Table 1: Elms Farm; Facies Types (soil microfabric types and associated data)

Material	Sample Number examples	Sampling depth, Soil Micromorphology (SM), Bulk Data (BD), Microprobe (Probe) and Elemental Map (EM) and FTIR.	Phase, Interpretation and Comments
Soil Microfabric 1a/Microfacies 1a	**M3**	5-80 mm SM: *Structure*: massive with burrows; 30% voids, channels, and complex and simple packing voids; *Coarse Mineral*: C:F (limit at 10 µm), 70:30; very dominant poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; silt-size quartz; few stone size flint; *Coarse Organic/Anthropogenic*: frequent wood charcoal; rare brown stained sand-size bone/scat and likely human coprolite (some bone non-autofluorescent); rare relict fine (<0.5 mm) size roots; very few (x2) small stone-size pot; humified plant lengths/byre fragments and amorphous organic matter; *Fine Fabric*: heavily speckled and dotted, dark blackish brown (PPL), low interference colours (open porphyric, speckled b-fabric, XPL), dark brown with many black specks (OIL); very abundant charred and amorphous fine organic matter, with rare phytoliths; (very few inclusions of M2 soil); *Pedofeatures*: rare very thin (50 µm) dusty dark yellowish to reddish brown clay void coatings (possibly phosphate rich);	Phase II: Area J: below Roman gravel surface. (5211) upper fill 0.5-80 mm: very dominant fine to coarse charcoal-rich dumps with few traces of stabling waste; background levels of coprolites and animal scat; vegetated open space.
Soil Microfabric 1b/Microfacies 1b	**M2; BD2** (929)	125-200 mm SM: *Structure*: spongy and burrowed; 20% voids, vughy with channels, and complex and simple packing voids; *Coarse Mineral*: C:F (limit at 10 µm), 70:30 – 60-40; very dominant poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; frequent fine sand-coarse silt-size quartz dominated patches/burrow fills; (rare instances of diatom-rich silt); *Coarse Organic/Anthropogenic*: very few wood charcoal; occasional 2 mm+ long humified plant lengths/byre/crust fragments associated with yellowish brown cemented articulated phytoliths, phytolith concentrations, diatoms and diatom concentrations (very abundant) and patches of amorphous organic matter; rare brown stained sand-size bone/scat and likely human coprolite (somebone is poorly autofluorescent under UVL); *Fine Fabric*: heavily speckled and dotted, dark yellowish brown (PPL), low interference colours (open porphyric, speckled b-fabric, XPL), dark brown with black specks (OIL); abundant charred and amorphous fine organic matter, with rare to abundant phytoliths, rare to abundant diatoms; *Pedofeatures*: rare very thin (50 µm) dusty clay void coatings in burrow fills rich in phytolith and diatom silt-fine sand fabric; rare to occasional dark yellowish brown fine (200 µm) void infillings of likely iron	Phase II: Area J (5211): middle fill 125-200 mm: very dominant earthworm worked and burrowed deposit of byre and stabling waste, typically rich in silts, phosphate-cemented articulated phytoliths, humified organic fragments and diatoms (ingested or brought in from waterholes on hooves); background levels of scat and "night-soiling"; vegetated open space.

		phosphate (see M6 probe), also cementing articulated phytoliths. BD: poorly humic (3.8% LOI) and moderately phosphate-rich (2200 ppm P_2O_5OI), with low MS (47 x 10^{-8}SIkg^{-1}), and enhanced Pratio (1.4).	
Soil Microfabric 2/Microfacies 2	**M1; BD1** (928)	250-310 mm SM: *Structure*: massive with burrows; 30% voids, channels, and complex and simple packing voids; *Coarse Mineral*: C:F (limit at 10 µm), 70:30; common small stones (20-35 mm) of flint, with dominant poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; frequent coarse silt-size quartz; *Coarse Organic/Anthropogenic*: very few wood charcoal spread at base of sample; rare relict fine (<0.5 mm) size roots; rare instance of 2 mm long humified plant lengths/byre/crust fragments; rare brown stained sand-size bone/scat and likely human coprolite; rare instance of sand-size fused ash (melted phytoliths and blackened cereal hairs); *Fine Fabric*: heavily speckled and dotted, dark yellowish brown (PPL), low interference colours (open porphyric, speckled b-fabric, XPL), dark brown with black specks (OIL); abundant charred and amorphous fine organic matter, with rare phytoliths; *Pedofeatures*: rare dark yellowish brown fine (200 µm) void infillings of likely iron phosphate (see M6 probe). BD: poorly humic (3.7% LOI) and moderately phosphate-rich (1240 ppm P_2O_5OI), with low MS (43 x 10^{-8}SIkg^{-1}), and enhanced Pratio (1.3).	Phase II: Area J (5211): lower fill 250-310 mm: basal accretion and dump of occupation debris, with rare fused cereal waste, traces of stabling material and background levels of scat and "night-soiling"; vegetated open space. (Fill over natural sands and gravels – 5213)(Less humic and phosphate-rich compared to overlying layer)
Microfacies 3	**BD4**	170-250 mm BD: humic (8.4% LOI) and poorly phosphatic (550ppm P_2O_5OI), with low MS (61 x 10^{-8} SIkg^{-1}), and enhanced Pratio (2.3).	Phase II: Area J (5506/5589): 250 mm thick brickearth clay floor layers: humic but poorly phosphatic layer, likely indicative of interbedded organic material, with little input of phosphate – so likely "clean" non-stabling, non-dumping area.
Soil Microfabric 4a/Microfacies 4a	**M5; BD5**	30-460 mm SM: *Structure*: massive with bedded sediments; 380-390 mm - laminated sands, 390-420(440) mm – clean sands; 420(440) mm – loamy sands; 35% voids, very dominant complex packing voids, with open channels and vughs; *Coarse Mineral*: C:F (limit at 10 µm), 85:15; frequent small stones (20 mm) of flint, with dominant poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; very few coarse silt-size quartz; *Organic/Anthropogenic*: very few wood charcoal; rare instances of bone and root traces *Fine Fabric*: speckled, grey to yellowish brown (PPL), low to medium interference colours (monic/gefuric/chitonic, speckled b-fabric, XPL), mainly pale yellow with dark brown patches (OIL); rare charred and amorphous fine organic matter, with rare phytoliths; *Pedofeatures*: rare thin (50 µm) dusty clay void coatings and infills, predating rare multi-laminated dark coloured thin (50 µm) dusty clay void coatings,	Phase II: Area J (5972): at the base of some 410 mm of roadside sands: washed and leached roadside sands and gravels, comprising: 380-390 mm: sands with iron-depleted clay, with laminae of weakly phosphatic iron stained soil, 390-420(440) mm: clean sands, 420(440) mm: loamy sands with very few charcoal, instances of bone and rare phytoliths; yellowish clay strongly stained with weakly phosphatic iron; a last phase of dark dusty clay inwash; sediments contain included soil relic features of once being weakly formed argillic brown sand subsoils (Bt horizon). Open ground,

		which post-date, abundant amorphous yellow ferruginous (and possibly weakly phosphatic) impregnations and nodules – commonly as pans. BD: very poorly humic (1.2% LOI) with low phosphate (630 ppm P_2O_5OI), with very low MS (9 x 10^{-8}SIkg^{-1}), and enhanced Pratio (1.3).	with occasional plants, receiving inwashed sands and gravels from nearby road, including inputs of dilute phosphate as reflected in low phosphate content; soil likely affected by flooding and common high water tables – hence very low MS.
Soil Microfabric 1c/Microfacies 1c	**M6; BD6a and 6b**	200-340 mm: SM: *Structure*: massive/prismatic with burrows; 35% voids, open channels and vughs; *Coarse Mineral*: C:F (limit at 10 µm), 70:30; few small stones (20-35 mm) of flint, with dominant poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; frequent coarse silt-size quartz; *Organic/Anthropogenic*: few wood charcoal spread at base of sample; many mm to cm size patches of yellow to dark brown black amorphous organic matter with sheets of phytoliths and cellular material preserved – yellow-staining into surrounding fine fabric (night soil); rare brown stained sand-size bone/scat and likely human coprolite (autofluorescent under UVL); *Fine Fabric*: heavily speckled and dotted, dark yellowish brown (PPL), low interference colours (open porphyric, speckled b-fabric, XPL), dark brown with black specks (OIL); abundant charred and amorphous fine organic matter, with rare phytoliths; *Pedofeatures*: occasional dark coloured thin (50 µm) dusty clay void coatings, associated with abundant amorphous yellow ferruginous (and likely phosphatic) impregnations and nodules. Probe: yellow stained concretions: 0.04% Na, 0.11% Mg, 1.28% Al, 12.31% Si, 0.22% P, 0.02% S, 0.33% K, 0.68% Ca, 0.05% Ti, 0.05% Mn, 0.57% Fe; EM: scatter of flint and quartz (Si) with a clay (Al/Si) matrix containing K, Mg, Ca and P; FTIR of yellow cement: nearest fit was jarosite ($KFe_3(SO_4)_2(OH)_6$; possibly neoformed from breakdown of Ca and K-rich ash? BD: humic (5.7-6.0% LOI) and phosphate-rich (2920-3210 ppm P_2O_5OI), with low MS (58-68 x 10^{-8}SIkg^{-1}), and enhanced Pratio (1.2-1.3).	Phase II: Area J (5951/5987): beneath 60 mm of Roman gravel surface and some 140 mm of occupation deposits: soil and occupation debris waste fill, marked by major dumping of phosphate and organic matter-rich "night-soil" (hence one of the most highest phosphate contents on site), possibly alongside ashes and fine charcoal (used to "sweeten" the cess bucket fill); post-depositional weathering and decalcification and localised waterlogging led to iron hydroxide (phosphate) formation.
Soil Microfabric 5/Microfacies 5	**M7; BD 7**	270-380 mm SM: *Structure*: massive with channel/vughy microstructure; burrowed; 15-20% voids, open and closed vughs with fine channels; *Coarse Mineral*: C:F (limit at 10 µm), 60:40; very few small stones (20-35 mm) of flint, with dominant moderately well sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; frequent coarse silt-size quartz; *Organic/Anthropogenic*: instance of 30 mm long coarse bone fragment that is patchily autofluorescent under UVL; few wood charcoal (frequent in burrow fill microfabric c); *Fine Fabric*: three microfabrics, few a) finely speckled greyish yellowish brown (PPL), low interference colours (open porphyric, speckled b-fabric, XPL), yellowish brown with black and orange specks (OIL); many charred and amorphous	Phase II: Area J (6676): below 270 mm thick Roman surfaces: Brickearth slab composed of Eb upper subsoil horizon soil, with frequent burrows infilled with humic and charcoal-rich soil, that also shows evidence of slaking and inwash – from a likely overlying occupation surface, and includes inputs of phosphate; soil also trampled in from surrounding humic soils/turf surfaces or turf from construction. Occupation brickearth soil layers merge downwards into natural strong

		fine organic matter, with occasional phytoliths; common b) finely speckled grey (PPL), low interference colours (close porphyric, speckled b-fabric, XPL), grey with rare black specks (OIL); occasional charred and amorphous fine organic matter, with occasional phytoliths; frequent c) finely speckled and dotted dark yellowish brown (PPL), low interference colours (close porphyric, speckled b-fabric, XPL), yellowish brown with black and orange specks (OIL); abundant charred and amorphous fine organic matter, with occasional phytoliths; *Pedofeatures*: a) rare thin (50 μm) dusty yellow brown void clay coatings; c) many to abundant multi-laminated thick (600 μm), dusty and impure clay coatings and infills, and intercalations; microfabric c also associated with many dark brownish ferruginous stains and impregnations some as fan-like shaped iron hydroxide; general: occasional amorphous yellow to dark brownish ferruginous (and likely phosphatic) impregnations and nodules. BD: moderately humic (4.9% LOI) and phosphate-rich (1470ppm P_2O_5OI), with very low MS (16 x 10^{-8}SIkg^{-1}), and enhanced Pratio (1.5).	brown (7.5YR4/6-4/8) brickearth subsoil.
Soil Microfabric 6/Microfacies 6	**M8; BD8**	160-240 mm SM: *Structure*: massive/subangular blocky with burrows; 30% voids, complex and simple packing voids with open channels and vughs; *Coarse Mineral*: C:F (limit at 10 μm), 75:25; frequent small stones (20-30 mm) of flint, with dominant poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; frequent coarse silt-size quartz; *Organic/Anthropogenic*: few wood charcoal – some as fragmenting 18 mm diameter twig wood sections; rare instances of coarse (15 mm) size bone, burned bone (low autofluorescence under UVL); occasional to many scat/nightsoil/human coprolitic bone (zero to moderate autofluorescence under UVL) – some including bone and plant food residues – bran?; rare 1-2 mm size patches of charred/humified plant lengths/byre fragments and amorphous organic matter, containing abundant phytoliths and rare diatoms; fused cereal waste with very abundant phytoliths and vesicular silica fabric including melted flint (strongly autofluorescent under UVL); vesicular sand rich nodules also present; *Fine Fabric*: heavily speckled and dotted, dark brown to blackish brown (PPL), very low interference colours (close porphyric, speckled b-fabric, XPL), dark brown with abundant black specks (OIL); very abundant charred and amorphous fine organic matter, with occasional to many phytoliths, and rare diatoms; *Pedofeatures*: rare to occasional amorphous yellow ferruginous (and likely phosphatic) impregnations and nodules, rarely with vivianite – some associated with amorphous organic matter and phytolith concentrations; rare thin (50 μm) dusty yellow brown void and grain clay coatings.	Phase II: Area J (13806): beneath Iron Age stony surfaces 13804 (100 mm) and 13805 (100-160 mm): pit fill of burned domestic and byre waste, rich in charcoal, fused cereal waste, and burned diatom and phytolith-rich and sandy fused mineral material; also present are large quantities of coprolitic waste from scat, human coprolites and night-soil sources (all contributing to high phosphate). No iron-working waste (e.g. hammerscale) was found and the only moderate MS reflects this.

		BD: humic (8.1% LOI) and phosphate-rich (3390 ppm P_2O_5OI), with moderate MS (92 x 10^{-8}SIkg^{-1}), and enhanced Pratio (1.2).	
Soil Microfabric 4b/Microfacies 4b	**M9**	Sampled by Essex CC SM: *Structure*: massive; 30% voids, very dominant complex packing voids, with very few open channels and vughs; *Coarse Mineral*: C:F (limit at 10 µm), 90:10; common small stones (20-25 mm) of flint with very few pieces of pottery; common poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; very few coarse silt-size quartz; *Organic/Anthropogenic*: rare instances (x2) of sand-size scat/coprolite that are weakly autofluorescent under UVL and iron/phosphate? cemented charcoal; *Fine Fabric*: speckled, dark yellowish brown (PPL), very low interference colours (monic/gefuric/chitonic, speckled b-fabric, XPL), dark brown patches with occasional black specks (OIL); many mainly amorphous fine organic matter, with rare instances of phytoliths; *Pedofeatures*: rare amorphous yellow ferruginous (and possibly weakly phosphatic) impregnations and nodules; dominant amounts of very thin to thin (<100 - <500 µm) organic and organo-mineral excrements .	Phase II: Area I (5883/5839): natural gravels and sands mixed with small amounts of anthropogenic materials (very few pot and coprolite fragments – bone and night soil –charcoal cemented with Fe/P?), with fine infill of humic soil, which is of likely raw humus acid content and hence the dominance of very thin excrements. The high amount of humic material may also have an inferred origin – weathered animal dung waste from the overlying surface. Both the organic matter and the anthropogenic inclusions are small enough to have been worked down-profile by fauna.
Soil Microfabric 4b/Microfacies 4b	**M10**	Sampled by Essex CC SM: *Structure*: massive; 40% voids, very dominant complex packing voids, with very few open channels and vughs; *Coarse Mineral*: C:F (limit at 10 µm), 80:20; common small stones (20-25 mm) of flint with very few pieces of pottery; common poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; very few coarse silt-size quartz; *Organic/Anthropogenic*: rare instances (x1) of bone/coprolite and sand-size hammerscale (x1); and iron/phosphate? cemented charcoal; *Fine Fabric*: speckled, dark yellowish brown (PPL), very low interference colours (monic/gefuric/chitonic, speckled b-fabric, XPL), dark brown patches with occasional black specks (OIL); many mainly amorphous fine organic matter, with rare phytoliths; *Pedofeatures*: rare amorphous yellow ferruginous (and possibly weakly phosphatic) impregnations and nodules; dominant amounts of very thin to thin (<100 - <500 µm) organic and organo-mineral excrements .	Phase II: Area I (5883): natural gravels and sands mixed with small amounts of anthropogenic materials (rare coprolites and charcoal cemented with Fe/P and an example of hammerscale), with fine infill of humic soil, of likely raw humus acid content and hence the dominance of very thin excrements. The high amount of humic material may also have an inferred origin – weathered animal dung waste from the overlying surface.
Soil Microfabric 4b/Microfacies 4b	**M11**	Sampled by Essex CC SM: *Structure*: massive; 30% voids, very dominant complex packing voids, with very few open channels and vughs; *Coarse Mineral*: C:F (limit at 10 µm), 75:25; common small stones (20-30 mm) of flint with very few pieces of pottery/burned daub; common poorly sorted subangular to angular fine sand to coarse sand-size quartz, flint and quartzite; very few coarse silt-size quartz; *Organic/Anthropogenic*: rare instances (x2) of bone/coprolite; and iron/phosphate? cemented charcoal; *Fine Fabric*: speckled, dark yellowish brown	Phase II: Area I (5883/5935): natural gravels and sands mixed with small amounts of anthropogenic materials (rare coprolites and charcoal cemented with Fe/P), with fine infill of humic soil, of likely raw humus acid content and hence the dominance of very thin excrements. The high amount of humic material may also have an inferred origin –

		(PPL), very low interference colours (monic/gefuric/chitonic – porphyric in places, speckled b-fabric, XPL), dark brown patches with occasional black specks (OIL); many to abundant mainly amorphous fine organic matter, with rare phytoliths; *Pedofeatures*: rare amorphous yellow ferruginous (and possibly weakly phosphatic) impregnations and nodules – sometimes cementing charcoal fragments; dominant amounts of very thin to thin (<100 - <500 µm) organic and organo-mineral excrements .	weathered animal dung waste from the overlying surface.
Soil Microfabric 4c/Microfacies 4c	**M12**	Sampled by Essex CC 0-30 mm SM: *Structure*: massive with frequent burrows; 25% voids, very dominant complex packing voids, with very few open channels and vughs; *Coarse Mineral* and *Organic/Anthropogenic*: as MFT4b, frequent gravel-size material, mainly of up to 10 mm size brickearth fragments (dark reddish brown to black [PPL], moderate interference colours [very close porphyric, speckled, reticulate and grano-striate b-fabric, XPL], yellow, orange to black [OIL], with coarse mineral of, C:F, 65:35, very dominant coarse angular silt to medium sand-size quartz; trace only of organic matter; pedofeatures include occasional thin void clay coatings and intercalations, and very abundant iron (in places Fe/Mn?) impregnations, with rare partial void infills of yellowish amorphous material that is weakly autofluorescent under UVL [Ca/P?]; *Fine Fabric*: speckled and dotted dark yellowish/greyish brown (PPL), low interference colours (porphyric, speckled b-fabric, XPL), yellowish brown with rare black specks (OIL); many amorphous and occasional charred fine organic matter with rare phytoliths; *Pedofeatures*: rare to occasional dusty clay void and grain coatings, especially associated with fine fabric in burrow fills; many impregnative iron mottles, with possible rare amorphous Fe/P infills; frequent >500 µm likely earthworm organo-mineral excrements. 30-80 mm: as above, but only very few gravel, including only very few brickearth fragments.	Phase II: Area E (8067?): spread of gravel and brickearth stained by iron mottling and of likely building/occupation origin, over more natural sands and gravels. A weakly humic fine soil had been both washed and earthworm-worked into these sands and gravels, possibly from a putative overlying humic (dung-rich) silty occupation soil. Ground water fluctuations have caused iron mottling.
Soil Microfabric 4c/Microfacies 4c	**M13**	Sampled by Essex CC SM: as M12 0-30 mm, but with C:F, 55:45; many dusty clay coatings, some as very pale grey (iron-depleted) variants; many impregnative iron mottles, with occasional to many amorphous Fe/P infills; frequent >500 µm likely earthworm organo-mineral excrements.	Phase II: Area E (8067?): spread of gravel and brickearth stained by iron mottling and of likely building/occupation origin. A weakly humic fine soil had been both washed and earthworm-worked into these sands and gravels, possibly from a putative humic (dung-rich) silty occupation soil. Inwash of water containing phosphate is also likely. Ground water fluctuations have caused iron mottling and leached soil zones.