}$ in both the whole soil and the labile pool of soil Pb.

Table S1. Rural roadside soils

Pb_E, isotopically exchangeable Pb E-values; LOI, loss on ignition

Soil sample	Depth (cm)	Soil pH (0.01 M CaCl ₂)	Total soil Pb content (mg kg ⁻¹)	E-value (Pb _E) (mg kg ⁻¹)	LOI (%)	Available-P (mg kg ⁻¹)	Isotopic ratios			
							Total soil Pb		Labile soil Pb	
							²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb	²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb
Site 1_1	0–20	6.1	47	12	8.8	4.2	1.138	2.419	1.131	2.408
Site 1_2	0–20	6.8	48	7	8.5	1.9	1.14	2.423	1.131	2.408
Site 1_3	0–20	6.73	48	8	8.8	4.4	1.144	2.424	1.133	2.411
Site 1_4	0–20	6.3	48	11	14.6	3.2	1.144	2.426	1.135	2.413
Site 1_5	20–26	6.95	39	3	5.8	3	1.157	2.433	1.154	2.43
Site 1_6	26–30	7.5	15	2	4.4	6.1	1.202	2.485	1.18	2.452
Site 1_7	30–40	7.46	60	0	4.2	3.9	1.166	2.443	1.178	2.445
Site 1_8	0–20	7	43	6	7.1	5.9	1.153	2.431	1.137	2.418
Site 1_9	20–26	7.12	63	2	5.3	2	1.171	2.449	1.15	2.43
Site 1_10	26–30	7.45	22	1	4.1	3.1	1.194	2.472	1.179	2.455
Site 1_11	30–40	7.57	18	0	4.1	5.2	1.192	2.468	1.17	2.444
Site 1_12	0–20	6.65	49	11	7.1	3.1	1.147	2.425	1.135	2.412
Site 1_13	20–26	6.7	41	5	5.7	2.4	1.155	2.432	1.143	2.42
Site 1_14	26–30	7.24	14	0	3.8	5.3	1.2	2.478	1.171	2.445
Site 1_15	30–40	7.43	15	0	3.6	6.4	1.198	2.477	1.179	2.462
Site 2_1	0–20	4.64	66	31	15.5	5.5	1.127	2.403	1.118	2.4
Site 2_2	0–20	4.27	66	20	13	12.2	1.127	2.404	1.119	2.396
Site 2_3	0–20	4.17	65	16	11.2	4.9	1.134	2.413	1.13	2.407
Site 2_4	0–20	4.13	62	18	11.4	20.8	1.13	2.409	1.123	2.399
Site 2_5	20–30	3.95	30	16	5.9	9.3	1.169	2.45	1.161	2.446
Site 2_6	30–40	3.92	25	12	4.9	2	1.176	2.46	1.169	2.446
Site 2_7	40–50	4.05	25	12	4.8	11.1	1.169	2.448	1.162	2.435
Site 2_8	50–60	4.25	24	12	5.2	3.8	1.172	2.456	1.162	2.434
Site 2_9	0–20	4.53	71	42	13.2	23.6	1.125	2.399	1.12	2.398
Site 2_10	20–30	4.35	161	104	7.6	11.4	1.172	2.448	1.174	2.453
Site 2_11	30–40	4.22	25	14	3.4	7	1.181	2.466	1.174	2.451
Site 2_12	40–50	4.19	20	8	3	2.5	1.188	2.478	1.183	2.463
Site 2_13	50–60	4.29	17	9	2.6	2.3	1.188	2.469	1.189	2.466
Site 2_14	0–20	5.32	109	37	16.1	9.4	1.145	2.518	1.134	2.416
Site 2_15	20–30	4.43	69	35	8.2	26.4	1.166	2.436	1.176	2.453
Site 2_16	30–40	4.76	44	18	5.1	14.3	1.179	2.457	1.16	2.444

Soil sample	Depth (cm)	Soil pH (0.01 M CaCl ₂)	Total soil Pb content (mg kg ⁻¹)	E-value (Pb _E) (mg kg ⁻¹)	LOI (%)	Available-P (mg kg ⁻¹)	Isotopic ratios			
							Total soil Pb		Labile soil Pb	
							²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb	²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb
Site 2_17	40–50	5.07	35	9	5.1	2.7	1.189	2.468	1.183	2.463
Site 2_18	50–60	5.15	20	8	4.9	5.4	1.192	2.47	1.185	2.465
Site 3_1	0–20	5.08	32	12	8.4	2.7	1.158	2.439	1.147	2.426
Site 3_2	0–20	4.74	33	14	8.5	3.9	1.158	2.441	1.147	2.423
Site 3_3	0–20	4.78	25	14	8.1	2.7	1.158	2.437	1.148	2.421
Site 4_N1	0–20	5.72	63	23	16.6	29.7	1.135	2.414	1.127	2.403
Site 4_N2	0–20	5.36	65	29	20.1	25.3	1.126	2.405	1.117	2.395
Site 4_N3	0–20	6.67	55	14	10.6	11.3	1.131	2.41	1.118	2.395
Site 4_S1	0–20	6.98	233	35	10.3	7.3	1.1	2.379	1.104	2.384
Site 4_S2	0–20	6.98	64	17	11.4	5.6	1.116	2.394	1.107	2.385
Site 4_S3	0–20	7.01	88	26	18	7.8	1.114	2.389	1.096	2.377

Table S2. Sewage Farm soils

Pb_E, isotopically exchangeable Pb E-values; LOI, loss on ignition

Soil sample	Soil pH (0.01 M CaCl ₂)	Total soil Pb content (mg kg ⁻¹)	E-value (Pb _E) (mg kg ⁻¹)	LOI (%)	Available-P (mg kg ⁻¹)	Isotopic ratios			
						Total soil Pb		Labile soil Pb	
						²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb	²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb
6A	6.14	256	51	11.4	153.7	1.137	2.418	1.136	2.415
6B	6.57	324	88	10.8	190.4	1.13	2.411	1.133	2.416
6C	6.24	229	80	9.6	183.7	1.139	2.42	1.135	2.416
6D	6.19	282	101	11.8	141.8	1.131	2.412	1.136	2.418
7A	6.58	55	8	6.56	146.8	1.165	2.446	1.159	2.437
7B	6.74	102	19	6.38	128.5	1.157	2.435	1.151	2.431
8A	6.26	596	184	24.5	291.7	1.116	2.398	1.115	2.401
8B	5.86	631	147	23.8	379.9	1.12	2.401	1.122	2.402
8C	6.03	433	104	19.7	252.8	1.122	2.398	1.124	2.409
8D	6.08	683	145	25.5	314.9	1.119	2.395	1.117	2.397
8E	6.17	608	154	29.3	276.4	1.12	2.398	1.125	2.402
8T	6.47	712	137	25.2	182.4	1.119	2.398	1.121	2.4
9A	6.34	673	162	23.4	216.3	1.124	2.403	1.128	2.41
9B	6.53	511	124	19.5	126.1	1.124	2.403	1.123	2.411
10A	6.53	82	17	6.14	53	1.16	2.436	1.154	2.432
10B	6.44	68	12	5.42	69.1	1.162	2.439	1.144	2.434

Table S3. London soils

Pb_E, isotopically exchangeable Pb E-values; LOI, loss on ignition

Soil sample	Soil pH (0.01 M CaCl ₂)	Total soil Pb content (mg kg ⁻¹)	E-value (Pb _E) (mg kg ⁻¹)	LOI (%)	Available-P (mg kg ⁻¹)	Isotopic ratios				Land use
						Total soil Pb		Labile soil Pb		
						²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb	²⁰⁶ Pb/ ²⁰⁷ Pb	²⁰⁸ Pb/ ²⁰⁷ Pb	
641188	7.3	1416	272	9.3	n.a.	1.138	2.42	1.145	2.426	Unproductive open space
641198	7.14	2237	123	6.7	25.8	1.142	2.425	1.142	2.425	Commercial and residential
641201	6.93	1006	190	10	n.a.	1.147	2.43	1.142	2.423	Commercial and residential
641221	6.98	641	111	9.7	1.4	1.164	2.446	1.161	2.446	Recreational area
641228	7.07	166	9	7.1	n.a.	1.149	2.429	1.145	2.425	Commercial and residential
650221	7.07	2762	432	15.4	80.8	1.17	2.452	1.163	2.45	Recreational area
650266	6.88	1864	270	9.5	28.2	1.15	2.434	1.148	2.427	Park
650324	6.98	2154	647	7.5	23.1	1.147	2.427	1.149	2.424	Domestic garden
650373	5.56	320	65	11.5	37.2	1.152	2.432	1.143	2.422	Minor metalled roads–verge
650436	7.07	1512	345	7.3	27.5	1.128	2.408	1.136	2.425	Domestic garden
650499	5.28	9044	6771	10.4	6.3	1.141	2.415	1.141	2.417	Park
650763	6.74	7212	2933	6.7	19.9	1.153	2.434	1.151	2.433	Domestic garden
650773	7.24	996	253	6	n.a.	1.133	2.418	1.133	2.416	Grass moor
650803	6.74	1828	536	9.2	12	1.143	2.425	1.144	2.422	Domestic garden
650903	5.98	193	51	8.3	2.3	1.14	2.42	1.138	2.417	School
650930	6.9	245	43	6.8	15.6	1.129	2.406	1.125	2.408	Domestic garden
650932	5.57	428	124	9.2	17	1.111	2.39	1.109	2.39	Major roads/verge
651006	6.69	213	43	7.9	n.a.	1.127	2.407	1.125	2.405	Minor metalled roads/verge
651013	6.92	2284	507	16.6	28.5	1.16	2.442	1.162	2.445	Deciduous woodland
651021	6.43	1731	255	17.5	207.4	1.116	2.397	1.119	2.4	Minor metalled roads–verge
651100	6.4	534	85	14	n.a.	1.137	2.414	1.14	2.423	Urban open space
651133	5.8	217	51	11.3	22.8	1.147	2.427	1.144	2.425	Park
651344	7.21	927	158	15.5	4.7	1.112	2.392	1.11	2.389	Domestic garden
651438	5	99	29	4.3	1.6	1.164	2.446	1.16	2.433	Grass moor
651654	3.29	162	62.5	17.3	14.7	1.141	2.421	1.137	2.419	Deciduous woodland
651871	6.74	919	311	7.3	4.1	1.134	2.414	1.13	2.407	Domestic garden
651954	6.75	1546	180	15.5	42.4	1.146	2.428	1.151	2.432	Domestic garden
651975	6.87	172	18	7.7	n.a.	1.125	2.406	1.12	2.401	Domestic garden
652570	6.74	1247	269	9.7	15.6	1.133	2.415	1.136	2.417	Domestic garden
652631	7.23	2587	668	10	5.9	1.157	2.44	1.157	2.44	Domestic garden
652900	6.66	237	45	10.1	20.2	1.129	2.409	1.128	2.412	Domestic garden

Soil sample	Soil pH (0.01 M CaCl ₂)	Total soil Pb content (mg kg ⁻¹)	E-value (Pb _E) (mg kg ⁻¹)	LOI (%)	Available-P (mg kg ⁻¹)	Isotopic ratios				Land use
						Total soil Pb		Labile soil Pb		
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653407	6.29	301	75	10.3	n.a.	1.135	2.413	1.13	2.41	Domestic garden
653570	6.7	6600	1450	10.9	19	1.162	2.445	1.161	2.441	Recreational area
653588	4.95	187	74	5.7	1.9	1.151	2.428	1.148	2.426	Domestic garden
654281	6.62	1153	283	8.2	1.1	1.143	2.424	1.141	2.423	Domestic garden
654432	6.91	22572	3409	11.5	34.9	1.081	2.359	1.082	2.36	Unproductive open space
654464	7.2	507	100	9	14.6	1.146	2.426	1.146	2.426	Major roads–verge
654542	7.12	845	281	6.9	8.7	1.147	2.429	1.143	2.426	Domestic garden
654699	7.25	4056	729	16.9	6.3	1.146	2.429	1.144	2.427	Domestic garden
654950	6.75	779	183	5.3	11.5	1.129	2.409	1.126	2.41	Domestic garden
654976	7.05	3974	511	14.4	10.5	1.131	2.413	1.131	2.412	Commercial and residential
655376	6.76	115	23	5.5	n.a.	1.163	2.442	1.157	2.435	Graveyard
655522	6.78	123	14	5	19.8	1.137	2.419	1.136	2.417	Unproductive open space
655783	7.07	1377	323	6.4	3.8	1.115	2.394	1.113	2.393	Domestic garden
655952	6	3798	1363	5.7	1.2	1.142	2.429	1.148	2.43	Domestic garden
656000	6.44	4530	1488	12	37.9	1.103	2.386	1.102	2.382	Domestic garden
656271	7.31	420	68	6.1	13.5	1.128	2.404	1.125	2.406	Hospital Grounds
656359	6.61	205	51	9.9	n.a.	1.141	2.424	1.135	2.424	Urban open space
656463	6.03	952	188	12.4	n.a.	1.148	2.43	1.145	2.427	Park
656571	6.9	230	57	7.8	7.3	1.116	2.394	1.116	2.399	Domestic garden