

4. RADIOCARBON DATING

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A total of 30 sub-samples were submitted for radiocarbon dating. All 30 samples were single entities (Ashmore 1999) and comprised plant macrofossil elements, predominantly cereal caryopses and charcoal, with one hazelnut shell, apart from a single cremated human bone sample. Dating was undertaken by the Scottish Universities Environmental Research Centre (SUERC). The material derives from fills of features associated with structures (Structures A to H), pit clusters (Pit Groups 1 and 2), and other features, including a number of iron working pits spread across the development area and discrete features, including pit [092] and pit [037], from the latter of which fragments of quernstone (SF 12 and SF 13) were recovered. A sample of cremated bone was also radiocarbon dated from deposit (060)/(065) from cremation pit [059]. Conventional radiocarbon ages (Stuiver & Polach 1977) for all 30 samples are presented in Table 1 and Illus 21. Calibrated date ranges were calculated using the terrestrial calibration curve (IntCal13) and OxCal v4.4. Bayesian modelling of 27 of the 30 dated samples was undertaken (not including dates highlighted grey in the table, which were of uncertain security).

The radiocarbon dates were analysed using a Bayesian approach, a form of Markov Chain Monte Carlo sampling, applied using the online program

OxCal v4.4 (<http://c14.arch.ox.ac.uk/>). Details of the algorithms employed by this program are available in Bronk Ramsey (1995; 1998; 2001; 2009) and in the online manual. As noted above, the model includes data from 27 of the 30 samples, as the conventional dates of three samples appeared to be of uncertain security, perhaps representing the presence of residual (or intrusive) material. It should be noted more generally that many features on site appeared to be shallow and/or truncated, leading to a degree of insecurity in some of the material available for scientific dating.

Following the removal of problematic dates (samples SUERC-95366, SUERC-104039, and SUERC-104040), the model represents eleven phases of activity ranging from the Mesolithic-Neolithic transition to the medieval period, with floruits of archaeological activity in the later 1st millennium BC and early 1st millennium AD (Middle Iron Age and Late Iron Age Phases 4 and 5) and in the later 1st millennium AD (early medieval Phases 7 to 9). Two likely medieval features were recorded: pit [092] (Phase 10), and pit [033] (Phase 11). The model has good agreement ($A_{model}=107.7$) between the majority of the radiocarbon dates, and only one date had an agreement of less than 90%. A sample of hazel charcoal (SUERC-104036) from the fill of posthole [102] had an agreement of 74.3%. A date with an agreement index less than 60% is considered to have poor agreement with the overall model and may represent intrusive material.

Table 1 Radiocarbon dating results from Craggan (grey highlight = not included in model)

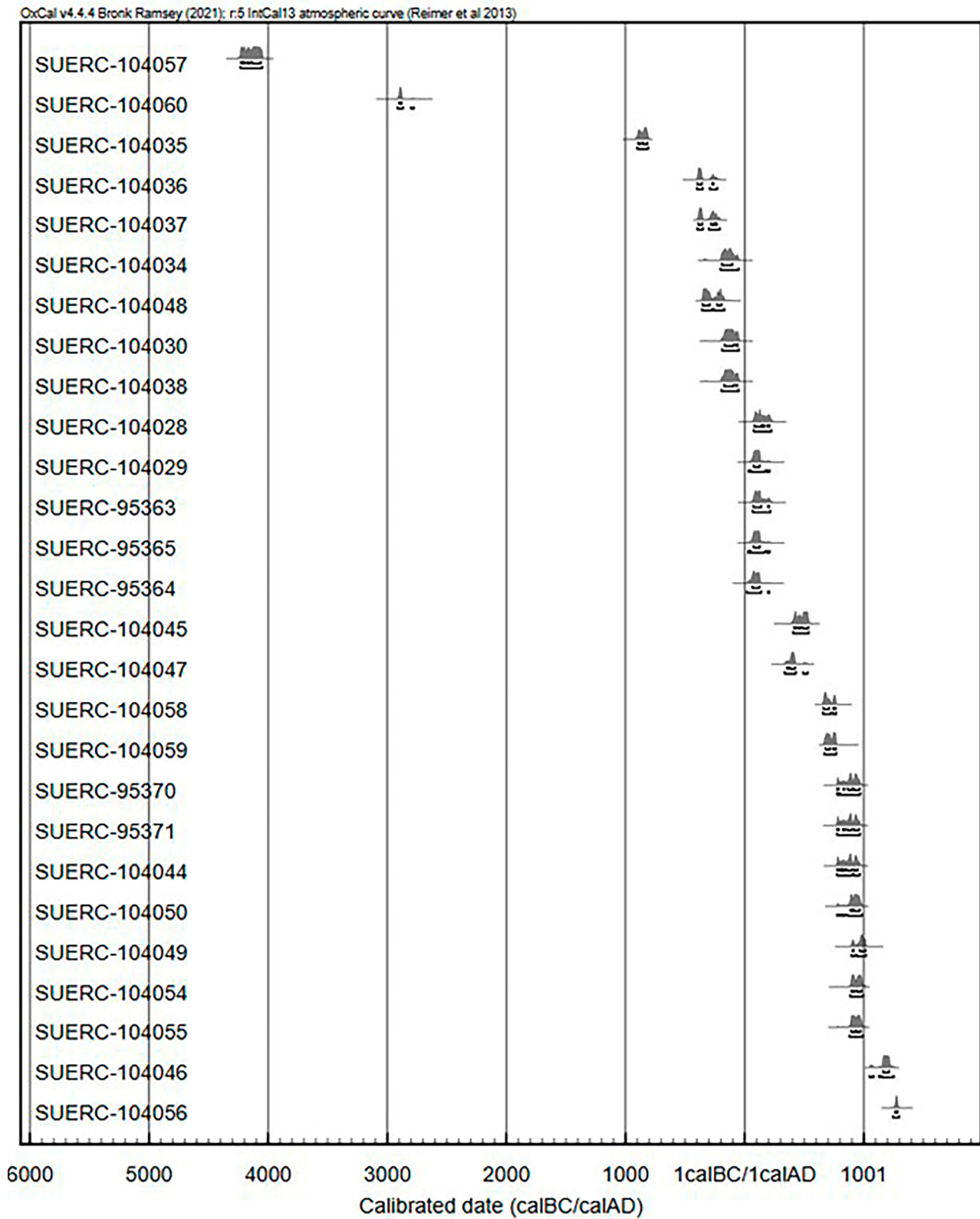
SUERC Code	Material	Context No.	Feature No.	Radiocarbon Age (BP)	Calibrated Date (95.4%)	$\delta^{13}\text{C}_{\text{‰}}$	Area	Phasing
SUERC-104057	Pine charcoal from pit [031], Pit Group 1	032	031	5313±26	4241–4049 cal BC	-27.0%	Pit Group 1	Mesolithic/ Neolithic = 1
SUERC-104060	Cremated human bone (long bone) from pit [059] in vicinity of ring ditch Structure G	060/065	059	4254±26	2915–2868 cal BC; 2802–2774 cal BC	-22.0%	Structure G	Late Neolithic = 2
SUERC-104035	Pine charcoal from fire pit [106], Structure F	107	106	2704±26	903–808 cal BC	-26.3%	Structure F	LBA = 3
SUERC-104036	Hazel charcoal from posthole [102], Structure F	103	102	2278±26	400–351 cal BC; 291–209 cal BC	-25.2%	Structure F	MIA = 4
SUERC-104037	Alder charcoal from ring ditch [061] Slot 2, Structure G	062 Slot 2	061	2261±26	394–350 cal BC; 305–208 cal BC	-26.5%	Structure G	MIA = 4
SUERC-104034	Birch charcoal from posthole [214], Structure E	215	214	2116±26	336–330 cal BC; 198–51 cal BC	-26.0%	Structure E	MIA = 4
SUERC-104048	Hazel nut shell from pit [124]	125	124	2180±26	361–154 cal BC	-23.7%		MIA = 4
SUERC-104030	Alder charcoal from ring ditch [130], Structure E	218 SE	130	2099±26	196–185 cal BC; 179–43 cal BC	-27.3%	Structure E	MIA = 4
SUERC-104038	Birch charcoal from ring ditch [061] Slot 3, Structure G	062 Slot 3	061	2104±26	196–46 cal BC	-27.3%	Structure G	MIA = 4
SUERC-104028	Birch charcoal from posthole [080], Structure D	081	080	1869±26	cal AD 120–237	-27.0%	Structure D	LIA = 5

Table 1 cont.

SUERC Code	Material	Context No.	Feature No.	Radiocarbon Age (BP)	Calibrated Date (95.4%)	$\delta^{13}\text{C}_{\text{‰}}$	Area	Phasing
SUERC-104029	Alder charcoal from posthole [088], Structure D	089	088	1899±26	cal AD 70–216	-26.4‰	Structure D	LIA = 5
SUERC-95363	Alder charcoal from ring ditch [3001] Slot 1, Structure C	3002 (Slot 1)	3001	1881 ±27	cal AD 68–217	-26.4‰	Structure C	LIA = 5
SUERC-95365	Birch charcoal from posthole [39019], Structure A	39020	39019	1901 ±27	cal AD 29–39; cal AD 50–174; cal AD 192–211	-26.4‰	Structure A	LIA = 5
SUERC-95364	Cereal caryopsis (hulled barley) from pit/posthole [3003], Structure C	3004	3003	1913 ±27	cal AD 20–139; cal AD 197–206	-22.1‰	Structure C	LIA = 5
SUERC-104045	Cereal caryopsis (hulled barley) from pit [273]	307	273	1595±26	cal AD 420–542	-22.1‰		EM = 6
SUERC-104047	Birch charcoal from possible fire pit [039]	040	039	1647±26	cal AD 265–273; cal AD 354–442; cal AD 449–480; cal AD 494–536	-26.1‰		EM = 6
SUERC-104058	Cereal caryopsis (hulled barley) from pit [011], Pit Group 2	012	011	1309±26	cal AD 657–710; cal AD 722–775	-24.6‰	Pit Group 2	EM = 7
SUERC-104059	Birch charcoal from fire pit [017], Pit Group 2	018	017	1284±26	cal AD 663–776	-25.9‰	Pit Group 2	EM = 7
SUERC-95370	Birch charcoal from hearth [39035], Structure B	39036	39035	1149 ±27	cal AD 777–793; cal AD 801–971	-26.9‰	Structure B	EM = 8
SUERC-95371	Alder charcoal from pit [39037], Structure B	39038	39037	1154 ±27	cal AD 776–969	-25.8‰	Structure B	EM = 8

Table 1 cont.

SUERC Code	Material	Context No.	Feature No.	Radiocarbon Age (BP)	Calibrated Date (95.4%)	$\delta^{13}\text{C}_{\text{‰}}$	Area	Phasing
SUERC-104044	Cereal caryopsis (oat) from pit [037] associated with quernstones	038	037	1156±26	cal AD 772–790; cal AD 821–979	-23.6‰		EM = 8
SUERC-104050	Alder charcoal from pit [202]	203	202	1131±26	cal AD 774–785; cal AD 834–844; cal AD 877–993	-27.8‰		EM = 9
SUERC-104049	Rowan charcoal from pit [170]	171	170	1071±26	cal AD 894–928; cal AD 946–1025	-27.3‰		EM = 9
SUERC-104054	Birch charcoal from pit [311]	312	311	1102±26	cal AD 887–995; cal AD 1009–1012	-27.7‰		EM = 9
SUERC-104055	Alder charcoal from pit [337]	338	337	1114±26	cal AD 885–994	-28.8‰		EM = 9
SUERC-104046	Hazel charcoal from pit [092]	235	092	861±26	cal AD 1053–1075; cal AD 1156–1233; cal AD 1240–1260	-28.1‰		Medieval = 10
SUERC-104056	Cereal caryopsis (oat) from pit [033], Pit Group 1	034	033	728±26	cal AD 1232–1242; cal AD 1258–1301; cal AD 1370–1378	-23.8‰	Pit Group 1	Medieval = 11
SUERC-104039	Cereal caryopsis (hulled barley) from posthole [279], Structure H	280	279	2469±26	763–469 cal BC; 435–423 cal BC	-24.8‰	Structure H	
SUERC-104040	Birch charcoal from posthole [283], Structure H	284	283	1171±26	cal AD 772–900; cal AD 918–960; cal AD 967–972	-26.1‰	Structure H	
SUERC-95366	Birch charcoal from ditch [39021], Structure A	39022	39021	1088 ±27	cal AD 893–1015	-25.7‰	Structure A	



Illus 21 OxCal plot of radiocarbon dates