



ARO29: Newcraighall, Edinburgh: A landscape of change through its archaeology and history

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ARO29: Newcraighall, Edinburgh: A landscape of change through its archaeology and history

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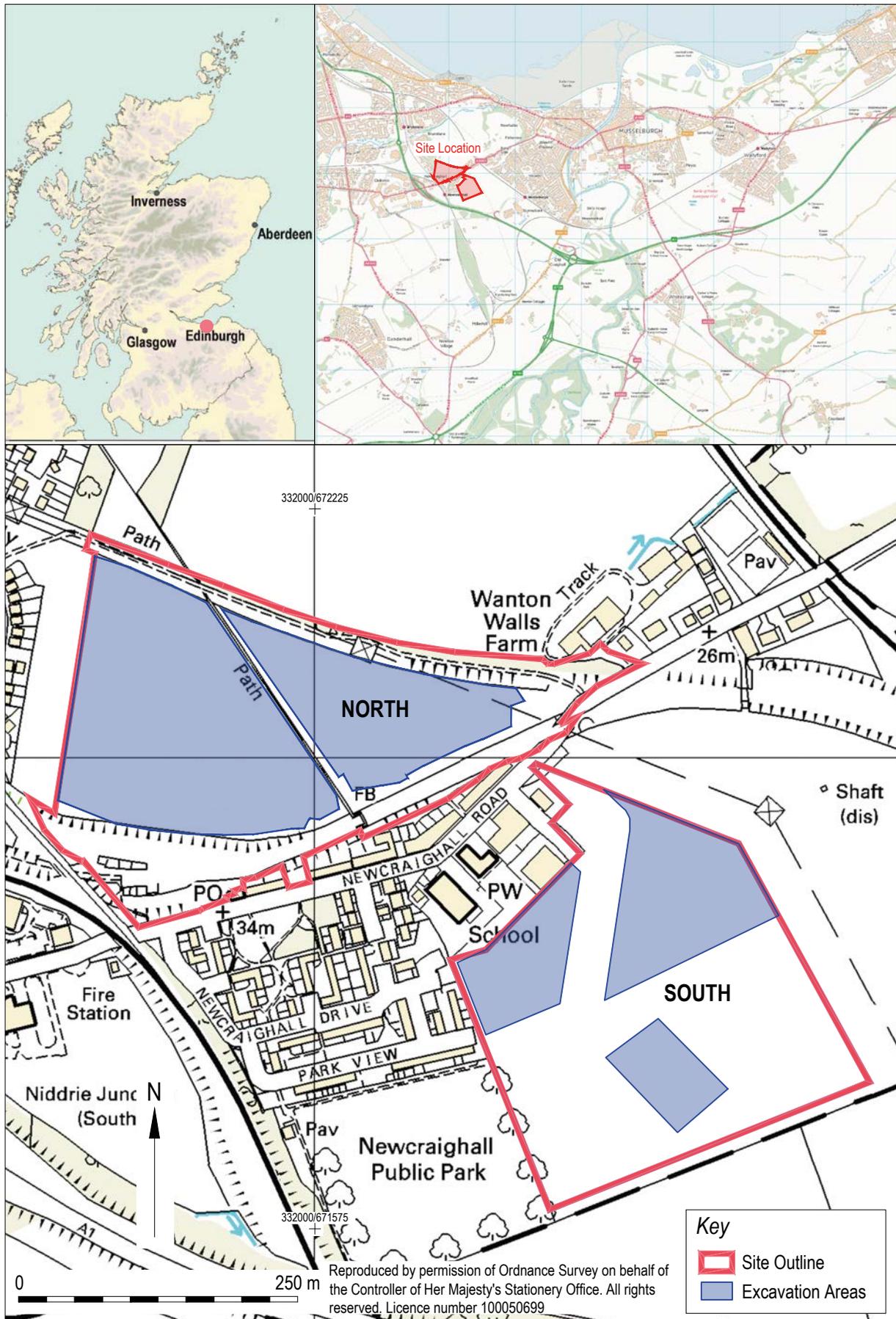


Figure 1: Site Location.

Abstract

A programme of archaeological work by GUARD Archaeology Ltd on the North and South sites at Newcraighall resulted in a complex story of land use changes from prehistory to the present day. This investigation was combined with detailed research into the history of the area for the seventeenth and eighteenth centuries.

The earliest activity recorded centred round groups of pits where the specialist evidence suggests that people during the late Mesolithic/early Neolithic, late Neolithic and Bronze Age had visited the place using pits for cooking and fires.

However, the majority of features, date from medieval times through the post-medieval period to modern times. These include various sized coal pits or shafts, and the footings of four structures, probably colliery buildings, arranged around a now infilled mineshaft on the southern site.

Elements of a designed landscape associated with Brunstane House included a *ha-ha* or proto-ha-ha that traversed the northern site. The presence of several large culverts may also have connections with both landscape alterations and the coal-mining industry. Fragments of curved and linear ditches may be remnants of earlier field systems dating from the medieval and post-medieval periods, and possibly relating to extensive remnants of broad rig cultivation found across the two areas. While many of the features were of unknown date, their spatial distribution suggests nineteenth to twentieth century activity.

The historical research demonstrates the complexities of landownership with evidence of the development of coal mining and coal ownership, the value of historical maps to the research, and the social and economic realities of the times. Other coal-related features included salt pans, water wheels and lime kilns. Examination of papers relating to Brunstane House showed that they had direct bearing on the understanding and dating of the landscaping features and other groundworks, including changes to the estate boundaries and also the runrig system. A labourer's daily diary for the winter of 1735-6 was an especially interesting find from the point of view of what work was undertaken on the estate, by whom and for how much.

This project shows the value of combining two subject areas together, as from their partial evidences, it is possible to produce a much more rounded view of the life of the times from the landowner to the coal miner during the post-medieval and early modern times.

Introduction

This report draws together the results of a series of archaeological investigations carried out between 2011 and 2016 on land forming part of the policies around Brunstane House and Newhailes House near Newcraighall (Figure 1) (NGR: NT 323 718). The archaeological work led to documentary research into the history of the estate (see Historical Research) as well as research into the artefacts recovered from the investigations.

The work was instigated in 2011 by Barratt East Scotland who commissioned GUARD Archaeology Ltd to undertake a desk-based assessment, metal detecting survey, trial trench evaluation and subsequent strip, map and sample excavation across land to the north of Newcraighall (*Newcraighall North*) that contained a series of mineshafts and landscaping features associated with Brunstane House.

Further work was commissioned by Avant Homes (formerly Bett Homes) in 2015 on a proposed development area situated immediately south-east of Newcraighall (*Newcraighall South*). It consisted of a metal detecting survey, an archaeological evaluation, an open area excavation of a colliery works in the southern part, a strip, map and sample in the northern part of the development over possible mineshafts; an archaeological watching brief and monitoring visits (see Hunter Blair and Will 2016). Two possible mineshafts were uncovered in the southern area along with drains and other linear features. The fieldwork projects were directed by Alan Hunter Blair in 2011 and between 2014 and 2016.

The sites, formerly large fields, lie between the A1 to the south and west and the main East Coast railway line to the east. They lie on either side of the former mining village of Newcraighall and are situated on the southern boundary of Edinburgh City where it meets that of Musselburgh. The subsoil comprises deposits of till, of outwash sand

and gravel deposits, while the bedrock is part of the Scottish Lower Coal Measures Formation, which include sandstone, siltstone and mudstone with seatclay or seatearth and coal at the top. Coal seams are common and many exceed 0.3 m in thickness (British Geological Survey 2018).

All elements of fieldwork and reporting were conducted following the Chartered Institute for Archaeologists (CIfA) standards and guidance. The site archive is lodged with Nation Record of the Historic Environment and the finds have been declared to the Treasure Trove Unit.

Archaeological and historical background

The results of the 2011 desk-based assessment included the discovery of a ring-ditch cropmark, which was considered to represent a prehistoric roundhouse and settlement to the north-east of the Newcraighall North development areas. This was reidentified by Cross (see historical research) as an eighteenth century water feature. To the north, additional cropmarks were identified of potential prehistoric date, including the Brunstane enclosure, which is a Scheduled Ancient Monument, and another possible enclosure. These, together with aerial photographic evidence and previous archaeological investigations of similar cropmark sites, demonstrated that the Lothians were occupied relatively intensively, during later prehistory.

Lying also to the north of the proposed development area, are two known medieval sites. One is Brunstane moated enclosure, a rectilinear feature visible as a cropmark on aerial photographs. The other is Brunstane House, which first appeared in historical records in the early fourteenth century as a tower house built by the Crichtons. It was demolished in 1547 and rebuilt as a house on a new L-shape plan by c. 1565.

The present archaeological works took place on land that is geographically close to the battlefield of Pinkie, fought between the Scots and English on 10 September 1547 as part of the 'Rough Wooing', the attempt of the English to link the English and Scottish Kingdoms, through the marriage of the young Queen Mary of Scotland and Edward VI of England. The battle ended in a rout (a disorderly retreat of defeated troops) with

much equipment discarded by the fleeing Scots army. It is likely that some small metal finds found within the topsoil of Newcraighall North derived from this event.

While the bulk of archaeological sites within the proposed development area date to the post-medieval and modern periods, none of the historical maps of the seventeenth and eighteenth centuries consulted during the desk-based assessment depict any settlement, and only a light distribution of rural settlement is noted in the surrounding 1 km study area. The village of Newcraighall developed the late eighteenth and nineteenth centuries to cater for the needs of the expanding population of Edinburgh, including housing for workers in the surrounding nursery gardens. By the later nineteenth century, particularly after the opening of the Klondyke coal pit in 1897, the settlement had become predominantly a mining village. Some of the miners' cottages have been restored and are C listed buildings and are possibly depicted on the Andrew and Mostyn Armstrong map of 1773 as three rectangular buildings to the north-east of Newcraighall Road. The abandoned coal mineshafts across the development area are most likely associated with the Newcraighall or Klondyke Colliery, which operated between 1897 and 1968, and was located to the south-west of the site. The pit closed in 1968, and today there is little sign of Newcraighall's mining past. Another colliery, the New Craighall Colliery, was situated to the south-east with other mineshafts to the north-west.

The course of the former Fisherrow Branch of the Edinburgh and Dalkeith Railway Line forms part of the northern boundary of the Newcraighall South site and the southern boundary of the Newcraighall North site. It is depicted on all maps between the Ordnance Survey First Edition 6-inch map of 1854 and Bartholomew's map of 1934. Visible remains include a modern foot bridge that crossed over the railway line, now a path, and Wanton Walls Bridge.

Metal detecting survey results

Both Newcraighall North and South sites were subject to metal detecting surveys, primarily to recover any items associated with the Battle of Pinkie.

On Newcraighall North the metal detecting survey resulted in the recovery of 417 metal finds distributed widely across the area. Of these items, only nine were identified as having archaeological interest. The remainder includes heavily corroded nondescript iron fragments and represents agricultural and later mining activities, modern dumping and the nearby railway. Significant finds include a small musket ball, three belt fragments, three rectangular lead objects, a fragment of a possible axe and a late seventeenth/early eighteenth century coin.

The metal detecting survey of Newcraighall South also resulted in the recovery of a large number of metal artefacts, but after further examination many were discarded. Objects such as heavily corroded modern iron, lead, or alloy fragments including bolts, nails, wire and copper pipe, appeared to relate to recent agricultural activities, modern dumping and the nearby railway line. Important finds include four cast copper-alloy buckles from shoes, belts, or straps that may date to the nineteenth century, and two small lead discs, possibly weights. A circular lead medallion was also recovered, as were a decorated strap and a small cast lead Roman soldier.

Coins discovered during the metal-detecting survey included a possible Charles I farthing dating between 1625 and 1649, and a Charles I silver halfcrown of 1645. Two possible George III farthings were also recovered, one of which dates to 1799. A number of Victorian pennies and modern coins were also identified.

The archaeology

Excavation results

Groups of pits

Four groups of pits were identified on the Newcraighall North site (Figure 2). Group 1 (Plate 1) comprised nine pits aligned NNE/SSW, which measured c. 1 m in diameter by 0.3 m deep. They were filled with silty-clay and some charcoal flecks. Only the fill (033) of pit (041), contained a single artefact - a fragment of clay pipe stem.

Pit group 2 consisted of three shallow pits including pit (070) (Plate 2) randomly arranged north of a linear feature (065), perhaps associated with drainage and one pit located south of it. The pits measured c. 0.5 m in diameter and c.

0.23 m in depth. Some of their fills contained coal fragments, and post-medieval pottery was recovered from the fill (061) of pit (063).



Plate 1: Pit Group 1 during excavation. From the NNE.



Plate 2: Pit 070 in Pit Group 2 during excavation.

Pit group 3 comprised five pits randomly arranged along the western edge of the central mineshaft alignment. These measured c. 1 m in diameter and up to 0.3 m deep. Most of the fills contained coal, and finds include sherds of post-medieval pottery and green bottle glass shards (Plate 3).



Plate 3: General view of area during excavation of prehistoric pit groups.



Figure 2: Plan showing location of mineshafts, prehistoric pit groups and landscape structures.

Pit group 4 consisted of a vague linear alignment of six pits located towards the eastern edge of the site. Two of these (179 and 194) contained modern animal burial pits. The four remaining pits were sub-oval or sub-circular in plan and up to 0.39 m deep. Their fills contained modern ceramic and glass, which was not retained. An area of possible hardstanding (204) comprising sand with pea gravel may be associated with them.

Nine pits forming three small groups, pit groups 5, 6 and 7 were found on the Newcraighall South excavation area (Figures 2, 3 and 4). The pits generally measured up to 1.02 m in diameter by c. 0.39 m deep.

Pit group 5 comprised three pits (2075, 2069 and 2092/2095) spaced closely together. Pit (2075) was filled with a firm, mid-brown silty-sand with sandstone fragments. A prehistoric flint knife (SF 46) was recovered from this pit during excavation.

Pit group 6 consisted of two pits (2080 and 2091) to the south of pit group 5. Pit 2091 contained sufficient charcoal in its fills to suggest it may represent a cooking pit. A small chert/flint core was recovered from its base.

Pit group 7 comprised four pits (2084, 2086, 2088 and 2096). Finds attributable to the prehistoric period were recovered in the form of pottery fragments from the fills of pits 2088 and 2096 during excavation.

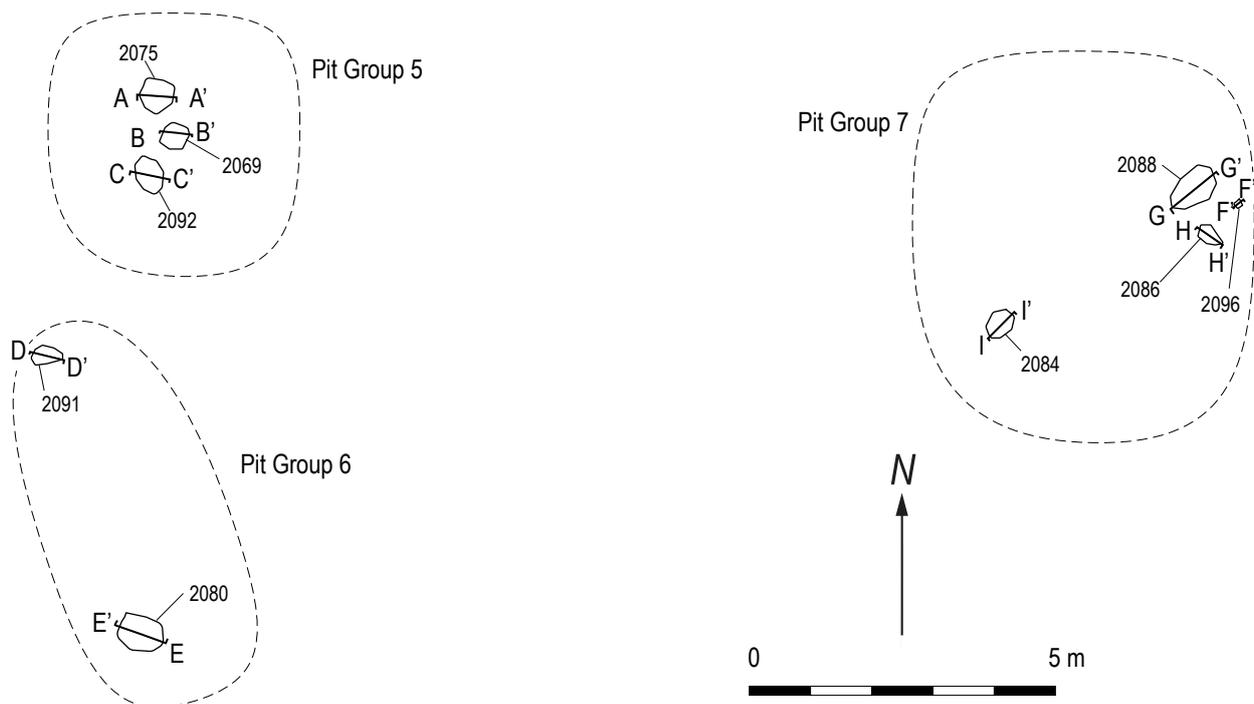


Figure 3: Plan of pit groups 5 (later Neolithic), 6 (late Mesolithic/early Neolithic) and 7 (later Neolithic).

Coal mining activities

The majority of features encountered during the archaeological work were related to mining activities. Distinct areas of mine working were identified across both the north and south parts of the site as discrete but discontinuous pit alignments of varying shapes and sizes. The pits were generally sub-rounded small or medium-sized features with steep-sides. Others were large, oval and some were shafts (Figure 5). Generally, they measured either c. 1.5 m in diameter or up to 16 m long by 8 m wide. A total of 63 pits, probably directly related to mining were recorded, but given the health and safety implications of excavating these features and in order to minimize ground disturbance, only 18 examples were trial excavated. This was done in order to characterise and date them, and for the possible retrieval of any artefacts. The smaller pits were excavated to a depth of 1.35 m by hand and the larger pits to a depth of 7 m by machine. All the pits on the Newcraighall South area were subject to machine excavation during geotechnical site investigation works.

The upper fills of these pits varied: some had coal-rich earth, others contained large amounts of ash and industrial metal-working debris, others had coal-rich, blue/grey shale, and a small number were found with the addition of random sandstone cobbles. Of the larger oval pits

excavated by machine, some were filled in with earth and rubble, others with shale and coal.

Most of the finds recovered from these features comprise post-medieval pottery, although the fill (030) of pit 031 (Plate 4), in the central pit alignment, yielded sherds of medieval Scottish East Coast White Gritty Ware. Post-medieval and early modern pottery, glass shards and clay pipe fragments were recovered from the fills of the larger oval pits.



Plate 4: Mining pit 036 in foreground with pit 031 to the rear in the central pit alignment. From the south.

Seven pits that had ashy, slag-rich upper fills were generally sub-circular or sub-oval in plan and measured c. 5 m to 8 m. The majority of these features were found in the eastern pit alignment on the northern site, with a single ash-filled pit

(139) located in the central pit alignment (Plate 5). Post-medieval pottery, glass sherds, clay pipe fragments, slag and occasional animal bone fragments were recovered from the fill of pit (088) in the western pit alignment (Plate 6).

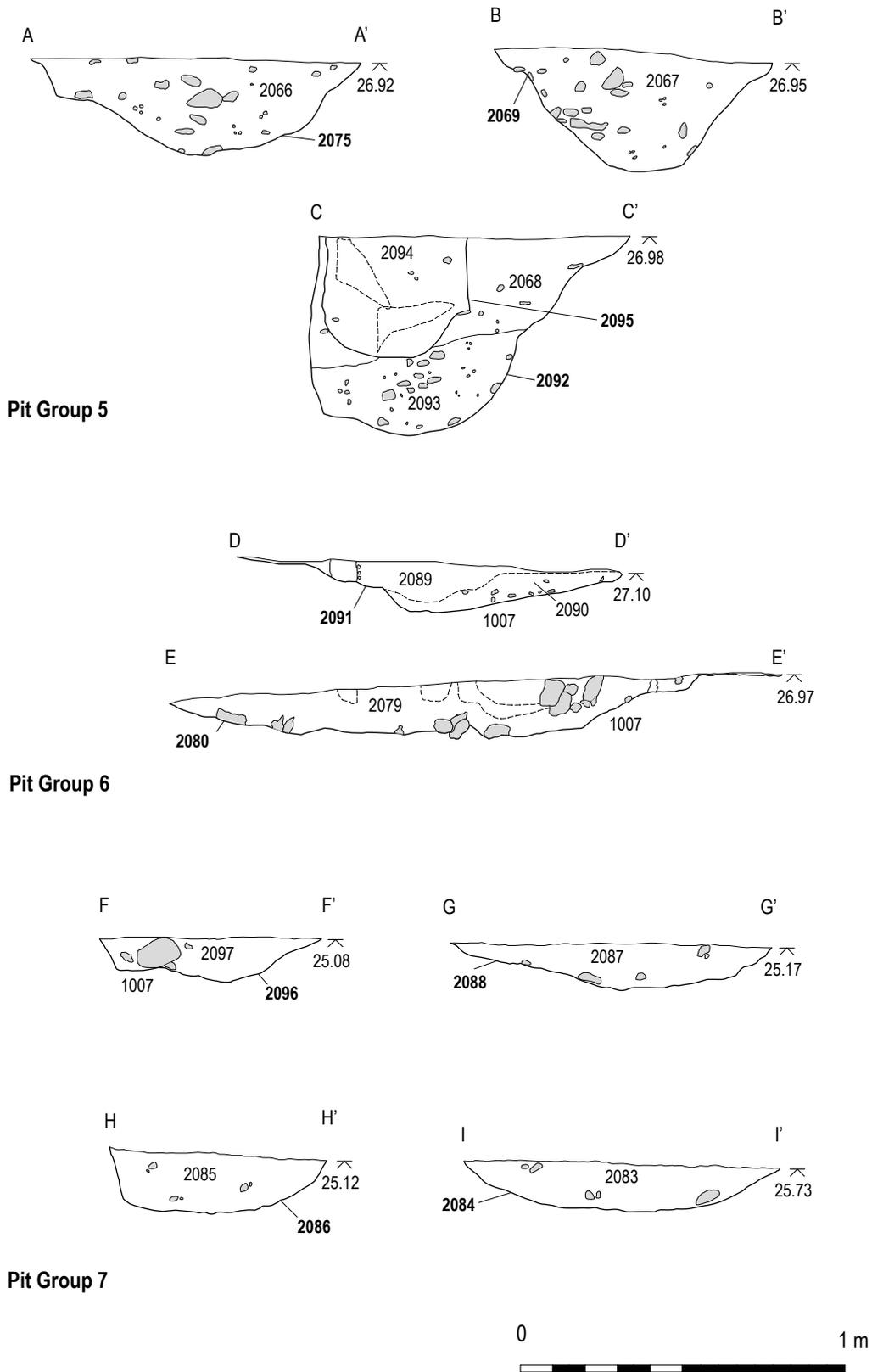


Figure 4: Sections through the main pits of pit groups 5, 6 and 7.

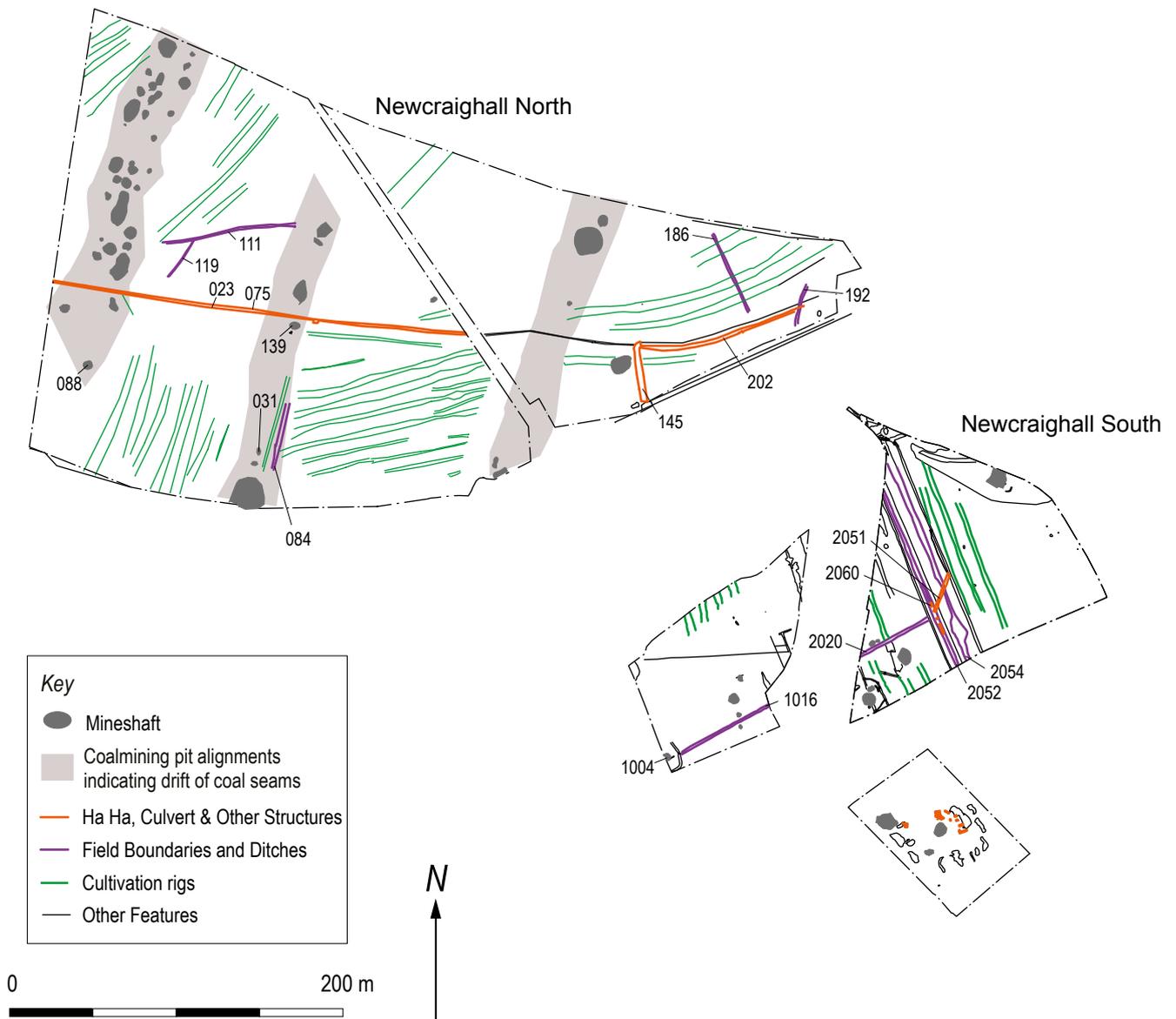


Figure 5: Plan of the mineshafts in relation to later structures and features.



Plate 5: Mine pit 139 in central seam alignment.



Plate 6: Mine pit 088 in west seam alignment.

The only structural remains (Figures 5 and 6) directly associated with mine working were found in the southernmost part of Newcraighall South, where they comprised four lime-mortar bonded sandstone structures. Two of them, Structures 1 and 2 were associated with an infilled mineshaft (O15) (Figure 6). A single sandstone structure, Structure 3 (Figure 9) was recorded to the west close to an infilled mineshaft (O77) and a short section of wall Structure 4 was found adjacent to a track (O04) to the east of Structure 1 (see below).

Structure 1 (Figure 7), was located to the immediate north of mine shaft (O15) and comprised a sandstone base (O14). The building was U-shaped in plan with six external stone buttresses, and was sub-divided internally by a red brick partition wall (O70). It measured 3 m by 4 m externally. The structure had an additional c. 1.5 length of wall at the south-east end of the north-eastern wall, with a corresponding parallel wall (O94), at 1.1 m distance. The south-east wall of the structure was not present.

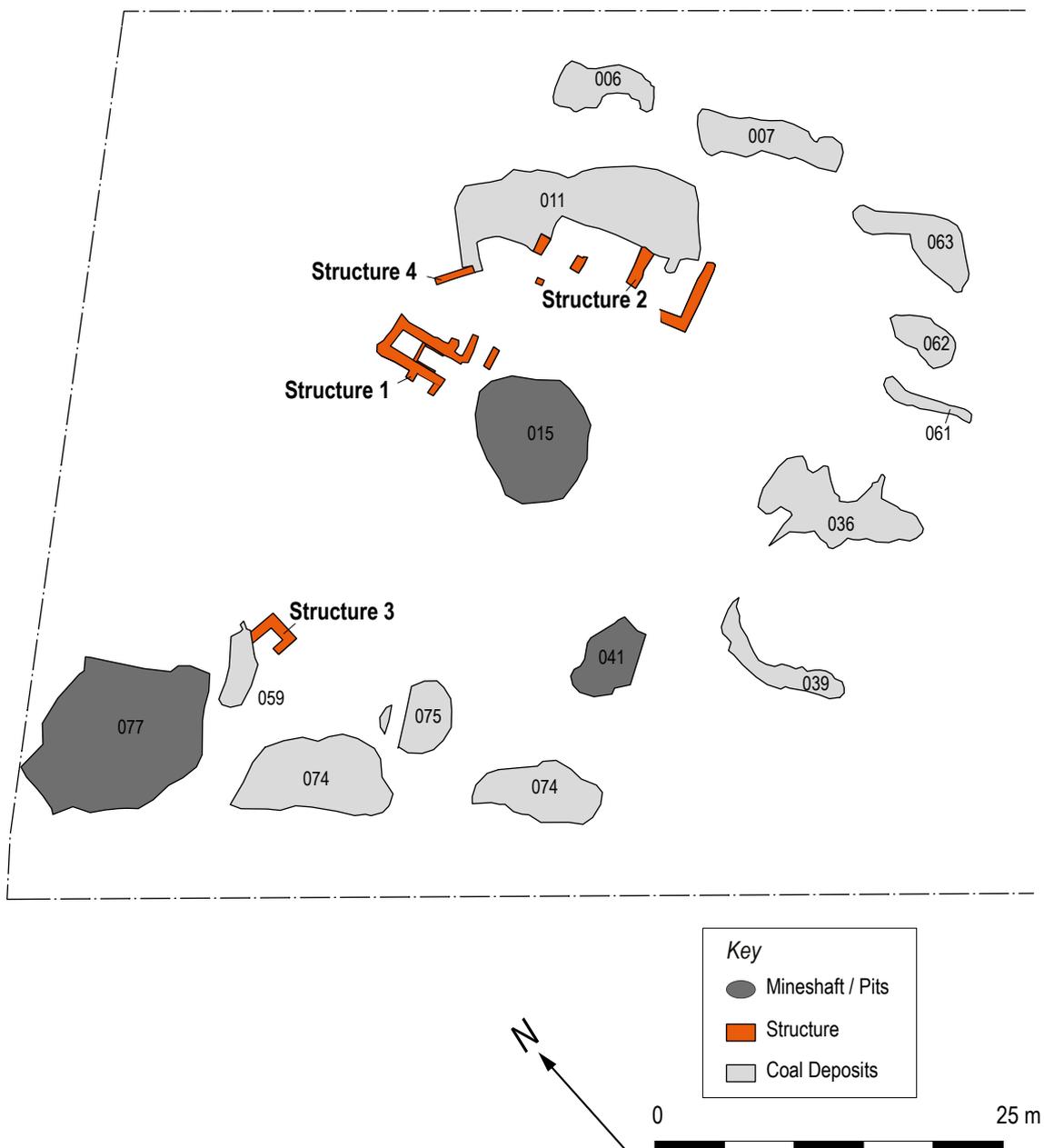


Figure 6: Location of Structures 1 to 4 in relation to mine shafts and coal deposits, in the southern area of Newcraighall South.

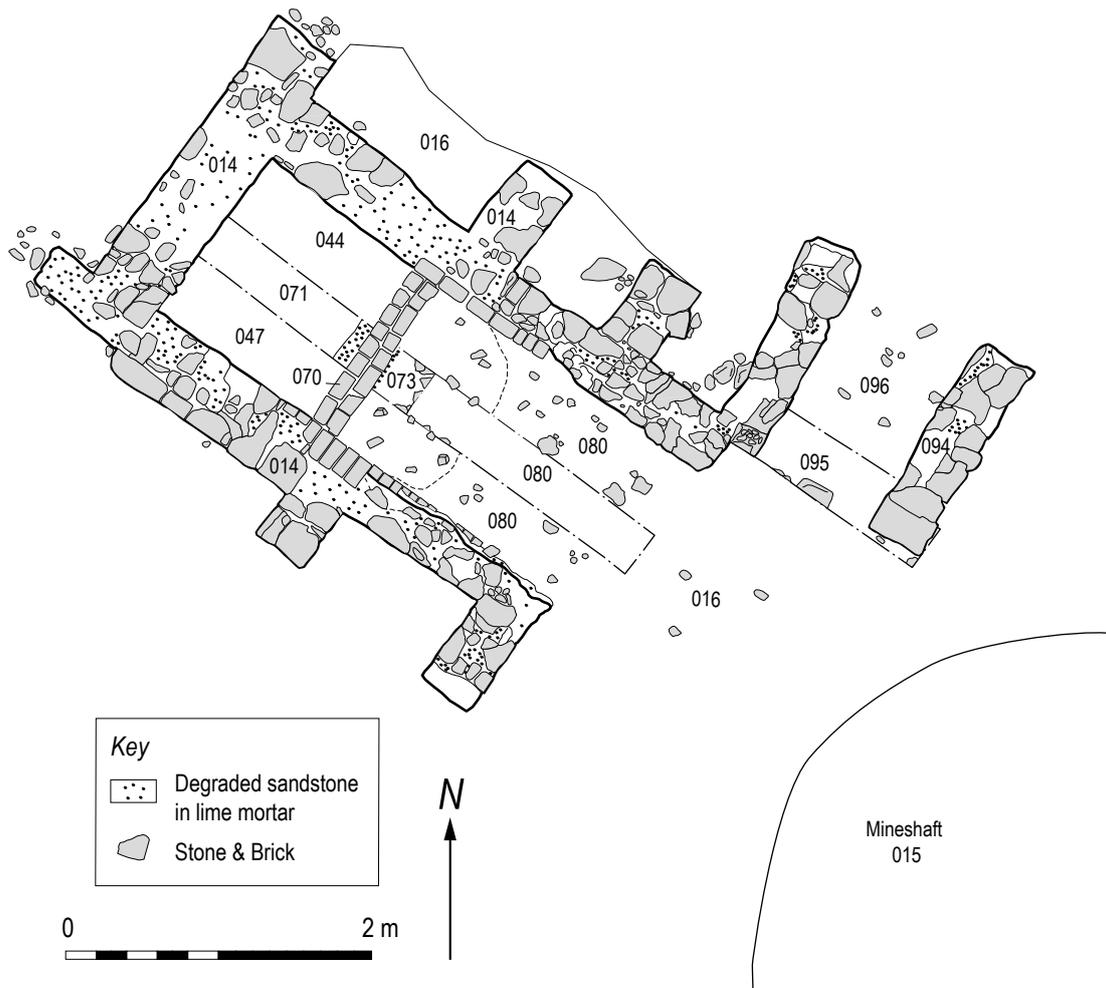


Figure 7: Detailed plan of Structure 1.

The walls of the structure, which survived to a height of 0.45 m, contained occasional unfrogged red bricks and roughly dressed sandstone masonry blocks (Plate 7). A single course of unfrogged red brick formed the internal wall faces of the south-eastern compartment of the structure. The area within had been infilled with a layer of rubble (080) beneath a trampled coal-rich layer (016). The compartment on the north-west side of partition wall (070) contained a coal-rich trampled layer (047) and a layer of clay with crushed shale, ash and coal fragments (071). Below these deposits were layers of trampled coal debris: (072 below 071 and 081 beneath 080) that overlay a layer of crushed sandstone (073) which acted in part as a foundation for the brick partition wall (070), and a floor at the base of the entire structure.

The layers between the walls of the south-east addition (094) comprised a sandy clay with sandstone and brick fragments (096) overlying a dark trample layer (095). The difference between these infill layers and those within the building,

and together with the addition of the brick facing on the inside of the south-eastern faces of the structure, suggest had been subject to remodelling during the course of its use.



Plate 7: Mining structure 1. From the east.

Structure 2 (Figure 8) was less well preserved than Structure 1. It comprised four equally spaced but poorly-built lime-mortar bonded sandstone rubble walls or footings (023, 044 and 045), with the longest (024) consisting of more mortar than stone. The structure measured c. 10 m in length by c. 6 m in width and it was aligned NW/SE.

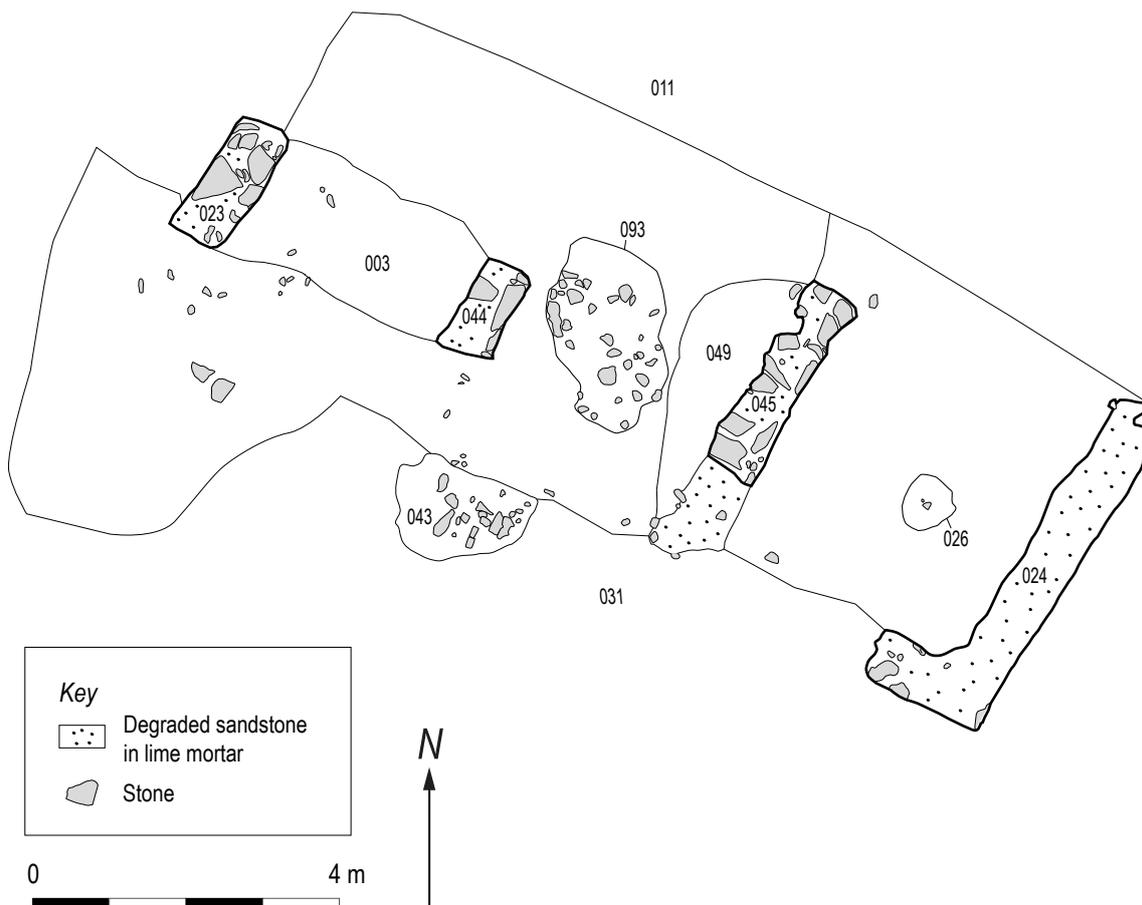


Figure 8: Detailed plan of Structure 2.

Between walls (024) and (045), and beyond the latter, at the south-east end of the structure was a hard deposit (049) of dark grey/reddish-brown, clay/silt with small stones. At the north end of the structure, natural sandy clay (003) was visible between footings (023) and (044). A 1.8 m long by 0.5 m wide, sub-rectangular rubble-filled pit (093) was located in the middle of the structure between footings (044) and (045) with a smaller pit (026), 0.6 m in diameter, positioned between footings (024) and (045). Immediately south-west of the structure was an area of heat-affected subsoil (043) that suggests that machinery was used within part of, if not all of Structure 2.

The structure was located 8 m to the north-east of mineshaft (015) and was abutted to the north and east by a surface of hardstanding (011) of silty clay, brick fragments and sandstone rubble. The area between the mineshaft and Structures 1 and 2 also consisted of a hardstanding surface of fragments of sandstone and brick fragments, clinker and slag-rich industrial waste, overlain by coal dust, coal and shale fragments (031).

Structure 3, located to the east of an infilled mineshaft (077) (Figure 9 and Plate 8), was built from mortar-bonded rubble and formed a small three-sided building (021) measuring 4.1 m long by 2.5 m wide, which was aligned NE/SW. It was built on the clay subsoil (003) and had an accumulation of rubble and industrial debris around it (019 and 064). The structure had an internal compacted surface that consisted of sandstone rubble (022) partially overlain by a deposit of fine coal fragments (059). Between this and the basal trampled layer with remnants of a paved stone floor (063), was a layer of re-deposited clay with coal and sandstone fragments (061).

The areas surrounding the structures and shafts consisted of deposits of coal debris and may represent areas where coal had been stock-piled (Figure 6). Deposits of coal fragments (006, 007, 036, 039, 061, 062 and 063) were located to the south and south-east of shaft 015 while coal dust deposits (019, 074 and 075) were arranged around mine shaft 077.

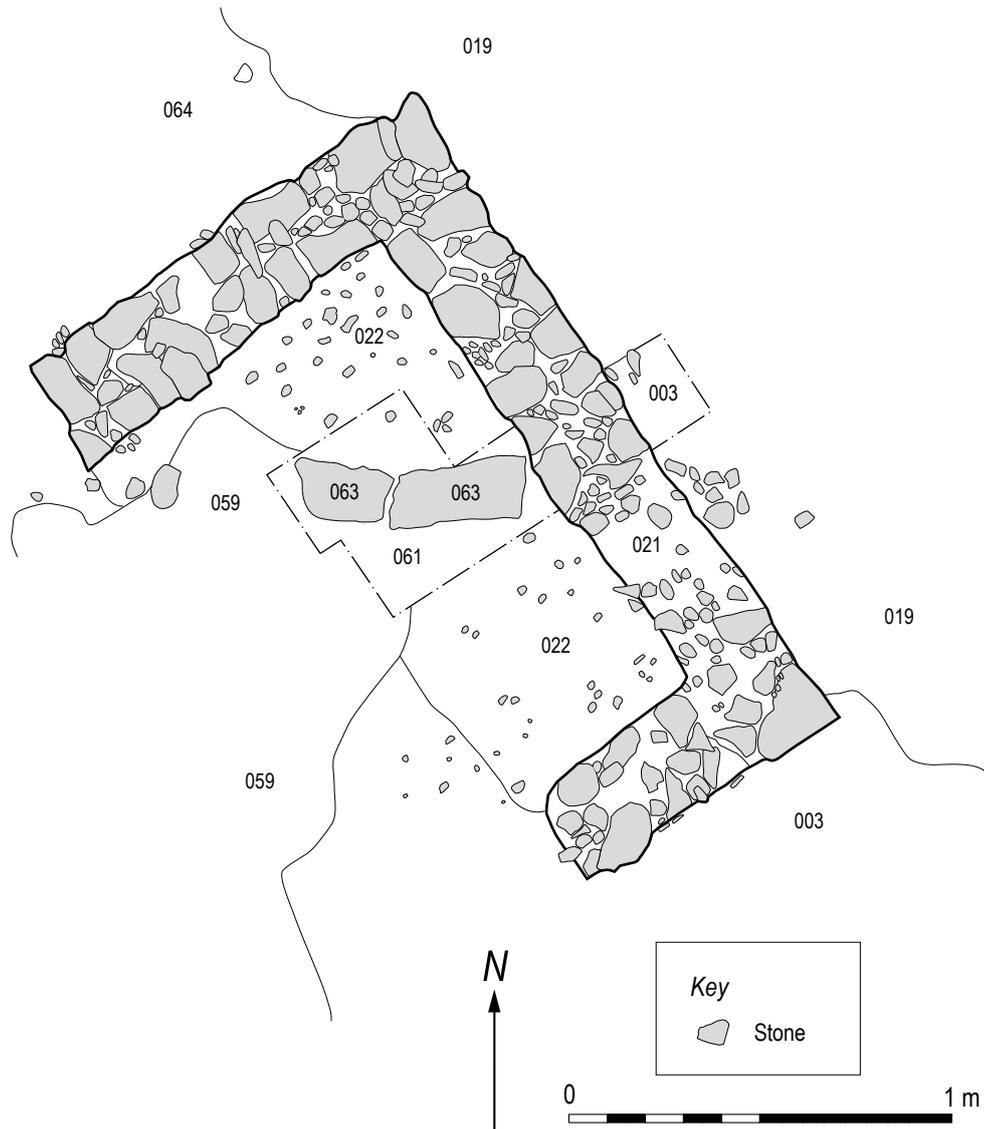


Figure 9: Detailed plan of Structure 3.



Plate 8: Structure 3 overlain by coal dust deposit (059).
From the south-east.

Other recent landscape features

Cultivation rigs

The remains of broad rig cultivation were noted over all parts of the excavated areas of both Newcraighall North and South (Figure 5). They were generally aligned N/S and E/W, although in the north-west corner of Newcraighall North a number of furrows were aligned NE/SW. In Newcraighall South, what little remained of the cultivation marks, was generally aligned NNW/SSE.

Linear features

Between the E/W and N/S aligned cultivation rig remnants in the southern part of Newcraighall North, was a N/S oriented ditch (084), recorded over a distance of 34 m (Figure 5). It measured

0.95 m wide by 0.45 m deep and was filled with sandy-silt (083) (Plate 9). This is probably a relict field boundary sub-dividing areas of the rig system.



Plate 9: Boundary ditch 084. From the south.

Two slightly curvilinear features were recorded north of the ha-ha in Newcraighall North. One, (111) was aligned roughly E/W and measured 55 m in length, by c. 0.8 m in width and was c. 0.21 m in depth. It was filled with stoney, sandy clay (112). Towards its western extent, a spur (119) branched off to the south-west, which was recorded over a distance of 20 m. No datable material was recovered from the fills of these features but they probably represent truncated fragments of earlier field boundaries. Towards the east side of the site, a linear feature (186) aligned NW/SE, was cut by rig cultivation marks. It survived 48 m long, 1 m wide and 0.5 m deep, and was filled with stoney, sandy-clay (187). Two fragments of medieval pottery were recovered from the feature, which may represent part of an earlier relict field system, or a drainage ditch, or possibly both.

In the SE corner of the northern area, a further, slight curvilinear feature (192) aligned NE/SW was investigated. It measured 30 m by 1.1 m and was 0.22 m deep. It was filled by dark sandy-silt (193) containing post-medieval finds. The function of this feature is unclear but it would appear recent in date.

In Newcraighall South, a NE/SW aligned ditch (1016/2020) cut through the rig cultivation marks and an infilled mineshaft (1004) at the west end of site. A large horseshoe-shaped tile drain was found at the base of this ditch. A further broad deep ditch (2052) aligned N/S was found towards the east side of site, this also contained a tile

drain at its base. A number of other narrow, but similar, field drain trenches were visible across the southern area of this site.

Further linear/curvilinear features were visible around some of the mineshafts, these may represent the position of fences enclosing the shafts to prevent access to the workings but some of the broader, deeper features may be associated with drainage.

A track (004/2054) was recorded running northwards across the site and away from the southernmost area of mine workings. It comprised sandstone rubble and brick fragments graded with cinders and ash towards the northern end of its course.

Ha-ha

The remains of a truncated ha-ha (Figures 5 and 10) comprising a lime-mortar bonded sandstone rubble wall (023) constructed against the north side of a V-shaped ditch (027), cut into subsoil (002) and was recorded traversing Newcraighall North in an E/W alignment. The wall survived to a height of 0.5 m with three courses of stonework noted in the ditch, which was 1.38 m wide by 0.53 m deep. The ditch had a primary fill (026), and a secondary fill (024) which encompassed tumble (025) from the ha-ha (Plate 10).



Plate 10: Ha-ha (023) and ditch (027). From the west.

A heavily truncated causeway (Figure 5 and Plate 11) (075) consisted of lime mortar-bonded sandstone blocks that were located towards the middle of the ha-ha. A stone-built culvert 145, located in the eastern part appeared to discharge into the remodelled section of the ha-ha ditch, perhaps long after the ha-ha had become redundant.

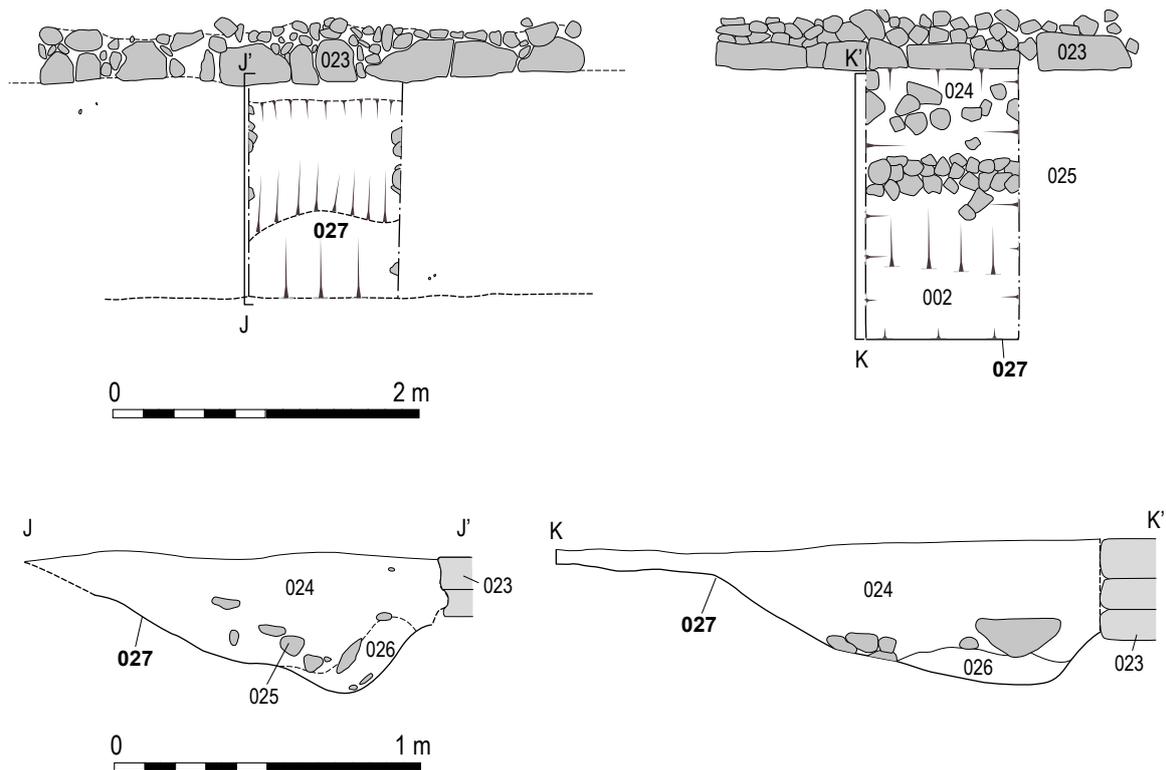


Figure 10: Plan of and sections through the ha-ha (023) and its ditch (027).



Plate 11: The truncated remains of a causeway (075) forming one of the crossing points over the ha-ha (023). From the south.

Culverts

Four culverts were recorded during the site investigations (Figure 5). The first (086, not illustrated) lay to the south of Newcraighall North and was revealed during removal of the southernmost railway embankment associated with the former Fisherrow Branch of the Edinburgh and Dalkeith Railway Line. It comprised a lime-mortared sandstone culvert with two walls positioned 0.4 m apart and built four courses, or 0.47 m high. The walls were capped by sandstone slabs. Vertically positioned metal bars were found

at one end of the feature which acting as a filter to prevent the drain blocking.

Another culvert (145) was much larger and comprised two lime-mortared sandstone walls 0.4 m wide, positioned 1.7 m apart, which attained a height of c. 1 m (Figure 11). Large, sandstone slabs capped the walls, some with tool marks, with the voids between plugged with small sandstone fragments set in lime-mortar (Plate 12). The culvert was aligned N/S with a sharp turn towards the east at its northern end where it discharged into the former course of the ha-ha ditch (027) (Plate 13).

During construction of the railway line the southern end of this culvert was blocked by a wall (148) which diverted the flow of water into a rubble-filled ditch (156) that ran along the base of the north side of the railway embankment. Where the culvert capstones were displaced during this work, sections of steel rail track were laid to replace them and the upper courses of its walls had been re-pointed with cement.

At the northern end of the culvert, it appeared that the ha-ha ditch had been remodelled to form a soakaway (160) filled mainly with dark sand (161). At some point, the silted-up



Plate 12: Culvert 145 capping slabs. From the south.



Plate 13: Culvert 145 during excavation with the ha-ha ditch in the distance. From the south.

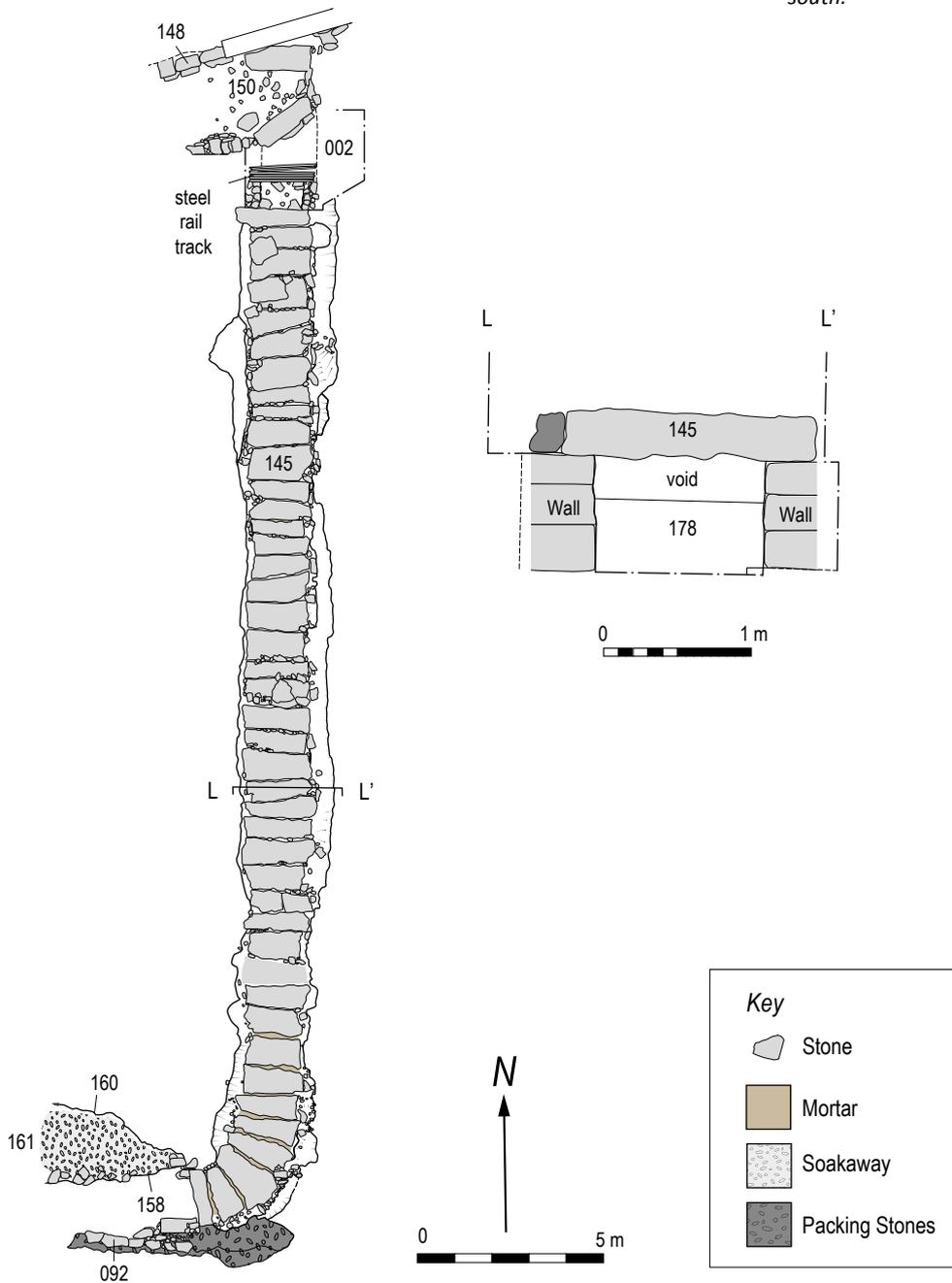


Figure 11: Plan of and section through the culvert (145).

soakaway channel (160) was partially re-cut (158) and refilled with sand and gravel and rubble. The ha-ha wall appeared to have been consolidated (092) over a distance of 7.5 m from the point at which the culvert discharged into the soakaway, but beyond this, the ha-ha did not continue.

Towards the eastern end of Newcraighall North, a disturbed lime-mortared sandstone culvert (202), aligned SW/NE was uncovered. This comprised two sandstone walls positioned 0.35 m apart and capped by sandstone slabs. It was not possible to fully excavate the drain due to the presence of water. Many of its capstones to the east had been displaced, possibly during cutting of the later soakaway channel (158) for culvert 145. A canalised stream is depicted on the Ordnance Survey map of 1895 (published 1895) possibly represented by culvert (202).

On Newcraighall South, was a short culvert (2051) (Figure 12), with walls built from sandstone rubble with large irregular sandstone slabs capstones. Smaller stones had been placed to plug the gaps around the edges of the capstones and lime-mortar filled the voids between the capstones. The culvert contained a tile field drain. Three tile field drains were visible converging at its open truncated SE end: one of these was from ditch (2020). A truncated return to the culvert (2060), which did not contain a ceramic drain, was visible aligned NE/SW to the south of culvert (2051)

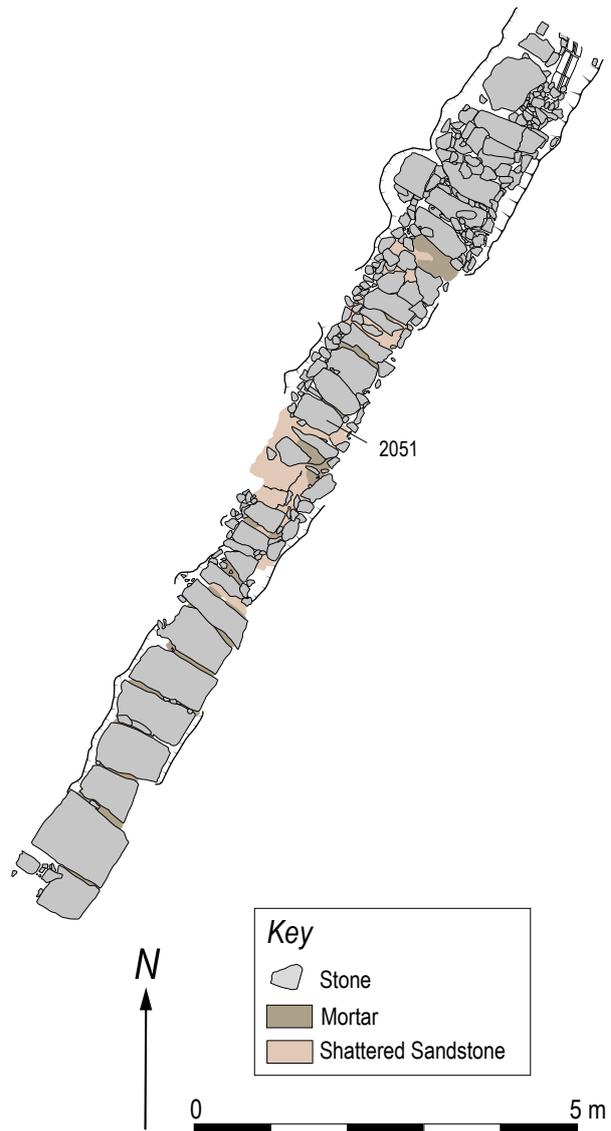


Figure 12: Plan of culvert (2051).

Radiocarbon dates

Although most of the features and structures investigated on site relate to the late eighteenth and nineteenth century coal mining activities, several pits were excavated that appear to be prehistoric in origin, and artefacts including prehistoric pottery and flint tools were recovered from them. A radiocarbon dating programme

was therefore undertaken to investigate these prehistoric features on Newcraighall South. Eight dates were submitted for AMS dating to the Scottish Universities Environmental Research Centre (SUERC). These dates were derived mainly from charcoal and carbonised nutshell obtained from bulk soil samples recovered during the excavation (Table 1).

Lab Code	Context	Feature	Sample description	Radiocarbon age BP	$\delta^{13}C$	95.4% probability	
SUERC-74786	2066	Pit	Charcoal: Corylus	4083±28	-25.4‰	2699–2567 cal BC	LN
SUERC-74787	2066	Pit	Charcoal: Corylus	4034±28	-26.5‰	2623–2475 cal BC	LN/EBA
SUERC-74788	2087	Pit	Charcoal: Alnus	3056±29	-25.9‰	1408–1257 cal BC	MBA
SUERC-74789	2066	Pit	Charcoal: Corylus	4041±28	-28.9‰	2631–2475 cal BC	LN/EBA
SUERC-74793	2083	Pit	Charcoal: Alnus	3415±29	-25.0‰	1775–1630 cal BC	EBA
SUERC-74794	2097	Pit	Charcoal: Alnus	3104± 28	-27.3‰	1431–1291 cal BC	MBA
SUERC-74795	2067	Pit	Carbonised nutshell: Corylus Avellana	4055±28	-23.9‰	2668–2486 cal BC	LN/EBA
SUERC-74796	2097	Pit	Carbonised nutshell: Corylus Avellana	4059±28	-25.1‰	2523–2497 cal BC	LN/EBA

Table 1: Radiocarbon dates from NCHS.

Environmental remains and artefacts

Carbonised plant macrofossils and charcoal

By Diane Alldritt

Introduction

A total of twenty two bulk environmental samples ('GBA' *sensu* Dobney et al. 1992) taken from archaeological Newcraighall South, were fully analysed for carbonised plant macrofossils and charcoal.

They produced a small assemblage of carbonised plant material which consisted of occasional discrete caches of wood charcoal and hazel nutshell from some of the pits, in particular (2069, 2075 and 2091), whilst other pits contained only traces of charred detritus. Some samples were found to contain concentrations of clinker and coal, as well as modern seeds, suggesting more recent features or a heavy degree of mixing intruding from the modern industrial remains present at the site. Eight samples were submitted for radiocarbon dating and these consisted of well-preserved fragments of alder and hazel charcoal as well as hazel nutshell. Three samples were submitted from pit (2075 and 2066), two samples from pit (2096 and 2097) and single samples from pits (2069, 2067, 2075, 2066, 2084, 2083, 2088 and 2087). The radiocarbon dates produced spanned the very late Neolithic through to the middle Bronze Age periods, with the majority falling within the late Neolithic/early Bronze Age range.

Methodology

Bulk environmental samples were processed by GUARD Archaeology Ltd. using a Siraf style water flotation system (French 1971). The resultant 'flot' from each sample was dried before examination under a low powered binocular microscope at x10 to x20 magnifications. The heavier 'residue' portion of each sample was dried and then sorted by eye, with potentially carbonised material subsequently forwarded to the author for identification. All identified plant remains including charcoal were removed and bagged separately by type. Fragments suitable for radiocarbon dating were bagged individually and forwarded to SUERC for analysis. Wood charcoal was examined using a high powered Vickers M10 metallurgical microscope at magnifications up to x200. The reference photographs of

Schweingruber (1990) were consulted for charcoal identification. Plant nomenclature utilised in the text follows Stace (1997) for all vascular plants apart from cereals, which follow Zohary and Hopf (2000). The term 'seed' is used in the broadest sense to include achenes, nutlets and so forth.

Results

The environmental samples produced a small assemblage of carbonised plant material which mostly consisted of wood charcoal along with hazel nutshell. Preservation of the charcoal was generally good, with a mixture of crushed material and 5 mm to 20 mm fragments, whilst the hazel nutshell was largely found in a highly crushed state of preservation, with only the occasional larger fragment up to 10 mm in size, perhaps from soil conditions or the roasted nuts being processed as food. The samples contained from <2.5 ml of charred detritus up to 20 ml of charcoal and nutshell fragments with occasional sterile samples also present.

Modern material consisting of seeds and earthworm egg capsules was recorded in amounts from <2.5 ml up to 10 ml, which, along with fragments of clinker and coal in some deposits indicated the potential for mixing from more recent post-medieval and modern industrial activity. The detailed results table can be found in the site archive.

Prehistoric Pit Groups

Three distinct pit groups were found during the project with a cluster of five pits (Pit Groups 5 and 6) located toward the western side Newcraighall South consisting of 2069, 2075, 2080, 2091 and 2092, whilst 23 m east of this were a series of four further pits (2084, 2086, 2088 and 2096) forming Pit Group 7 (see Figure 3).

Pits (2069, 2075 and 2092) were a cluster of three, whilst 2080 and 2091 lay slightly to the south. A single sample from pit (2069/2067) consisted primarily of crushed slivers of *Quercus* (oak) charcoal with a few fragments of *Corylus* (hazel) charcoal and some very small fragments of *Corylus avellana* (hazel) nutshell. The hazel nutshell from 2069 returned a date of 2668–2486 cal BC (SUERC-74795) placing this at the late Neolithic/early Bronze Age transition period. Four samples from pit (2075/2066) contained greater

concentrations of burnt material, with mixtures of hazel nutshell and oak, hazel and *Alnus* (alder) charcoal. Samples 36, 41 and 62 from 2066 were all fairly similar with mixed fuel types and hazel nutshell forming the main constituents, whilst sample 61 from the upper fill contained all oak charcoal. The samples from 2075 suggested a re-use or return to this pit on a number of occasions, for cooking/processing of hazel nuts and perhaps other times simply to use it as a fire pit or hearth. Three radiocarbon dates were taken from fragments of hazel charcoal from pit (2075/2066) with all producing very closely matched results indicating activity in the transition period between the late Neolithic/early Bronze Age. Sample 36 (2066) returned a date of 2699–2567 cal BC (SUERC-74786), sample 41 (2066) gave a date of 2623–2475 cal BC (SUERC-74787), and sample 62 (2066) returned as 2631–2475 cal BC (SUERC-74789) showing consistency of results and a fairly narrow date range of possible use.

Pits 2069 and 2075 contained a similar range of evidence indicating burning activity taking place within them, probably for processing hazel nuts and to use for other cooking and heating activities. The similar radiocarbon date ranges for these two features indicated they were probably contemporary. In contrast, the upper fill of pit (2092/2068) produced no carbonised material. It contained clinker and coal, perhaps indicating some disturbance from more recent industrial activity.

Outlying pit 2080/2079 was largely sterile of burnt remains, with occasional crushed fragments of clinker present, but its companion 2091/2089, a possible cooking pit or burnt area was interesting, as both samples from it produced large concentrations of *Quercus* (oak) charcoal in fragment sizes 10 mm to 20 mm. This feature was probably a substantial fire pit with material burnt in situ, perhaps for cooking or general heating purposes, and no other burnt remains were found in it. This feature (2091) was not dated but could potentially have been a random earlier Neolithic fire pit unrelated to the other features.

The second group of pits, lying to the east of the above and consisting of 2084, 2086, 2088 and 2096, produced varied results, with some of the features containing evidence for disturbance by more recent industrial activity. Pit 2084/2083 contained some trace evidence for burning

with a single fragment of *Alnus* (alder) charcoal identified from sample 64 (2083) mixed through with clinker and modern seeds. The alder charcoal was dated producing a date range of 1775–1630 cal BC (SUERC-74793), placing it in the early–middle Bronze Age transition period. Pit 2088 contained a few fragments of oak and alder charcoal from sample 45 (2087) along with clinker fragments. Three samples from 2096/2097 also produced traces of burnt detritus, sample 49 was found to be sterile whilst a fragment of alder charcoal was recovered from sample 66, and a small cache of highly crushed hazel nutshell was found in sample 63. Samples of alder charcoal from 2088 and 2096 were radiocarbon dated with both producing middle Bronze Age date ranges. Pit 2088/2087 gave a date of 1408–1257 cal BC (SUERC-74788), whilst pit 2096/2097 proved to be of a similar period with a date of 1431–1291 cal BC (SUERC-74794). Pit 2086/2085 contained the least material - a single fragment of oak charcoal.

The date range obtained for the eastern group of pits indicated largely Bronze Age activity suggesting both a spatial and temporal separation from the earlier dated western pit group. Interestingly a further date obtained from eastern pit 2096/2097, this time on hazel nutshell produced a date of 2672–2488 cal BC (SUERC-74796) which more closely matched the western pit dates. Pit 2096 therefore could have been an earlier feature that was re-used in the middle Bronze Age.

Other Features

A single sample from deposit 2108, an area of hard standing to the SE side of mineshaft 2106 was sterile of carbonised remains. The sample, however, produced a large amount of crushed and degraded clinker fragments, appearing to be coal derived, which are most likely related to more recent industrial activity in the area.

Two pits (2103/2102 and 2105/2104) were sterile of carbonised remains, producing only coal, clinker and modern material.

Discussion

The agricultural economy

No carbonised cereal grain or weed seeds were present in any of the samples.

Wild resources

The group of five pits located to the western side of Newcraighall South appeared to have been the main focus for burning with part of this activity including the processing of hazel nuts for food. Nuts would have been a local seasonal resource, gathered for immediate roasting and consumption or to be stored for use later in the winter, and the presence of hazel nutshell is usually a fairly typical indicator of Mesolithic or Neolithic activity (Bishop et al. 2009). Evidence for roasting of hazel nuts was mostly in evidence in pit 2075, which produced carbonised nutshell from three out of four samples, with some 10 mm pieces present. Smaller quantities of highly crushed nutshell were recorded from pit 2069, whilst a stray trace fragment was found in pit 2091. Hazel nutshell from 2069 produced a date of 2668–2486 cal BC (SUERC-74795). The radiocarbon dates from 2075 and 2069 generally indicated the transition between late Neolithic/early Bronze Age activity suggesting the gathering of hazel nuts as a wild resource remained an important part of the food economy in this region into these later periods.

In contrast, the eastern cluster of four pits contained significantly less material, although a few crushed fragments of hazel nutshell were located in pit 2096/2097. The radiocarbon date of 2672–2488 cal BC (SUERC-74796) from the nutshell in 2096 was more closely aligned with the dating of the western pits and could indicate earlier use of this feature.

Woodland resources

The samples produced a small amount of wood charcoal consisting mainly of oak with lesser quantities of hazel and alder, indicating mixed deciduous oak woodland being exploited for fuel. Of possible prehistoric date was the outlying fire pit or cooking area 2091, which produced the greatest quantity of charcoal with a large amount of oak charcoal recorded. Containing only slightly less than this, the upper fill of pit 2075 in the western pit group also consisted solely of oak charcoal, and combined with evidence from the earlier fills, indicated a significant amount of repeat burning activity was taking place there. Pit 2075 produced three very closely matched radiocarbon dates with hazel charcoal from sample 41 (2066) producing a date range of

2623–2475 cal BC (SUERC-74787) indicating the transition between the late Neolithic and early Bronze Age for the burning activity there. Pit 2069 also in the western group returned a similar date of 2668–2486 cal BC (SUERC-74795) suggesting possibly quite a short concentrated episode(s) of burning taking place in this group.

The eastern group of pits contained less carbonised material and had probably been disturbed to some extent by more recent industrial processes. However the radiocarbon dates produced fairly consistent results indicating middle Bronze Age burning activities taking place in these features, marking a distinct separation from the earlier activity seen in the western group. Alder charcoal from pit 2088/2087 returned a date of 1408–1257 cal BC (SUERC-74788) whilst alder charcoal from pit 2096/2097 produced a similar possible range from 1431–1291 cal BC (SUERC-74794).

More recent industrial activity was reflected in the samples containing clinker and coal that was mixed through some of the deposits, in particular in pit 2092 and near mine shaft 2106.

Conclusion

The environmental samples from Newcraighall South produced small quantities of carbonised plant remains consisting of charcoal and hazel nutshell. Significant focuses of burning activity were indicated from some of the pits, in particular in western pit group (2069 and 2075) radiocarbon dated to the late Neolithic/early Bronze Age periods, and in outlying pit 2091. Hazel nuts were probably being gathered and processed as a food resource during this phase of use of the site. A lesser amount of burning activity was occurring in the pits to the east, although these did appear to have been more disturbed by recent industrial use of the area. The eastern pits were found to represent a different phase of activity with the majority of samples producing middle Bronze Age radiocarbon date ranges.

Charcoal identification indicated the use of mixed deciduous oak woodland for fuel, with the main concentrations of burning taking place in pits 2075 and 2091. These features were probably substantial fire pits used for roasting hazel nuts and other cooking processes, signalling or general heating purposes during prehistory.

The lithic assemblage

By Torben Bjarke Ballin

Introduction

Prehistoric artefacts consisting of pottery and a small lithic assemblage (18 pieces), were recovered from two pit groups identified during the strip map and sample phase of the Newcraighall South works.

The lithic artefacts are characterised in general terms, with the aim of dating and discussing them. The evaluation of the lithic material is based upon a detailed catalogue (see Appendix 1) and the artefacts are referred to by their number in the catalogue (CAT).

Key Definitions

The definitions of the main lithic categories are as follows:

Chips: All flakes and indeterminate pieces the greatest dimension (GD) of which is ≤ 10 mm.

Flakes: All lithic artefacts with one identifiable ventral (positive or convex) surface, $GD > 10$ mm and $L < 2W$ (L = length; W = width).

Indeterminate pieces: Lithic artefacts which cannot be unequivocally identified as either flakes or cores. Generally the problem of identification is due to irregular breaks, frost-shattering or fire-crazing. *Chunks* are larger indeterminate pieces, and in, for example, the case of quartz, the problem of identification usually originates from a piece flaking along natural planes of weakness rather than flaking in the usual conchoidal way.

Blades and microblades: Flakes where $L \geq 2W$. In the case of blades $W > 8$ mm, in the case of microblades $W \leq 8$ mm.

Cores: Artefacts with only dorsal (negative or concave) surfaces – if three or more flakes have been detached, the piece is a core, if fewer than three flakes have been detached, the piece is a split or flaked pebble.

Tools: Artefacts with secondary retouch (modification).

Summary and discussion

Only one tool was recovered from the site, with the remainder being debitage, see Table 2 (General artefact list). The debitage includes eight chips, five flakes, one blade, and three microblades. Most of the flakes and blades are incomplete and the solitary tool is a large scale-flaked knife.

	Flint	Chert	Agate	Total
Chips	3	4	1	8
Flakes	1	4		5
Blades	1			1
Microblades		3		3
Scale-flaked knives	1			1
Total	6	11	1	18

Table 2: General artefact list.

In total, six pieces are flint, whereas 11 pieces are chert. One small chip is agate. The scale-flaked knife (CAT 1), the fragment of a blade (CAT 2), and one flake (CAT 5) are in Yorkshire flint (Ballin 2011a). The remainder of the flint is thought to be local North Sea flint. The chert was probably procured locally from the region's Carboniferous limestone or collected from local shores (Cameron and Stephenson 1985). The solitary agate flake suggests that agate pebbles from the local volcanic outcrops may also have been exploited (*ibid.*). The chert microblades (CAT 12, 13, 15) were generally produced by the application of soft percussion, whereas the flakes and blades in Yorkshire flint (CAT 1, 2, 5) were manufactured by the application of hard percussion (Ballin 2011b; Suddaby and Ballin 2011).

The scale-flaked knife (CAT 1) (Figure 13) is based on a large broadblade (69 by 32 by 7 mm), and it has neat scale-flaking along the entire right lateral side. It has a slight overhang along this edge, dorsal face, and small flat chips have been detached along this same edge, ventral face. This suggests that the piece was used for cutting. The overhang may indicate rejuvenation of the cutting-edge. In connection with the author's investigation of later Neolithic lithic assemblages from sites near the Overhowden Henge in the Scottish Borders (Ballin 2011a), three scale-flaked or plano-convex knives were presented to use-wear specialist Dr Randy Donahue, University of Bradford, who carried out a cursory examination

of the specimens. His verdict was the same in all three cases, that the knives had been used for cutting/sickling grasses or cereals. Most likely, the Scottish scale-flaked and plano-convex knives (or some of them) are sickles, and they probably carried out the same work as the curved sickles of southern Britain (Clark 1934). In contrast to some scale-flaked and plano-convex knives, the present piece has no *gloss* along its cutting-edge.

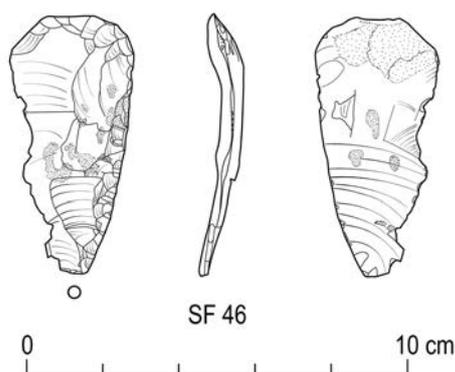


Figure 13: Scale-flaked knife, CAT 1.

As shown in Table 3 all lithic finds were recovered from pits: pit 2075 yielded three pieces, pit 2088 one piece, pit 2091 eleven pieces and pit 2092 three pieces. However, it is unlikely that any other objects than the impressive scale-flaked knife (CAT 1), represent intentional deposition. Most likely, all other artefacts – not least the tiny chips, flakes and microblade fragments – represent residual artefacts that is, knapping debris scattered across old settlement surfaces which entered the pits with the backfill when these were filled in.

Pit	2075	2088	2091	2092	Total
Context	2066	2087	2089	2068	
Chips			5	3	8
Flakes	1	1	3		5
Blades	1				1
Microblades			3		3
Scale-flaked knives	1				1
Total	3	1	11	3	18

Table 3: Distribution of the assemblage.

The prehistoric lithics are clearly datable to several periods, with the soft percussion microblades dating to the late Mesolithic/early Neolithic framework, and the Yorkshire flint objects produced by Levallois-like technique to the middle/late Neolithic period. Figure 3 shows the distribution of the datable elements. However, it is quite possible that all of these pits

were dug during the same period. As the site is clearly a palimpsest, the diagnostic pieces in the pits only provide a *terminus post quem* for the features, apart from the scale-flaked knife. If this piece is indeed a deliberately deposited piece (grave good or ritual sacrifice), pit 2075 is likely to have been dug in the later Neolithic, and the neighbouring pits may have been dug during the same period, maybe even by the same people.

Prehistoric pottery

By Beverley Ballin Smith

Two plain sherds of robust, handmade, coarse pottery, SF 50 and 67, were found during the excavation of pits on the east side of Newcraighall South site. The pits survived as a discrete group of four features (2084, 2086 2088 and 2096). Pit 2088 was the largest of the group but the much smaller 2096 was situated close by, but to the immediate east.

A single sherd was found in each of these two features: SF 50 in pit 2088 and SF 67 in pit 2096. SF 50, a body sherd, weighs 45.3 g and has a wall thickness of 14.8 mm. The clay contained rock temper of quartz, sandstone and unidentified other rocks. It is a heavy, well-fired plain sherd but some of its coarse rock temper protrudes through the exterior surface. The slight concavity noted in the shape of the sherd suggests it originated from near the base of the pot. Its surface finish has not survived but thick carbonised food residues are noted on its interior surface.

SF 67 shares many similarities with SF 50, as it is also a body sherd. It weighs 27.3 g and measures 14.3 mm in wall thickness. It too has quartz and sandstone rock temper but the filler is well-integrated with the clay. The exterior surface of the sherd has survived better than SF 50, as there is evidence that it was smoothed after forming. It is also burnt, with red/buff colours dominating. Visible on its interior surface is a thin layer of carbonised food remains. The presence of carbonised food residues on both sherds suggest that they were part of a cooking pot(s) that was used on the hearth.

It is logical to ascribe these sherds as belonging to the same pot due to their shared characteristics of manufacturing techniques. However, taphonomic conditions within the two different pits, has led to differences which suggest there is an element

of doubt. The characteristics of this pottery (thickness, hard fired body and well integrated temper) suggest they are middle to late Bronze Age in date, and this appears to be confirmed by the radiocarbon dates: pit 2088/2087 (dated 1408-1231cal BC) and pit 2096/2097 (dated 1431-1291 cal BC, but also 2836-2488 cal BC).

Medieval and Post-medieval pottery

By Bob Will

Introduction

Pottery was found at both Newcraighall North (199 sherds) and from Newcraighall South (52 sherds) weighing a total of 2570 g. In addition there are brick and tiles amounting to 24,609 g. They cover the medieval, post-medieval and modern periods although the main assemblage from Newcraighall North is modern (Table 4). All the sherds were examined, weighed and recorded according to guidelines and standards produced by the Medieval Pottery Research Group (MPRG 1998, and 2001) (The catalogue is presented as Appendix 2). No scientific analysis was undertaken.

Scottish White Gritty Ware

Twelve sherds Scottish White Gritty Ware fabrics were recovered (see Table 4). It is a fabric which is found throughout Scotland but particularly in the east of the country, where so far the only published kiln site is at Colstoun in East Lothian. White gritty wares first appear in the late twelfth century but the tradition lasts into the late fifteenth. This fabric has been extensively studied and it is likely that a number of kilns were in production throughout Scotland (Jones et al. 2006). All the sherds that were recovered appear

to be from different vessels and cover a wide date range. The earliest sherd from Newcraighall North is a rim from a possible cooking pot which could date to the late twelfth or early thirteenth century, but there were also three sherds that were thicker-walled with a reduced fabric, which could be from the late medieval period into the fifteenth century.

The earliest sherds from Newcraighall South are two undecorated body sherds from a possible cooking pot or storage jar and one has smoke marks on the external surface. Another undecorated sherd is in a slightly pink fabric which could also be from a storage jar. These three sherds could date to the late twelfth or early thirteenth century. The remaining two sherds were thicker-walled with a reduced fabric and green glaze which could be from the late medieval period, possibly the fifteenth century.

Scottish Medieval Redwares

One rim sherd and three body sherds were recovered in Scottish Medieval Redware fabrics. This type of pottery was produced from the thirteenth to the fifteenth century and is found across most of Scotland. It has recently been the subject of an extensive research programme funded by Historic Scotland (Haggarty et al. 2011). The sherds from Newcraighall North are all small and thin-walled with traces of glaze and a dark red heat skin. The fabric is smooth and well mixed with no obvious inclusions, which suggest that these sherds date to the late medieval period. The rim and neck sherd from Newcraighall South is from a jug with a rounded rim and a decorative cordon below. The sherd is thin-walled with patchy light green glaze and dates to the fourteenth century.

Fabric	Total	Rim	Base	Handle	Body sherd	Weight (g)
Scottish White Gritty Ware (SWGW)	12	1	0	0	11	97
Scottish Medieval Redwares (SMR)	4	0	0	0	4	43
Post-medieval Stoneware	4	0	0	0	4	37
Scottish Post-medieval oxidised ware	11	1	1	0	9	181
Scottish post-medieval reduced ware	7	0	2	0	5	136
Post medieval?	1	1	0	0	0	14
White earthenware	154	32	24	3	95	680
Industrial stoneware	17	5	4	0	8	772
Red earthenware	26	4	4	1	17	423
Red earthenware slip-lined	14	3	2	1	8	175
Kiln furniture	1	0	0	0	1	12
Total	251	47	37	5	162	2570

Table 4: Medieval and later pottery types and quantities.

Scottish Post-medieval Oxidised Wares (SPMOW) and Scottish Post-medieval Reduced Wares (SPMRW)

Eleven sherds of Scottish Post-Medieval Oxidised Ware were recovered from across the two sites, together with seven sherds of Scottish Post-medieval Reduced Wares from Newcraighall South. These fabrics were first classified at Stirling Castle (Haggarty 1980) and date from the late fifteenth to the eighteenth century. Similar vessels were made in both fabrics and the main difference between the two is the firing conditions in the kiln which produce the grey/black fabric colour on the reduced wares.

The only published kiln site in Scotland is at Throsk on the banks of the Forth to the east of Stirling (Caldwell and Dean 1992), but other kiln sites making similar vessels are likely to have been in operation across Scotland. Historical research at Throsk has uncovered details about the potters and their families, as well as links to other parts of Scotland (Harrison 2002). It has been suggested that it was the draining of the carse that led to the development of pottery production as the carse clays were made more easily accessible (Haggarty and Lawson 2013). The best range of vessels so far recovered comes from Throsk and Stirling Castle where platters, bowls, skillets, fish dishes and money boxes or *pirlie pigs*, as well as the more common jugs have been recovered.

The sherds from Newcraighall North include a possible rim from a small cooking pot and a rim from a large bowl. Two of the body sherds are glazed on the inside, which would suggest that these are from a bowl rather than a jug or storage jar. The sherds from Newcraighall South include those that are glazed on both sides, suggesting that they may have come from a bowl or platter. The reduced base is slightly warped and has a stacking scar on it where the glaze has run and it had stuck to another pot in the kiln.

Post-medieval Stoneware

Four sherds were recovered in stoneware fabrics, two of them have a distinctive speckled 'tiger' salt glaze appearance often found on stoneware vessels from Frechen in Germany. These 'Rhenish' stoneware vessels were imported into Scotland from the Low Countries and Germany from the fifteenth century and became increasingly

popular throughout the seventeenth century and were copied by local potters. Unlike the Frechen vessels and other imported stonewares which have dark grey fabrics the sherds from Newcraighall have a white or light grey fabric and are therefore likely to be local versions that started to copy the imported vessels in the seventeenth century and continued into the nineteenth century. A range of vessels were produced but it is the storage jars, flasks and drinking mugs that are the most common. These sherds are most likely from storage jars or flagons. One sherd from Newcraighall South was also recovered in grey stoneware fabric with brown glaze on the exterior with a slightly speckled finish. It is from the neck of a bottle or jar.

One of the sherds from Newcraighall North (SF 101, unstratified) has a light grey fabric and a glossy glaze and could be from an imported stoneware bottle or flask, possibly from Siegburg. Similar vessels start to appear in Scotland from the fifteenth century.

Industrial Pottery

White earthenwares

A total of 152 sherds were recovered from the two sites in white earthenware fabrics and these represent the largest group in the assemblage. They consist of a range of forms including bowls, teacups and plates or other flatwares. They have been decorated by a number of methods including transfer printing and hand painting. The earliest use of transfer printing was c. 1795 and this soon became the dominant form of decoration, certainly from 1830, with blue being the most common colour and it common in this assemblage. Most of the sherds were too small to identify the patterns but the common 'willow' style pattern was present. Many of the patterns are well known and were often patented, which provides a date for when they went into production. As with many of these wares, patterns continued in use for long periods of time, but also some were used by different factories at different times, which make them difficult to date.

Only a few sherds with hand painted decoration were recovered in red and yellow, and these were mainly body sherds. Four sherds were recovered probably from a planter or vase with moulded decoration round the rim and bands of blue and brown round the body, which were

very popular in the late nineteenth century. One sherd from a banded planter has not been fired and is presumably a 'waster' from one of the local factories in Musselburgh or East Lothian. One sherd from Newcraighall South had a slightly blue coloured glaze that was flaking off and is probably 'tin-glaze'. This method of glazing white earthenware is slightly earlier than the other white earthenwares and could date to the late eighteenth century.

Red earthenwares

At total of 35 sherds are red earthenware fabrics and can be divided into two groups: brown glazed storage jars and slip-lined bowls. The fabric was fairly uniform red or orange with few inclusions and this would suggest that they were being produced in factories rather than small potteries. Nine of the sherds from Newcraighall North were from large slip-lined bowls that were used in dairying. Storage jars were represented at Newcraighall South where six sherds were recovered in red earthenware fabrics often with a dark brown glaze. One of the sherds has cream/yellow slip decoration and is probably from a large bowl. These vessels are relatively common and were made at a number of sites throughout Scotland in the nineteenth century. One pottery has been excavated at Cupar in Fife (Martin and Martin 1996), although local potteries round Musselburgh were also making these types of vessels.

Industrial Stoneware

Seventeen sherds from large flagons and jars were recovered in white industrial stoneware but they also include a complete small bottle, possibly for ink or similar. These types of vessels were made in vast quantities in several factories including Glasgow and Portobello in the late nineteenth and early twentieth centuries. Stoneware jars were eventually replaced by glass and the factories' production tended to decline and disappear by the 1920s, although the jars themselves may have remained in use for much longer.

Kiln Furniture

A fragment of a stilt or spacer used to separate pottery during firing in the kiln was also recovered during the investigations at Newcraighall South. These have three legs of equal length with sharp

upward points at the end that are joined at the middle. The vessels to be fired are placed on to the points to minimise the area of contact. The stilts were made of white clay and were often made by specialist manufacturers, and frequently have numbers to indicate different sizes, but they were also made by the pottery factories. Pottery was a big industry in the Musselburgh and Prestonpans area in the nineteenth century and this fragment presumably came from one of the local potteries.

Brick/tile

From Newcraighall North, a large fragment of a hand-made brick and three fragments of roof tiles (pantiles) were recovered in a coarse orange/red fabric and probably represent locally made products from the eighteenth or nineteenth century.

A larger number (41) of fragments of brick and tiles were recovered from Newcraighall South (Table 5). The 26 tile fragments were all from curved roof tiles (pantiles) and were made of a coarse orange/red fabric and probably represent locally made products from the eighteenth or nineteenth century. The 15 brick fragments were all in course red or orange fabrics with inclusions of grog (broken brick in this case) and were all hand-made and unfrosted. Two complete bricks were recovered and were of similar size, one 225 mm by 110 mm by 65 mm and the other 245 mm by 115 mm by 55 mm. The complete bricks and larger fragments were all slightly irregular in shape and size which would suggest that they were all hand-made.

Fabric	No of fragments	Weight
Newcraighall North		
Brick and tile	3	374
Tile	1	88
Newcraighall South		
Brick	16	18902
Tile	29	5707
Total	49	25071

Table 5: Brick and tile quantities and weight.

Discussion

The assemblage covers a wide date range from the medieval to modern period with the largest group of sherds dating to the nineteenth and twentieth centuries. Given the size of the site this is a relatively small assemblage of pottery, with the medieval and post-medieval sherds accounting for only 23.6% of the total by sherd count and

only 16.7% by weight, but representing the main pottery traditions in Scotland at the time. The earliest sherds are Scottish White Gritty Ware, a rim and body sherds from cooking pots or storage jars, which could date to the thirteenth century. The post-medieval sherds are typical of the period and represent jugs and bowls and the stoneware sherd, although quite small, would indicate contact with mainland Europe although probably through merchants in Leith or other ports. The remaining sherds vessels are all common types for the nineteenth century onwards. The whitewares became the main pottery fabric and tended to be used for tablewares while the red earthenwares were used for more utilitarian storage jars and dairy bowls.

The artefact analysis of the metal detecting assemblage

By Natasha Ferguson

The assemblage as a whole is composed primarily of heavily corroded non-descript iron fragments representing a range of activities including agriculture and residual material, such as large iron bolts relating to later mining activity, modern dumping and the nearby railway. Despite deep corrosion, a small number of iron objects are identifiable, for example a fragment of a horseshoe (SF 256), a buckle (SF 54) and a hook possibly originating from a domestic environment. The horseshoe fragment, which has a broad flat plate, represents an early example dating from the mid-seventeenth to the mid-eighteenth century (Hume 1969, 237).

A small quantity of copper alloy and lead artefacts are included within the assemblage (Appendix 3). This includes a number of more diagnostic metal finds such as buckles, buttons, coins and a lead projectile, as well as some less identifiable objects, e.g. SF 319. Metallic condition, particularly of the copper alloy objects such as the possible late seventeenth/early eighteenth century coin (SF 036), and an earlier button, is very poor and does not allow for accurate identification.

Much of this material dates between the early eighteenth to the twentieth century. The earliest button (SF 64) identified in the assemblage is cast from copper alloy. The surface of the button is heavily corroded and the shank is missing. However, the style of the casting, with shallow

basin and outer rim, suggests a possible date of the mid-eighteenth century to the mid nineteenth century (Bailey 2004, 70).

Two interesting buckles have been recovered, although as most buckle forms have remained unchanged across many centuries it can often be difficult to date them accurately. The first (SF 139) is a square copper-alloy belt buckle of semi-ornate design. As similar buckle styles have been identified on mid-seventeenth century sites of conflict it is likely this buckle may also date to this period. A simple D-shaped iron buckle (SF 054) appears to be an early type, although this simple form can potentially date anywhere from 1250–1750. However, owing to the poor metal condition across the site, a later date for this buckle is more likely (Whitehead 2003, 18).

The artefacts composed of lead are perhaps the best surviving within the assemblage. Two lead artefacts are of interest. SF 319 may represent a weighted core of another object to provide balance. SF 251 is a small musket or carbine ball which has been heavily distorted due to impact with a hard surface. As this is an isolated find it is not possible however to associate this artefact to any conflict activity such as the Battle of Pinkie, as it could as equally relate to later farming or hunting activity.

The glass

By Robin Murdoch

Newcraighall North

A total of 48 shards of glass were recovered from the site. Most were from bottles but six window glass shards and one possible drinking vessel shard were also identified (Appendix 4).

Of the bottle glass, five shards were identified as eighteenth century; the one from SF 30 (078) is just possibly late seventeenth. A further 28 were nineteenth century. The small medicine bottle from SF 99 (unstratified) is late nineteenth or early twentieth century, and the five complete bottles SF 94-98 (unstratified) are twentieth century. SF 98 may date to the second quarter but the others are middle to later twentieth century.

The tiny clear shard from SF 42 (035) could be part of a drinking vessel but is rather thin and could easily be from an oil lamp glass chimney

and therefore probably nineteenth century. Many of the nineteenth century bottle shards are in 'black' glass which is not seen in Scotland before c. 1800. Some have an 'orange peel' effect, where the outer surface resembles the skin of that fruit. This was caused by contact with a mould that was not heated to the right temperature.

Although modern and unstratified, the complete bottles are quite interesting. SF 95 is from the Edinburgh and Dumfriesshire Dairy Company (E&DD Co) which adopted that name after beginning to source milk from Dumfriesshire around 1920. The 'dummy' as it was affectionately known locally operated until 1973 when it was absorbed by Kennerty Farm Dairies, an Aberdeenshire company. Kennerty was bought in turn by Robert Wiseman in 1994. SF 95 probably dates to the period 1955-59. United Glass Bottles (UGB) acquired Alloa Glassworks in 1955 and changed the parent name to United Glass (UG) in 1959, hence the embossing change on the bottles. The Kennerty bottles almost certainly date to the 1970s, and the presence of a metric capacity measure and enamelled decoration on the bottles confirms this.

SF 98, the 'Tit-bits' sauce bottle comes from a small Yorkshire company based in Selby which was operational between c. 1920 and the 1960s.

All six window glass shards (samples A-F) were selected for analysis, but sample C turned out to be too small for the pXRF target area. The five analysed samples were all kelp-fluxed with date parameters of c. 1700-c. 1835 (Dungworth and Girbal 2011, and Table 6). However, judging by their colour and condition samples A, B and F are likely to be middle to later eighteenth century while samples D and E are probably early nineteenth.

Newcraighall South

Some 20 glass shards were recovered from the area (see Appendix 4). Of interest are the following: of two shards, one is from an aerated water bottle c. 1900 and the other probably from a late eighteenth to early nineteenth century wine bottle; six shards ranged from possibly late eighteenth century to the twentieth century; two window glass shards were recovered and submitted for analysis (see below); 12 shards are generally earlier in date, however, there is a mid nineteenth century beer bottle shard.

Glass, especially the cheap potash fluxed type used to make wine bottles is very prone to corrosion and its condition can vary quite drastically depending on the pH value of the soil in which it was buried. Neutral or slightly acidic conditions have little effect but alkaline can be quite drastic. The difference is demonstrated by the condition of two wine bottle bases from SFs 37 and 39. Based on shape, both of these bottles date to the 'mallet' shape period c.1730-40, but, while SF 39 is in good condition, SF 37 is very corroded with only about a third of the heart glass surviving. This indicates that SF 37 has lain in very alkaline conditions and in a probably very damp environment. In contrast to the latter, the wine bottle shards from SF 1002 and SF 29 look to be from 'onion' shaped bottles of the first quarter of the eighteenth century, and are in excellent condition.

Window glass analysis

A total of 5 window glass shards from Newcraighall South were selected for analysis, by Historic Environment Scotland to establish their composition, and the results (Table 6) are interpreted with respect to the dating model in Dungworth and Girbal (2011, Fig 1), i.e. from c. 1700 onwards. The earlier glass is more doubtful since it appears that all window glass would have been imported into Scotland before the start of manufacture from raw materials c. 1610. In particular High Lime, Low Alkali (HLLA1) glass was introduced into England c. 1567 by immigrant glassworkers from the continent. It replaced the native forest glass composition there. However, since HLLA glass was developed in Germany in the fourteenth century and had spread to France by the fifteenth century, we have little evidence of where the importation came from. The dating of HLLA glass found in Scotland is complicated. HLLA2, with a much lower percentage of manganese was developed in England around 1600. Although the use of kelp as a fluxing alkali was not introduced until c. 1700, in Dungworth's investigations it looks as if it may have been used earlier, since HLLA2 glass with at least some kelp turns up regularly. The use of kelp leaves a significant strontium marker in the composition. The only provenance we have for this hybrid so far is in-situ panes in Traquair House by Innerleithen where they are present in building wings built c.1690.

Sample	SF	Context	Glass type	Date range	Comment
A	42	28	Kelp flux	c. 1700-1835	
B	42	28	HLLA2/kelp	c. 1650-1700	
C	15	2011	?	<1700?	Could be HLLA2/kelp but dubious
D	57	2109	Kelp flux	c. 1700-1835	
E	57	2109	SS1	c. 1835-1870	

Table 6: Window glass analysis.

Sample C had the main element characteristics but there were several anomalies in the lesser components. The shard was retested with the same results, so it remains a mystery.

Clay tobacco pipes

By Dennis Gallagher

Northcraighall North

This small assemblage consists of 38 fragments, mostly nineteenth-century in date, but with a few stems whose wider stem bores may indicate a possible seventeenth or early eighteenth date (Table 7 and Appendix 5).

Two makers are represented, Thomas White of Edinburgh and (possibly) John Begg of Leith. Thomas White was the most prominent pipe manufacturer in Edinburgh c. 1820-1870. He was renowned for the high quality of his pipes and had large sales, both in the home market and to the colonies. The business declined after his death in

1847 (Gallagher 1987, 27). There are two stems from Thomas White (Catalogue numbers: CAT N4, Plate 14, and 5). The bowl marked T(W) in an oval (CAT 6) may have originated as a mark of Thomas White but, by the mid-nineteenth century, it was widely used by other Scottish makers to signify a particular form of pipe. The similar style of mark, with a JB in an oval (CAT N7), was not widely used and is likely to be that of John Begg of Leith, recorded active as a maker 1867-88.



Plate 14: Clay tobacco pipe CAT N4.



Plate 15: Clay tobacco pipe fragments CAT N2 and N3.

Newcraighall North									
SF No	Area	Context	Bowl	Mouth piece	Stem	Total	Date range	Identified makers	Comments
4	1	12			3	3	c. 17th-19th?		
6	1	u/s			1	1	c. 17th?		
11	1	24	1			1	c. 19th		
13	1	24	1			1	1800-50		
17	1	30	3			3	late c. 17th??		
21	1	33			1	1	c. 17th		
39	1	78	1			1	c. 19th		
44	1	35	1		2	3	c. 17th?		
48	1	85			1	1	c. 19th		
52	2	118			1	1	c. 19th		
57	2	144	2		2	4	c. 19th	John Begg	
73		72			2	2	c. 19th		
82		191			2	2	c. 19th??		
88		198	1			1	c. 19th		
100		u/s	1		5	6	c. 19th	Thomas White	
General		1	1	1	5	7		Thomas White	
Total			12	1	25	38			

Table 7: Clay pipes.

Newcraighall South									
SF No	Area	Context	Bowl	Mouth piece	Stem	Total	Date range	Identified makers	Comments
5	Tr 7	702			1	1	19th		
8	Tr 21	2102	1		1	2	1690-1900	David Banks?	19th C. stem with glaze
17	Tr 37	3706							
3		8	1		1	2	c. 1650-60	William Banks	Adjoining basal fragment and stem
9		15							Porcelain - cosmetics or apothecary jar?
10		10		1		1	19th-early 20th		Light green glaze
20		2		1	1	2	17th-19th		Glazed mouthpiece
22		2			1	1	c. 1660-1720		
23		15	1			1	c.1850-early 20th		Small cutty with heart
25		2			1	1	17th		
49		27			2	2	17th		
55		51			1	1	17th		
63		u/s	2			2	19th		Basal frags with spurs
3	1	1003			1	1	17th		Scatch marks from finishing tool
4	1	1009			1	1	17th		
5	1	1002	1			1	1650-1700		Bowl wall frag
6	1	1015			1	1	19th		
21	2	2019			1	1	17th		
30	2	2047			1	1	17th		
44	2	2051			3	3	17th to 19th		
52	2	2021	1		2	3	c. 1680-1900		Basal frag, poorly made, late 17th C.
55	2	2081			1	1	17th		Parallel abrasions from over-dry finishing
56	2	2107			1	1	19th		
65	2	2111			2	2	19th		Glazed mouthpiece and stem with traces of glaze
60				1	2	3	post c. 1850		Two adjoining frags, all three probably from same short-stemmed cutty pipe
Total			7	3	25	35			

Table 7 (continued): Clay pipes.



Plate 16: Clay tobacco pipe fragment CAT N1.

There are three bowl fragments with decoration. Two (CAT N2 and N3 Plate 15) have relief ribbing, a style that was very common throughout the nineteenth century. The other (CAT N1, Plate 16), with Britannia in relief, is more unusual in a Scottish context. Britannia pipes from the London area have been associated with the surge of patriotism that followed the naval victories of the Napoleonic Wars, particularly that of Trafalgar in 1805 (Higgins 1981, 220-1). Pipe smoking was not a common custom in early nineteenth-century Scotland; the pipe may be an English product.

One stem fragment (CAT N5) is marked T.WHITE/...TTY PIPE. This is like to have been a Burn's Cutty

Pipe, which was very popular with the expansion of the Burns cult in late 1840s following the major Burns festival held in Ayr in 1844. Smoking a Burns Cutty pipe became an expression of Scottish identity both at home and among Scots expatriates overseas.

Newcraighall South

The clay pipe assemblage consisted of 35 fragments from 22 different contexts ranging in date from the mid-seventeenth to the early twentieth century.

The earliest pipe is a late example of the work of William Banks (CAT S1). This a well-made piece though of low quality, in not having the burnishing of higher quality pipes. Other seventeenth-century fragments include a large bowl (CAT S2) of c. 1690-1720. This again is a low quality product as its maker's marks are indecipherable through wear of on the mould. Other stem fragments in the assemblage show evidence of careless production. One stem (SF 55, context 2081) has had its seams trimmed when the clay was leather hard, producing corrugated ridges, another one (SF 3, context 1003.) has repeated marks from the finisher's finger nails. Whoever was consuming the pipes was buying from the cheaper end of the market.

The nineteenth-century pipes include a part of a bowl and stem of a small cutty pipe decorated with a hatched heart, a popular late nineteenth-century motif (CAT S3).

Industrial waste analysis

By Christine Rennie

A total of 470 pieces of industrial waste from the excavation of former colliery buildings at Newcraighall South were examined using a x10 hand lens and according to accepted guidelines (Historic England 2011). This was to observe any surface characteristics that could indicate the metallurgical process that produced the waste. Each bag of small finds was weighed, and the number of pieces counted. The pieces had a combined weight of 14.14 kg (see Table 8).

All the material was found to be iron (Fe) slag, from which most of the metal had been removed through smelting. The resultant slag was generally very light in weight and had a frothy

surface appearance. The exterior of all the pieces included many vesicles showing that the air temperature within the furnace was high while the slag was liquid, and that the slag solidified quickly, trapping gases within the material. There were visible inclusions of stone, including burnt lime, on and within many of the examples. The lime may have been the flux or reducing agent used during the smelting of the iron ore.

The results

Aside from the single unstratified piece (SF 45), the industrial waste was recovered from five contexts over the excavation area (017, 018, 019, 020 and 026).

The largest volume was retrieved from context 017, the fill of a ditch that has been interpreted as a drain for water pumped from a mine shaft. This feature contained 426 pieces of slag (SF 46, 47 and 53) with a combined weight of 6.562 kg, as well as gravel, coal fragments and occasional marine shell fragments (Hunter Blair and Will 2016, 31).

Twenty larger pieces of industrial waste (SF 30) weighing 3.27 kg were found in fill 020 of ditch 057. This feature was also interpreted by the excavators as a drain, and the porosity of the industrial waste within the fill would certainly allow for the free flowing of water through it.

Four pieces of industrial waste (SF 34) were found in a deposit of stones and rubble 018 that abutted mineshaft head 015 and lay to the south of Structure 1. The deposit itself was mottled clay and silt that, in addition to the industrial waste, also included large stones and brick. The industrial waste had a combined weight of 0.272 kg.

The six pieces of industrial waste from context 019 (SF 62) weighed 0.4 kg, and were recovered from a deposit of mottled clay with inclusions of shale, coal dust and coal. The deposit abutted Structure 3 and mineshaft head 077. The excavators have interpreted it as an area for storage of coal (Hunter Blair and Will 2016, 29).

Thirteen pieces of industrial waste (SF 36) from pit 026 located within Structure 2 weighed 0.97 kg.

Context	SF	Number of pieces	Combined weight (kg)	Description
17	46	5	0.544	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Occasional pieces of tap slag, but generally undiagnostic waste from Fe production.
17	47	48	1.268	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Undiagnostic waste from Fe production.
17	53	373	4.75	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Some inclusions of burnt lime within the waste. Undiagnostic waste from Fe production.
18	34	4	0.272	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Undiagnostic waste from Fe production.
19	62	6	0.4	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Undiagnostic waste from Fe production.
20	30	20	3.27	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Undiagnostic waste from Fe production.
26	36	13	0.97	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Undiagnostic waste from Fe production.
u/s	45	1	0.028	Light, frothy, vasicular material. Gritty surfaces with adhering stones. Undiagnostic waste from Fe production.

Table 8: The characteristics of the industrial waste.

Discussion

The industrial waste recovered from Newcraighall South appears to contain very little iron, indicating that most of the metal was removed during the smelting process. Although the waste itself is largely undiagnostic, meaning that the process that produced it cannot be positively identified, occasional pieces within the assemblage are characteristic of tap slag. This was most evident in the waste recovered from context 017 (SF 46), where rivulets were observed on the upper surface of the material. This characteristic, in combination with the frothy and vasicular aspects of the waste, suggests that the material may have derived from a late bloomery, rather than from a blast furnace. In Scotland, the use of the charcoal blast furnace for smelting is traditionally dated from the early seventeenth century (Lewis 1984, 434), but the bloomery process continued to be used in some parts of Scotland until at least the later seventeenth century (Atkinson and Wombell 2015). The overwhelming volume of waste was undiagnostic, and could have been produced by either smelting or smithing.

There was no evidence from the excavations at Newcraighall South that the industrial waste was produced on the site itself. Rather, it appears that the material may have been brought to the mineworking site for specific use as fill material, mainly within the colliery's water drainage system. The question of where the industrial waste originated is unanswered.

Coin

By Donal Bateson

SF 3010, an English Charles I, silver halfcrown was found in Transect 8 of the metal detecting survey (Plate 17). Its initial mark is an eye and it was issued in 1645 by the Tower Mint, London. Its weight is 14.92 grammes / 230.3 grains, and the die axis is 90. The condition of the coin is corroded and it is fairly worn. (See North 1991, 2213; North and Preston-Morley 1984, Brooker 359)



Plate 17: SF 3013, English Charles I, silver half-crown, 1645.

General discussion

Prehistory

The earliest evidence for activity on the site was found on Newcraighall South in the form of three groups of pits which yielded lithic artefacts and sherds of prehistoric pottery. Evidence from them suggests their use, which was probably intermittent, ranges from the Mesolithic to the middle/late Bronze Age, a period of c. 3000 years or more. It would seem that the area was visited on numerous occasions during that time by hunter gatherers and others using the landscape, perhaps as a camp site. The mixed oak deciduous woodland in the vicinity would have been an attraction, providing fuel, shelter and food in the form of hazel nuts that were roasted in the pits. It is considered most likely that two of the groups of pits were dug during the late Neolithic and early Bronze Ages when a sickle, a scale-flaked knife in Yorkshire flint, was deposited or disposed in a pit of the western group. The burial of this implement may have been a deliberate action, perhaps indicating the closure of activities at the end of an autumn harvest, where feasting and a fire pit was the centre of events. The backfilling of these pits with surrounding material is likely to have included debris from earlier periods of use (visits to the site), hence the long time scales recorded by the artefacts.

The prehistoric pottery that came from the eastern group of pits is probably contemporary with the radiocarbon dates indicating a middle to late Bronze Age date range, although later Neolithic lithic artefacts were also found there, suggesting they were probably the products of earlier visits to the site.

The use of the landscape during the later Neolithic and the middle to later part of the Bronze Age, highlighted by the activities associated with the pits, indicate that contemporary settlements may have been situated near by, but this is not confirmed by the archaeological investigations. However, the paucity of prehistoric remains is probably due to later activities in the area.

Medieval and later activities

The majority of features encountered across the area related to mining activities. These generally were in the form of small pits or shafts. Larger

oval pits were also present and their alignments NNE/SSW presumably reflect the mining of the particular edges or seams of coals. The 'edge coals' of the Midlothian coalfield are so named due to the nature of the seams rising to the surface at a very steep angle. These are located at the west side of the coalfield and are aligned in a southerly direction from the Firth of Forth down through Niddry, Gilmerton and Loanhead. Whether the linear alignments of mining pits derive from periods of short duration, or whether these pits/shafts were established and worked out over a continuous broad date range, is difficult to determine. This is due to the material filling the shafts, although varied, yielded finds of a similar type and date range, although the historical research suggests that coal mining was at its peak here during the mid-seventeenth century. Although Blaeu and Blaeu's map of c.1654 (Figure 14) depicts the estate of Brunstoun, mining activities across the Midlothian coalfield are not portrayed.

While most of the finds recovered from the pits related to mining, comprised early modern and post-medieval pottery, the fill of pit 031 yielded the earliest pottery, that of medieval Scottish east coast White Grittyware Ware, dating to early thirteenth century. The monks of Newbattle Abbey, a Cistercian Friary founded in 1140 and patronised by David I, generated the majority of their income from coalmines held in their possession and held the mineral rights from Newbattle to the Firth of Forth (*Registrum*, Bannatyne Club 1842). The monks of Newbattle are regarded as amongst the first, if not the first, mine operators in Scotland. Although evidence is scant in the form of dateable material culture from the fills of these similar features, it is possible that a number of the coal mining pits, or possible bell pits, may date from the medieval period. Due to health and safety considerations during the excavation, it was not possible to analyse the pits in detail, and their actual type was not determined. It is possible, however, that the small assemblage of medieval pottery from pit 031 may simply represent residual cultural material that became incorporated into the backfilling material by accident. The other artefacts recovered from the same fill during the excavation of the pit, included three late seventeenth century clay tobacco pipe bowls and mid-late nineteenth century glass bottle fragments.



Figure 14: Brunstoun (Brunstane) depicted on Blaeu J and Blaeu's map of 1654 Lothian and Linlithgow (Reproduced with the permission of the National Library of Scotland: <http://maps.nls.uk/atlas/bleau/browse/108>).

The larger oval pits may represent adits accessing drift mines to the deeper, thicker, flat coal seams that were also worked in this area of the Midlothian coalfield (Tulloch et al. 1958). Although this is a tentative interpretation, a geo-technical ground investigation probe survey carried out concurrent to the archaeological work (see project archive) recorded a 4 m deep void 10-14 m below the present ground level and 20 m east of the most westerly coal mining pit alignment, in an area devoid of surface coal workings. Combining surface evidence with the ground investigation provided us with further information on the type of mining undertaken here and some indication of its likely date. The evidence of pottery, glass shards and clay pipe fragments suggest the pits were filled in during the post-medieval and early modern periods.

The colliery building remains found around the coal workings at the southern end of the site may date to the nineteenth century and represent the beginnings of improvements in mining techniques by mechanisation during the industrial revolution when the consumption of coal for industry and transportation increased exponentially. Structure 1 is likely to have been the base for the main pumping engine.

Although not forming the coherent ground plan of a building, it is possible that pit group 2, immediately east of the central coal mining pit alignment in Newcraighall North, and pit group 3 to the south-east of this, formed parts of ancillary structures associated with mining activity. Many of the pits in these groups had concentrations of coal in their fills, which suggests they may be related to coal mining activity from this period. Although evidence for their use is scant it is possible they may have been simple structures for temporary storage or lay-down areas for materials necessary to maintain the expansion of underground workings. Alternatively, they may represent simple shelters where miners congregated during shift changes near the entrances to the mine portal. These, however, are only tentative interpretations.

There is no evidence to suggest prehistoric activity on Newcraighall North but the truncated remains of two curvilinear and one linear ditch suggest earlier field systems, possibly dating from the medieval period. The medieval pottery sherds found across the site indicate use of the wider area at this time. Remnants of later broad rig cultivation were visible across all parts of the site indicating a later use of the landscape (Figure 15).



Figure 15: Rig and furrow cultivation marks in the north area overlaid onto map of Brunstane Farm 1879-1882, (unattributed map).

Designed landscape elements

In the 1730s other landscape changes took place. The three sandstone culverts suggest there was a certain amount of land and water management probably from the post-medieval period onwards. The landscaping of land and gardens of Brunstane House, to the north of the site, by Lord Milton at this time, was a significant capital investment in the property. The ha-ha is likely to be an integral part of the landscaping design (Figure 16), which may also have necessitated control of water runoff with the excavation of ditches and the building of culverts. The use of sandstone and lime mortar for both the ha-ha and the culverts suggest they may be contemporary or near contemporary features, and all predated the construction of the railway line. The relationship of the rig cultivation to the 1730s landscape changes has not been explored.

Nineteenth century and later activities

The remaining features suggest a predominance of nineteenth to twentieth century activity across the areas, not only in quantity and date of artefacts and features, but in terms of the spatial distribution. A previously recorded ring-ditch crop mark (Arabaolaza 2011) thought to be prehistoric in date was found instead to be a capped mineshaft.

The archaeological evidence clearly demonstrates that the development area was formerly part of a farming landscape and an industrial (predominantly coal-mining) one. While the precise purpose of some of the features encountered could not be identified, the nature of the materials they contained suggests that most relate to coal mining activities. The construction of the adjacent railway and the practice of agriculture during the medieval, post-medieval and modern periods indicate that this was, and remains, a landscape of change.

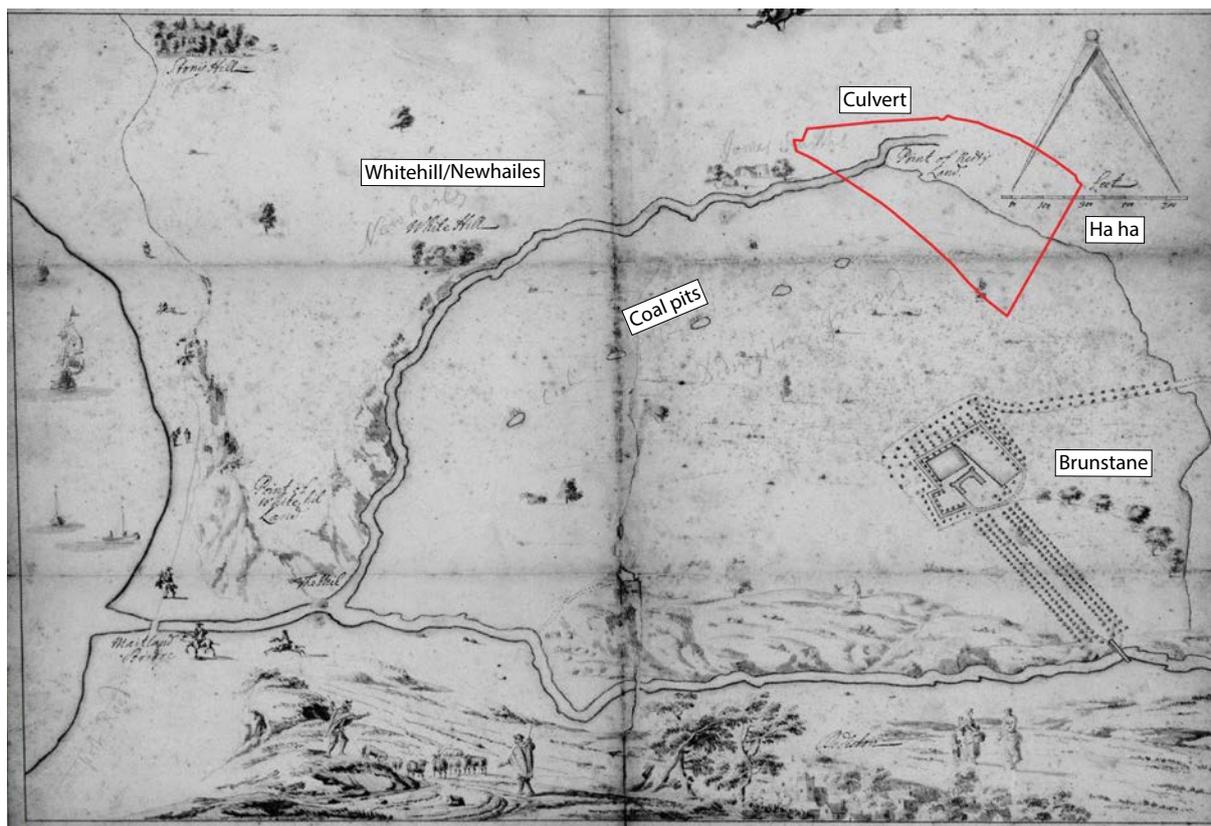


Figure 16: Newcraighall North boundary overlaid onto Slezer's map of Brunstane c.1672. Map provided by HES (EDD 18/12 P) with permission of the Duke of Buccleuch and Queensbury KT.

Historical research

by Morag Cross

Brunstane Coal Mining and Ownership History

In August 2014, archaeologists uncovered seventeenth century coal workings south of Brunstane House, between Duddingston and Musselburgh, near Edinburgh. The 8-acre field under historical investigation lies north of Whitehill Road, Newcraighall, and was part of Loan Shott field and Whitehill Park (also called Wanton Walls or Garden Foot Park), (NLS, Ms 17477, fos 99-100; NRS, RHP14979, RHP85500/1, RHP85505). Loan Shott contained the western and Whitehills Park, the eastern parts of the excavation. Brunstane, originally known as Gilbertoun (various spellings), was named after a castle near Penicuik which belonged to the Crichton family, who originally owned both 'Brunstanes'. The excavation revealed infilled holes, possibly 'adits' or bell-pits, as well as landscaping and agricultural features, such as a periphery-marking sunken fence and accompanying ditch, and a covered, stone-

built culvert. One of the earliest depictions of Brunstane was the 1654 map by Bleau and Bleau (Figure 14).

Coal-mining operations on the Brunstane estate are extraordinarily well documented from the 1680s onwards, describing working practices and the output of individual miners. Various extracts from reports over the centuries show the increasing sophistication of geological analysis. Mining engineer John Geddes wrote in 1868, 'There is obviously an extensive coalfield under these lands, consisting of 27 seams of coal of an aggregate thickness of 113 ft, and including the seaward range ... (which) is equal to the supply of all Scotland for a quarter of a century. The coals are known as the Edge Seams of Midlothian, and constitute three distinct groups', the third being the 'Brunstane or South Seams ... 52 ft thick, about 220 fathoms above the South Parrot', or gas coal (PRONI, D623/D/10/22).

Another consultant in 1831 confirmed that Brunstane's 'coal fields ... lye to the rise of', or higher than, surrounding workings, and consequently fair drainage arrangements had been officially enforced (PRONI, D623/A/222/6,

pt 5). This was *'to prevent violent competition in the sale of Coal by any other ... lessee of the adjoining coalfields ... The Jewel coal (is) ... the most valuable seam of coal in this country'*, and being shallower than nearby rivals' mineral veins, was *'easier won'*, (ibid).

Civil engineer John Grieve said of Duddingston and Brunstane in 1808, that *'These collieries are thought to be amongst the oldest in Scotland and the first that were opened for the supply of the Edinburgh market. ... There are 6 edge seams of coal in Brunstain ... the thickness of them in all is about 12 yards ... stretch(ing) from the seaside ... to the march at Whitehills and Niddry 1600 yards'* (PRONI, D623/D/10/14).

In 1688, a much earlier survey was produced by William Marstane, an *'oresman'*, most likely *'oversman'* or supervisor, rather than an *'orraman'*, or casual labourer. He observes, *'There are 3 seames at the (Magdalen Salt) Pans; The Great Seam of 14 foot laying most west, The 9 foot seame at the back, The foul seam 7 foot which is the most cast (worked); The foul seam was left unwrought by reason of a thick stone (dyke, or intrusion) which was found'*, (Tollemache, No 613). *'They have pierced the dyke ... and are setting down a sink (shaft) for air & stair'*. In the early 1680s, at Magdalen Pans *'there did 10 men and their servants work and each man did bring in one week 120 load of coals ... from 20 men 2,400 loads each week ... The 3 Men at Brunstone made each man 100 loads per week, which is 300 loads, till they did run upon the dyke'* (Tollemache, No 613).

'The Clear Rental' of Duddingston and Brunstane of 1685, observes that: *'The coal was known when the land was bought ... the work does but quit(e) cost and its represented as now out of the ground'*, in the overall valuation of the area. Indeed, in 1666, the Duke's brother remarked that *'ye may have 40 or 50 th(ousand) marks upon sufficient surtie (security) in Niddrys (coal) mine upon th(a)t estait and so to secwr (secure) the bargain to y(ou)r self'*, (Tollemache, No 1631). In the 1685 rental, property is described in subdued terms: *'The lands of Didistoun ar ... 900 acres ... wherof not abov 600 acres arable or pleught land'*, the rest being *'douns (moor) only, and fill of furze (gorse) ... Bruntstane ar all sett (rented out) at £1 ane acre'*, yielding £111/2/- per year (NRS, GD112/1/685).

The ownership of Brunstane and its mansion house has been little-studied, and the records are seemingly incomplete, and self-contradictory. Part of the reason is given among the records of the Scottish Parliament for 1661, concerning Brunstane's then-owner: *'The time of the late troubles the (Duke of Lauderdale's) writs and evidences of his lands were totally spoiled, except some few ... by hiding of them under the ground in the yard of Balcarres, where the underwater came through the seams of the iron chests wherein they were put ... (this inquest) find that the said writs were ... in three iron chests in the year 16 (blank) after the fight of Dunbar and ... totally spoiled'*, (RPS, 1661/1/209).

Apart from these unintended paper casualties of the Battle of Dunbar (1650), *'the Barony of Brunstane only consists of the single farm of Brunstane'*, in other words, a *'bonnet laird's'* estate, of modest size and lofty social pretensions (PRONI, D623/A/222/9). Brunstane comprised around 110 (Scotch?) acres in 1685, in 1800 approximated 166 acres, and 245 acres in 1868, depending upon which fields were counted at the time (NRS, GD112/1/685; PRONI, D623/D/10/8, 21). It has been frequently conflated, and confused with, the adjoining, larger Duddingston estate, although each was documented separately, even when they were under joint ownership.

Brunstane House as greatly-enlarged in the 1670s, possibly required more economically-productive land to support it than provided by its immediate *'perts and pendicles'*. Hence, it became usual for the owners of the mansion house to purchase all, or part of, the richer neighbouring Duddingston estate to supplement the agricultural and mineral resources required to maintain a stately home designed by both Sir William Bruce and William Adam. Architect John Adam and John Slezer, the military engineer, also worked on the house and gardens.

The conventional narrative is given by the Victorian historian James Grant's standard work, *'Old and New Edinburgh'* (1880). In May 1608, James Crichton inherited the estate, *'but from thenceforward to the time of Lord Thirlestane there seems a hiatus in the history'* (Grant 1880 III, 150). Grant *'examined the existing title deeds'*, jumping straight to the Duchess of Lauderdale, in 1682, her son Lionel, Earl of Dysart's alleged

possession of Brunstane House in 1703, and then to 1747 (*ibid*), by which time the lawyer Andrew Fletcher, Lord Milton, had actually been living at Brunstane for 15 years. Grant's mistakes were simply repeated by Good's parish history of Liberton (Good 1893, 81-2).

William Baird, historian of Duddingston was more careful, and noted the Crichtons' sale of Brunstane to the widowed Lady Thirlestane in 1597 (Baird 1898, 67-71; RMS VI, No 644). Later, Lady Thirlestane paid off the numerous debts the Crichtons had secured on the land (RPS, 1661/1/209, Gilbertstoun, Nov-Dec 1597; renunciation of annualrents, 1598-9). Lady Thirlestane's grandson, John Maitland, second Earl (later Duke) of Lauderdale (1616-82), wed Anne Home in 1632, their initials being displayed above a Brunstane doorway of 1639 (Hutton 2004; MacGibbon and Ross 1892 IV, 180). Of their three children, their only son Alexander was baptised locally on 12 May 1642, but died in infancy (NRS, Maitland 1642). The neighbouring Laird of Niddrie had been among his godparents (*ibid*).

Maitland initially sided with the Covenanters, supporting a Presbyterian church, and inherited the earldom of Lauderdale in 1645 (Hutton 2004). He transferred his allegiance to Charles I in 1647, and was captured after the Battle of Worcester in 1651. He spent the remainder of Cromwell's Protectorate, until 1660, imprisoned in England (*ibid*). The Commonwealth Parliament confiscated Lauderdale's estates in 1652, '*through his invading and disturbing the peace ... of England*', and granted Brunstane, its mills and grasslands, to one of their own supporters (RMS X, Nos 26, 447). A letter of 1658 informed the captive that Brunstane House was still in good condition although it had deteriorated to '*despoiled*' by May 1660 (Falla 1979 II, Nos 1017, 1047).

Lauderdale was reinstated in 1661 by a grateful Charles II, appointed '*sole secretary of state ... of Scotland*', (RPS, 1661/1/43; RMS XI, No 50), and awarded various public offices. Sir Patrick Thompson, owner of the contiguous estate of Duddingston, was in serious financial trouble in the later 1660s (Baird 1898, 61). A later owner described '*Such difficulties as usually attend purchases from one distressed by his creditors*,

(NLS, Ms 17477, f121v), and this sale caused '*such difficulties*' for decades. The lawyer in another sale of 1745 '*did not like the method ... in the later rights of referring to ... the disposition granted by Sir Patrick Thomson*', (PRONI, D623/A/48/1).

After using the property to raise money, '*Sir Patrick Thomsons with consent of his creditors*' sold '*Eister and Wester Duddingstounes, coalles, salt pans*' to the Earl around 1668 (RMS XI, Nos 919, 1005; Tollemache, Nos 536, 1890). Lauderdale had discussed the purchase since January 1666, when his brother told him that '*ye may be able ... to accomplish the bargane off dudiston*', by deception, thus achieving a lower price (Tollemache, No 1630). The neighbouring laird of Niddry, a less wealthy man, would '*enter on termes as for himself... y(ou)r name is not to be mentioned*', (*ibid*). Niddry, '*spok with Si()r patrik Thomson about the seatt off dudiston ... if ever he sold that estait ... he should wish (Niddry) wer his martshant (buyer) then any other*' (Tollemache, 1631; Falla 1979 II, Nos 1631, 1890, 2020). Having allegedly intimidated rival bidders, Lauderdale obtained a charter under the Great Seal in 1673 (Baird 1898, 61-2; NRS, C2/64, pt ii, f138).

Much later seventeenth century correspondence about the Duddingston and Brunstane coal is retained by the Tollemache family in Leicestershire, and it was impractical to access it for the present publication. Instead, the official catalogue provides a valuable overview (Falla 1979). Lauderdale's extensive political career as one of Charles II courtiers from 1660-80, functioning as *de facto* viceroy of Scotland for much of the time, is thoroughly documented. He is remembered as '*one of the five royal advisers who made up the body nicknamed the Cabal*', after their initials, namely Clifford, Arlington, Buckingham, Ashley and Lauderdale (Hutton 2004).

Lauderdale's own estates were administered via factors and Edinburgh lawyers like William Sharp (Falla 1979 II, Nos 1108-9, 1653, 2764). He granted Sharp various lands around Musselburgh in 1681, including the well-known '*coals (and) coalheughs*' of Monktonhall, but apparently retained for himself the valuable right '*to break the ground thereof and to set down sinks (pit-shafts) ... and all other things ... for working ... coal, ... paying all damage and expenses for ...*

filling up of the said sinks' (RPS, 1681/7/97). It was Sharp who informed Lauderdale that the Brunstane coal showed 'good prospects', and that it was doing well in 1665, these being some of the earliest comments on these mines (Falla 1979 II, Nos 1417, 1618).

In 1672, only weeks after the death of his estranged wife in Paris, Lauderdale married his mistress Elizabeth Tollemache (1626-98), Countess of Dysart in her own right (Marshall 2004). She was a widow supremely ambitious for her own children, and rumoured to have also been Cromwell's paramour. With a reputation for extravagance and avarice, 'whatever her Grace got hold of, she kept', Lady Dysart featured in several ribald satires (Cripps 1975, 124-8, 198, 203-4; Maidment 1868, 239). Typical was 'from what damn'd dunghill first she crept, Next while unmarried what intrigues she kept', or 'She was Besse of Old Noll (Cromwell) ... She plots with her tail ... But now she usurps both the sceptre and crown,' and 'If a Lord should dare whisper his love ... she'd sell him a bargain and laugh out aloud', none of which testify to a favourable public reputation (Maidment 1868, 234, 241-2, 244).

Lauderdale was further elevated to Duke of Lauderdale in 1672, and with his Duchess, 'their joint pursuit of money ... eventually acquired overtones of corruption', funded by his multiple state offices (Paterson 2003, 120, 198). By now, he had engaged his own protégé, the Surveyor-General of Scotland, gentleman architect Sir William Bruce in an 'ambitious and frantic programme' of embellishment at his landed estates of Thirlestane, Lethington (now Lennoxlove), and Brunstane (MacKechnie 2012a, 1-4; 2012b, 137; Dunbar 1975, 202; Paterson 2003, 120). Bruce, a cousin of the Duchess, also modernised Holyrood Palace, at Lauderdale's instigation (MacKechnie 2012b, 136-9, 142).

Slezer's Map of Brunstane c.1672 and the Coal Workings Depicted

Topographic artist and surveyor John Slezer illustrated the new gardens of Brunstane, a plan which has been ascribed to 1690 (Figure 16, RCAHMS, EDD18/12 P). However, there is good reason for believing that it is part of a series, along with the other views of Thirlestane, Ham House and Lethington of c.1671-7, when Slezer was employed by the Duke in draughting landscape

designs for the various policies and plantations (Dunbar 1975, 211, 214, 220). The figural vignettes, cartographic dividers and scales of feet, match those on the above mentioned plans of c.1671 (Ham House), c. 1674-7 (Lethington), and Thirlestane of c.1673-4 (Dunbar 1975, 211-4, 218 n55-6, 220, 223, 225-6). These related plans are shown in Dunbar (1975, plates 21B, 24B, 25A and B), and the drawing of Brunstane appears in Brown (2012, Figs 296, 304-5), who merely repeats Dunbar's statements regarding Brunstane without adding anything new.

Dunbar and Brown suggest the space-filling marginalia surrounding the landscape-layouts are by Slezer's occasional colleague, Jan Wyck (Brown 2012, 225-6; 230-2; Dunbar 1975, 211-12). Keith Cavers indicates that the 'little figures' drawn by Wyck were those in the highly-finished engravings of towns and castles intended for publication in 'Theatrum Scotiae', rather than those in Slezer's privately-commissioned garden designs (Cavers 1993, 9-11). Slezer himself cites payments to Wyck for 'touching and filling up ... with little figures' the drawings preparatory to engraving for *Theatrum Scotiae*, in a petition of September 1696, rather than the earlier garden plans (*Bann Misc* 1836, 309-10, 317). Indeed, Slezer's watercolour sketches of Edinburgh show similar foreground horsemen and stylised rocks, minor details for which it was probably impractical or unnecessary to pay another artist (Cavers 1993, 95-9). Therefore, it appears that the Brunstane, Thirlestane and associated plans are Slezer's work alone, and need not be dated to his magnum opus, the engraved *Theatrum Scotiae* of two decades later. This would re-date the Brunstane plan from c.1690 (RCAHMS, EDD/18/12 P), to c.1671, and give some confidence in interpreting the landscape features which it depicts.

Slezer's Brunstane plan, partially reproduced in Brown (2012, fig 301), shows a diagonal series of five 'coal pits' (labelled later in pencil), running SW/NE, through the area of discussed in this report. The dating of the map is important, because they indicate the extent of contemporary coal-workings. The avenue shown on the plan was 'staked out' by Bruce before November 1672, although the precise location of lime trees planted in 1675 is not specified (Dunbar 1975, 214, 216-7; Boyd 1993, 5). Cavers and Dunbar suggest Slezer may have quietly collaborated with Bruce on

several projects, so the garden design schemes may predate the intended physical groundworks (Cavers 1993, 90-1; Dunbar 1975, 229). Slezer was appointed Chief Engineer in Scotland in December 1671, and work on Brunstane began early in 1672, so the plans possibly date from this time (Cavers 1993, 1; Boyd 1993, 5; Dunbar 1975, 214).

Lauderdale sent Bruce his intentions for Brunstane in November 1672, '*I mean God willing to pursue the design of the gardens as we resolved at parting*', which supports an early 1670s attribution for coalpits drawn by Slezer (NRS, GD29/1897/6). They were following a seam also depicted on William Roy's *Military Survey* of 1752-5, where either the same, or similar pits proceed north-east (NLS, Roy 1752-5). The 1895 *Geological Survey map of Edinburgh* (GSS 1906) shows a coalfield covering the entire area between Brunstane and Musselburgh, with seams running almost SSW/NNE. It is obvious from map overlays that Slezer and Roy show an identical set of pits, perhaps with some additions from contemporary mining, continuing the same row further north-east. The pits on Roy's survey, nevertheless, are those in John Leslie's estate plan of 1764, where they give their name to the field, Swinton Holes (NLS, Roy 1752-5; NRS, RHP14979).

If the bigger pits excavated by Hunter Blair in 2014 are adits, or 'bell pits', or are the same ones as Slezer indicated by large oval holes, modern mining surveyors have suggested that they may only have lasted a few months before becoming exhausted (G Archibald and A B Donaldson, *pers comm* 2 July 2015). This could explain their large numbers and close proximity, among the most sizeable being pits (107), (118), and (163) (Hunter Blair 2014, 27-8, 30). Adits were only used for easily-accessible, shallow seams. A short shaft was dug to the coal, and the diameter of the pit-base increased as the surrounding coal was hewed out (hence the description 'bell-pit'). This literally undermined the roof, which eventually caved in, leaving a collapsed ground-surface, which was greater in extent than the initial small surface entry hole. The bell-pits predate the currently-available 1680s records consulted so far.

The Duke was adamant in his orders to architect Sir William Bruce that '*I do not like my great chamber to be on the west side (south-west*

wing) as you propose, for as you say very well, it must not have lights to the west side because of looking in to the kitchen court', (spelling modernised, NRS, GD29/1897/6). The Duke '*was resolved to turn the great chamber to the east-side (north-east wing), where I shall have the fair lights looking upon the sea & upon Fife, and the fourth light looking upon the garden*'; (*ibid*). In the garden he would have '*his billiard-board, and other conveniences*'. The work '*must be built and even this year too*', preceded by Thirlestane (*ibid*). The house was still at the planning stage on 24 December 1672, when the Duke '*was positive in putting my great chamber on the east side, looking to the sea*' (NRS, GD29/1897/7).

This emphasised the lower status of the south side of the house (here called the 'west'), and the architectural focus on the new avenue leading to Brunstane Bridge, across the Brunstane Burn, to the north-west (envisaged as the 'east' in Lauderdale's letters). Although the kitchen offices were to the south-west, there were also trees screening the '*Didingston Ground*', and its attendant coal-workings, from the genteel sight of the house (RCAHMS, EDD/18/12 P).

It is difficult to date the coal-works more precisely than the mid-seventeenth century, as the accuracy of Slezer's scale is uncertain. The two streams shown, Brunstane Burn to the north, and its un-named southern branch, are wildly out of proportion. The latter, designated Newhailes Burn in this report, formed the historic division between Liberton and Inveresk parishes. Therefore, the size, extent and likely date of the mineral excavations represented on Slezer's plan are hard to determine. Medieval pottery was found in pit (31), but given the preponderance of post-medieval material, the majority of the 49 mining-related pits identified are most feasibly of post-medieval origin (Hunter Blair 2014, 9, 19). The collapsed adits nonetheless predate the 1680s, as the records indicate more modern deep vertical shafts with horizontal galleries were being excavated at that date.

Slezer's southern stream is confusingly known as 'Brunstane Burn' by modern National Trust staff at Newhailes House (Connolly 2007, 2, 9; Paul Chandler, *pers comm*), and it may be associated with the culverts (158) and (145), which direct the flow south, out of the Brunstane policies (Hunter Blair 2014, 15-19). This rivulet

is canalized or culverted for much of its length, and is not named on any Ordnance Survey maps. As it is identical with that called the 'Newhailes Burn' in other sources (e.g. SNH 2001, 66-7; NRS, RHP4425) this name will be used in this report, to avoid confusion with any other watercourses. Newhailes Burn formed the historic borderline or march of Brunstane land, and is discussed later. Another culvert, (202) may represent an earlier channel for this small stream, which was of considerable legal importance in defining the edge of Lauderdale's financially remunerative territory (Hunter Blair 2014, 18).

In April 1678 her husband gave Elizabeth, Lady Dysart, for her lifetime use, the baronies of East and West Duddingston with their lucrative coal and saltworks (Tollemache, Nos 519, 521-2; Falla 1979 I, No 523). The Duchess in 1682 manipulated the Duke into leaving her, and her own son Lord Huntingtour, the Duke's entire landed and moveable estate (Tollemache, Nos 527, 530; Falla 1979 I, Nos 529, 531, 534, 560). This included the ancient Maitland family seats of Thirlestane and Lethington (*ibid*). In a cliché of step-motherhood, the Duchess also retained for herself the valuable jewellery collection bequeathed by the Duke's first wife to Lady Yester, the Duke's only child (Cripps 1975, 109-11; Falla 1979 II, No 3181, 3202).

These steps, although technically legal, disinherited the Duke's blood relatives and expected heirs, his daughter Lady Yester, and his brother Charles Maitland who succeeded to the earldom, but without the usual accompanying ancestral estates (Roswell 2012, 61; Falla 1979 II, 3154, 3177-8, 3205; Tollemache, No 3151). The enormous resentment and decades-long legal cases resulting from these unorthodox decisions preoccupied the Duchess until her death in 1698 (Roswell 2012, 60-1; Marshall 2004; Falla 1979 I, Nos 533, 534: II, No 3213; Tollemache, Nos 534, 560). The Maitlands eventually recovered Thirlestane, but still had to purchase Lethington back from the Tollemaches (Tollemache, Nos 560, 562).

Coalmining financial accounts at Brunstane and Duddingston 1680s-90s

The Countess of Dysart and Duchess of Lauderdale, formerly Elizabeth Tollemache, was clearly extremely shrewd and adroit at managing

her finances. She commissioned inventories of her material assets, which reveal how the coalworks were organised. The lessee, or tacksman by 1680 was one Charles Murray (Tollemache, No 613; Falla 1979 II, No 3017). He can reasonably be identified with Murray of Hadden, tacksman of excise for Mid- and East Lothian, and for HM Customs, rather than Charles Murray, an Edinburgh lawyer (NRS, E73/40-1; NRS, Murray 1698, 631; Falla 1979 II, No 3017). Murray leased three seams at '*the Mill Sink*', or pit, presumably around Brunstane Mill and Maitland Bridge (Tollemache, No 613).

The words of overseer William Marstan(e), who himself worked underground, explain Murray's reckless management style. The latter's pursuit of profit ignored minimum sizes of roof supports: '*Charles Murray left the work when he hade wrought to much coal and made the Roomes (individual miner's hewing spaces) soe large, that the stoops (coal pillars supporting the ceiling) ... became too small to support the Roof. Then did the water break in, by which there was two Roomes left ... Murray whose ... take (contract) bearing such a price ... for each room made his profit the greater the Larger the Roomes ware ... Murray did leave it untill the burn did break in upon it, and soe lost it wholly*', (Tollemache, No 613).

It paid to undercut the pillars, '*the stoops should be 10 quarters in thicknes and 6 ells (18ft 6 ins) long Murrays Stoops (were) not one Ell thikness ... (and did) break ... then did he Support the Roof (with) timber*', (*ibid*). An ell was 37 inches, with quarter-ells being roughly 9.25 inches (Connor and Simpson 2004, 42, 44, 58). Murray was also careless in his '*Neglect in not setting down a Sink of Ayre and Stair upon the Seam before it was wrought to the Dyke*', (Tollemache, No 613). Murray had '*his tack of the coal and the salt, the 10 roomes att £450 and the Salt Pans being 4 in Number at £250 sterling*', which was equated to '*two seams (which) will hold in work ten men and their servants*', (*ibid*). Salt-making was a major industry around Fisherrow and Musselburgh, and the Duchess's own Maitland and Magdalen Pans were fuelled by her estate's coal.

Murray was replaced by the currently unidentified '*Mr Paterson*' by 1683 (Falla 1979 II, Nos 3174-5, 3180). Paterson repaired the works, using

pillars '9 quarters in thickness', (about 6 ft 2 ins; Tollemache, No 613). He 'made the Roofe good by raising it higher w(i)th more timber and Recovered the work after which the Burn broak in and Drown'd' everything, the flood being in July 1684 (Tollemache, No 613; Falla 1979 II, No 3186). The 'mannagement' employed 10 miners, each with his bearer to carry creels of coal to the surface.

Thomas Bowen of Edinburgh, latterly 'of Lincs, gent' was another agent involved with the coal in conjunction with Paterson, complaining that profits were small because the outlay was so great (Falla 1979 I, No 712; II, Nos 3174-5, 3179, 3202-8). The third party was John Callendar of Easter Duddingston, who like the others may have been a lawyer acting as a steward or factor. He was in contact with the Duchess in 1684, and had apparently surrendered his tack by 1688 (Falla 1979 II, Nos 3175, 3179, 3189, 3209-10; Tollemache, No 613). 'Mr Callender did Employ 4 men from Preston Grange to sink the great Sink (shaft) down, they did run ... wrong, soe ... are discharged, and now (August 1688) her Grace own men ... are to sett this sink right' (Tollemache, No 613).

Marstan outlined the harsh payment system. 'The Rake is 2 Coal Bearers when they goe up and down the stairs together, they bring up ½ ticket everytime of small coal ... For that ½ ticket they pay her Grace 3 Counters', each counter being 8d Scots, and 6 counters making one ticket (Tollemache, No 613). Although it can be confusing trying to follow Marstan's calculations and vague definitions, an attempt is made here, although it should not be taken as definitive.

For four return trips carrying coal to the surface, a man earned one ticket, or 3/6d Scots. 'A good Coal ought to make 30 tickets Every day', or 2 men made 60 round trips each. All the workers owed 2 tickets per week to the Duchess, along with 'the 2 pennes and a beadle for each load' they lugged up, all due 'ever tho' there ware noe more but one dayes work from the men' (Tollemache, No 613). In short, the labourers were ruthlessly taxed at the same rate, even if there was no coal accessible to be worked. The calorific expenditure on porting 120 baskets of coal up ladders, no matter their length, seems incredible, but Marstan says some mines produced 40 tickets output of coal per miner and porter, although some teams might

have had several such servants. No obviously-female bearers, servants or surface workers appear among the detailed lists of names. The counters who had the responsible job of tallying the individual labourers' loads and payments were recorded as Hector Ross, and James Murray.

Marstan records the process of re-locating wandering veins of minerals once they veered 'off course', which seems rather haphazard, with surface bores and various passages being cut below ground to pick up seams interrupted by various faults. Judging by his modern handwriting and spelling, Marstan was fairly young in 1688, and highly literate, despite working underground since at least 1686. There are several William Mersto(u)ns born in Liberton and Inveresk/Musselburgh parishes between 1637-66, and he may be one of them (NRS, Merstoun 1634-66).

Although the use of female and child-labour in coalmines is well-attested in the eighteenth and early nineteenth centuries, the Brunstane accounts only discuss 'men'. They make no mention of anyone identifiably female, beyond the gender-neutral term 'bearers'. Therefore without verifiable evidence to the contrary, it has been assumed the workforce were entirely male during the seventeenth century period discussed below. The sole exception is for 12-19 March 1687, when '3 Women Carrying stones 1 day to Lay the Levell' are paid 12/- Scots altogether (Tollemache, No 613, 12-19 Mar 1687). This apparently indicates women were bringing suitable stones for an underground gutter or water course ('level'), to help drain the mine.

Weekly accounts for 'the 3 men att Brunstone, each ... 100 loads p(e)r week, w(hi)ch is 300 loads', (*ibid*), as well as the larger Duddingston and Magdalen Pans pits showing 'oncosts' or additional overheads of coal-extraction, survive from August 1686 until after January 1689 (Tollemache, No 613, unpaginated). Among other records are abstracts of weekly profit or loss, for various periods between August 1686 and August 1697 (Tollemache, No 614, unpaginated). The Duchess died shortly after in June 1698, suggesting that they were produced for her information. These writings reveal a wealth of ephemeral details about working practices, routine maintenance and the miners themselves, hence are worth examination.

Duddingston was referred to in the accounts as *'the Panns'*, because the saltworks were on Duddingston lands, and the Panns colliery employed more men (generally 9-13) than did Brunstane (2-5 men). The workers are moved between pits as required, and occasionally only one pit is listed as working that week. The weekly accounts 1686-7 *'as is given in by the Coalegrieve to James Murray'*, are all in one distinctive handwriting, although it's not clear if Murray is their author (e.g. Tollemache, No 613, 12-19 Sept 1686; 3-10 Oct 1686). The *'oncost'* or expense of extraction, is the most revealing section, although every individual miners' output is itemised in *'tickets'*, as well as the costs *'for Hewing and Bearing'*. *'Small coals'*, and panwood coals are frequently mentioned, the latter being used at the salt pans. In September and October 1686, panwood is extracted from Stoneyhill, the Pans pit, Brunstane and *'the Hardisflet sinke'*, or Hardyflatt pit (Tollemache, No 613, 5-12 Sept; 19-26 Sept; 24-31 Oct 1686).

The figures are given in the separately-valued contemporary Scots currency which was *'by 1700 worth one twelfth of the corresponding English sum'*, making it worth a fraction of the same figure in sterling (Robinson 1996, 588). Therefore seemingly large amounts of Scots money, when divided by 12 reveal a much more modest cash figure in English sterling.

From 23 January 1687 until 7 May, only the Duddingston pit(s) were worked, with Brunstane resuming in May. The Duddingston pit was near a watermill, for many of the overheads, or oncosts (which were separate from the miners' wages) during early 1687 concern repairs to the watermill, dam and wheel. There was usually coal for the Duchess's own use, in winter *'For her grace's Fire to the Lodging 42 Loades, £8/15-*, or in spring, *'For Her Graces Fire, 7 Loades to the Lodging, £1/9/2d'*, Scots money (Tollemache, No 613, 5-12 Dec 1686; 16-25 April 1687).

The analysis of the rate of work and output per man, per day would require more expert study, but the *'oncost'* comments show the hard graft, specialist trades and ancillary tasks in coal extraction. In the first week of September 1686, Alexander Lowgid and Robert Tyllier at Brunstane produced 43 and 76 loads of coal respectively, worth £25/7/- Scots, earing £12/2/-

for themselves and their bearers (Tollemache, No 613, 29 Aug-5 Sept 1686). The colliers got 4 loads for their own fires, worth 8/-, the Duchess received 6 loads (whether she was resident in Brunstane or not, her permanent staff required coal). The *'rests'* or unallocated money remaining was £12/3/- Scots, out of which oncost (cutting and clearing out 9 feet of the *'levell roome'* or passageway), consumed £18/8/-, leaving a week's loss of £6/8/- Scots *'Superexpended'*, (Tollemache, No 613, 29 Aug-5 Sept 1686). Additional costs for the Pans pit included 2lbs of candles, 300 flooring nails and *'couplin of the meind'*, presumably overhead rafters for the level, or passageway (*ibid*).

In later mining, using standard English terminology, a *'level'* was a roadway or passage, basically following the direction, or *'strike'* of a coal seam. In the Scots vernacular of the seventeenth and eighteenth centuries, a level also referred to *'A water-level or drainage-level in mining, a mine driven from the surface to carry off water from workings above it'*, and (DOST 2015, *'level(l)*, n, Def 3). A nineteenth century Lanarkshire mining glossary distinguishes the drainage function specifically as a *'water-level'*, and it is not always clear in what sense the general term *'level'* is used at Brunstane and Duddingston (Barrowman 1886, 23, 41).

Following the 1686-7 extraction records chronologically, in September payments are made for *'Bearers in working the great Seame att Bruntstane and in Carrying away the Rubish out of the same'*, for £1/16- Scots, for carrying stones to form the drainage *'level'* (Tollemache, No 613, 5-12 Sept 1686; Figure 17). James Wadherstoun (Witherspoon) is *'letting downe the Timber to the wright for Setting downe the Staire at Bruntstane 2 days and an halfe att 8d p(e)r day, £1'*, Scots (Tollemache, No 613, 5-12 Sept 1686). There are several storeys of galleries or workings above the drainage *'level'*, such as *'the Rome above the Levell'*, (*ibid*).

There were four men deepening the pitshaft at Hardyflatts, an area between the Brunstane Burn and Easter Duddingston, *'runing the mynde (mine) to the Bottome of the Sinke in the hard Flatte'*, (Tollemache, No 613, 5-26 Sept 1686; Harris 1996, 119). The operation was finished by late September when John Marr spent six days to

'lose the reid (clear the rubbish) from the staire head in the Hardiflet', and '800 floreing Nails ... For the staire and 700 plenchers (planks) were used for new ladders, by implication, also at Hardyflatts (Tollemache, No 613, 26 Sept- 2 Oct 1686). Safety considerations, as ever, were primitive: '4 lbs of Candles for ... the Myne for ill Aire, 18/-', (Tollemache, No 613, 19-26 Sept 1686).

The four foot coal was worked at both the Pans and Brunstane, where Robert Brown put *'up an upset (driving upwards following the seam) in the 4: Foote Coall'*, (Tollemache, No 613, 12-19 Sept 1686). The surface buildings appear as well, *'For one Lock and Key to heugh dore, 12/-' Scots*, and *'For peiceing the Towlle (towel or cover) which was att the windows'*, perhaps at the watermill, for which 2lbs of tallow was allocated for lubricant (Tollemache, No 613, 19-26 Sept; 3-10 Oct 1686). The gate from the pit to the pans is mended, and the office or counting house is upgraded: *'For counting Rome For playstering and glazing, £7/4/-', Scots* (Tollemache, No 613, 17-25 Oct 1686). On a human note, of the 12 men at the Pans pit in October, seven were called John, so nicknames were doubtless required (Tollemache, No 613, 24-31 Oct 1686). Equipment maintenance included 'laying' or sharpening and toughening working edges: *'For 5 picks Laying ... For one Hole laying ... For two Wodges waying 3lbs ... For 22 dozen picks Sharpning ... For 6 Wedges Rolling'* (Tollemache, No 613, 7-14 Nov 1686).

The majority of the expenses was repetitive and routine, *'for wet worke in the Rome above the Levell roome'*, and endless variations on *'John Cuningham for Carrying forward one fathome ... att Brunstane, 13/-', and '6 bearers carrying Rubish for Ridding the geats ... £5/4/-',* (Tollemache, No 613, 21-28 Nov 1686; 26 Dec-2 Jan; 23-30 Jan 1687). William Marstan's general report from 1688 mentions a failed attempt to drill deeper using expertise from Prestongrange, and this may have been in early 1687. *'To the Nottar at Preston for Extracting the Instrum(en)ts ag(ains)t Preston Grange for Coalhewers and Bearers, £5/6/8d'*, followed by *'For 1 Man and horse going to Penstoune about the Rods to boare one Downesett ... John Backs 2 Dayes boaring',* (Tollemache, No 613, 14-25 Nov 1686; 2-8 Jan 1687). This *'downesett'* at the Pans, which cost £1 Scots per week, was *'a minor road to a dip in*

the coal', which was driven, like an 'upset', at an incline to follow a seam (SND 2015, 'Doonset, n'; Tollemache, No 613, 9-16 Jan 1687).

Expenses for *'driving forward'* rooms or levels feature weekly, but as the number of men employed, and the geological seams and faults vary, this would repay closer examination. Examples include *'John Cuningam for Carrying forward one fathome of the Levell rome att Brunstane, 13/4d'*, or 1 Merk, Scots, and more usually, entries without naming miners, *'For 1 Fathome of the Levell Rome (at Pans pit) £1/10/-', Scots* (Tollemache, No 613, 26 Dec – 2 Jan; 5-12 Mar 1687). A fathom was six feet, and weekly progress in cutting coal or passages was measured in these units, as was rope: *'For 1 small Rope to bee 1 pooleing string 20 Fathom (120 ft), 10/-' Scots* (Tollemache, No 613, 19-26 Mar 1687).

There appears to have been some kind of agreement between the mineworkers regarding payment for making a mine, and an under-mine, at the Pans, in which the Prestongrange *'nottars'* or lawyer's visit and *'the Notar for takeing Instrument ... att severall places (cost) £3/10/-' Scots* (Tollemache, No 613, 17 Oct-25 Nov 1686). Further instances of this potential contract appear: *'For 6 Gallons Ale given to the Collyers for Entris', 'To the Coale hewers att the greement of the under myne', 'For the Over Myne in full and Compleat paym(en)t, £10, For the Under myne in part of paym(en)t, £10', Scots* (Tollemache, No 613, 2-8 Jan; 16-23 Jan 1687).

The old or abandoned workings also feature. *'John Mar 5 dayes for mending the Fallen-in whols att the Back Burne', and 'For takeing out of the timber out of three Sinkes (with other work) £4', Scots* (Tollemache, No 163, 19-26 Sept; 3-10 Oct 1686). The removal and reuse of props and shoring was standard practice, *'For 2 men 1 day takeing out Timber out of ane sinke, 16/-', Scots*, and *'For two men taking timber out of the pit att the Blackhousetree, £5/6/8d' Scots*, (Tollemache, No 613, 31 Oct-7 Nov; 14-25 Nov 1686). In early 1687, they transported *'4 draughts of Old timber from the Old Sinckes to the pans',* (Tollemache, No 613, 20-27 Feb 1687). In January 1689, *'For 19 Bearers carrying Rubish to fillup the Pit in the 7 foot Coalle',* received £2 Scots (Tollemache, No 613, 30 Dec 1688-6 Jan 1689).

Unrecorded water-wheel and other mechanical equipment

There is little information on mechanical devices, except for repeated mentions of a water-wheel, which may well have played some part in water management at the 'mill sink', although not explicitly stated as such. Hugh Loging spent '6 dayes helping the geats (gate/ barrier, or else passageway) and the downehead', which may be the dam-head, or the 'downcast', or ventilation shaft by which air current entered the pit (Tollemache, No 613, 29 Nov-6 Dec 1686; Barrowman 1886, 25). The following week Loging spent 'at the Wester Sclewce one day', and in January 1687, the 'six men ... helped to fasten the pannelling of the water mill, £1', Scots, which took '100: Double Nailes' (Tollemache, No 613, 12-19 Dec 1686; 2-8 Jan; 9-16 Jan 1687).

The Culross coal-mines, extending under the Forth in the sixteenth century, are well-attested, and Sir George Bruce installed water-powered pumps in 1595 (Shaw 2003, 62; Adamson 2008, 170-1). In the 1660s, the Earl of Wemyss further pioneered mine-drainage technology, including watermills and windmills, at his Fife coalpits (*ibid*, 64-7). He spent about £3,166 Sterling on 'a wheel ... on a 44 fathom sink at Clackmannan in the 1690s ... Large overshot wheels with elaborate lade systems ... and dams (were) typical of Scottish water engines' (*ibid*, 64-5).

There was a water engine at Thornton, East Lothian by 1681, which used similarly large quantities of wood to that at Brunstane, namely 392 deals at Thornton, 100 for repairs at Brunstane (Shaw 2003, 66; Tollemache, No 613, 6-13 Jan 1689). The Thornton equipment had buckets and others had plates, emptying water into troughs, although there were fewer such devices south of the Forth, where drainage by gravity using levels and horse-gins (Shaw 2003, 66-7). The first *Statistical Account* records that 'a rude machine composed of, and named, chain and buckets, was employed to raise the water in the mines', but ascribes it to the proprietorship of the Duchess of Argyll, in the early eighteenth century, so it may be a different device from the Brunstane water-wheel of 1686-7 (Bennet 1796, 368). The context of older and near-contemporary mechanical drainage at Culross in Fife has been fully examined by Adamson (2008, 172-3, 180-3).

The owner of Whitehill until 1702, contiguous with Brunstane to the south and east (in the early eighteenth century, part of it was renamed Newhailes), was the architect James Smith, who knew both of Brunstane's architect-planners, Sir William Bruce and John Slezzer (RCAHMS, EDD/18/12 P; Rock 2013; DSA 2014, Smith). In 1701, Smith 'obtained the Scottish rights for Thomas Savory's (first commercial steam) engine' (Shaw 2003, 71). This apparatus, he claimed, could raise in one hour, 'twenty tuns of water to the height of fourteen fathoms (84 feet) ... for the benefit of coal works', although he was writing after the Duchess's death in 1698, when her mining interests ceased (RPS, 1700/10/218).

Workers received 'ane gallone of Ale for the fastning of the Gugett of the water-wheele', which was the 'gudgeon', or iron pivot on which the axle-tree, and hence the mill-wheel, rotated (Tollemache, No 613, 3-10 Oct 1686; Johnstone 1927, 246). The gudget is adjusted twice more, once apparent connection with the mine, 'To John Backs 1 day going downe to the Bottome of the Mill Sinke (pit) w(i)th the Wright to Help the Pannell, 8/-, To the Man that helpt to throw up the Pannell and fasten the Gudget, 16/-' Scots. The 'mill sinke' may just possibly indicate the water-wheel pit, rather than a mineshaft (Tollemache, No 613, 12-19 Mar 1687; 2-9 Apr 1687).

John Dickson spent two days mending the damhead in February 1687, but by March it required remedial repairs or patching with straw: '1 Cart and Horse loading Hay to the Dam head, 10/-' Scots (Tollemache, No 613, 12-19 Mar 1687). An intriguing, single page for January 1689 says 'To the Wheele in the Hard Fost, 17 tickets 4 Compt(e)rs, £3/13/4', Scots, suggesting that men were receiving bonuses for freeing the frozen wheel from the ice (Tollemache, No 613, 6-13 Jan 1689). This took '15 Men 3 dayes at the Wheele and Cast at 8d p(e)r diem, £18' Scots, a 'cast' being a 'ditch, cutting or excavation', again implying a link with the mining process (Robinson 1996, 86; Tollemache, No 613, 6-13 Jan 1689).

The wheel required copious greasing for smooth running: '6lb Tallow for the Use of the Mill, £1/7/-' Scots (Tollemache, No 613, 19-26 Mar 1687). The wood to construct the machinery was cut locally, namely 'For 2 draughts of timber from Brunstane to the Pans to bee ane (blank) to the

Wheelee, and *'for 40 deals (planks) for the use of the wheele, £36*, Scots (Tollemache, No 613, 20-27 Feb 1687).

There is a clear distinction between the watermill, the horse mill, and the horse gin, which was a cheaper contemporary way of extracting water. Levels and water engines required enormous capital investment, as the various mining reports quoted bear witness. The gin is mentioned only once, in contrast to the wheel: *'John Dickson for Cutting off whins to mend the Horse gate 2 dayes, 13/4d ... For 2 Gallons Ale given to the Collyers For helping on w(i)th the Horse Gin Chaine, £1/12/-*, Scots (Tollemache, No 613, 19-26 Dec 1686).

Salt pans and their consumption of locally produced coal

The seaside salt pans themselves are occasionally included in the overheads and supernumerary costs for the coal-works, especially in spring 1687. *'For bringing from Edinburgh to the Pans 15 Stone of Skrews to beat one pan, 12/-*' Scots, (the screws themselves cost £33 Scots), and *'4lb Lead To Fasten the Cracks of John Izods (Izatt's) pan-dore*' (Tollemache, No 613, 26 Feb-5 Mar; 12-19 Mar 1687).

Every week from November 1686 David Scot appears, driving cartloads of fuel to the salt-pans, measured in bolls, a measure of dry volume. The boll had various definitions, 145 litres weighing peas and wheat, 211.6 litres for barley and malt, and in recent analysis, 85 and 90 pints, without specification for coal (Robinson 1996, 818; Connor and Simpson 2004, 252-4). A boll of meal by one modern reckoning contained about 140 lbs weight, or 63.5 kg, which gives an approximate idea of the weights carried (Robinson 1996, 52).

The bolls transported vary in number from 141, 155, 192, and 170 bolls for each week in November, and 129, 175, 262 and 237 bolls for April 1687 (Tollemache, No 613, 31 Oct-28 Nov 1686; 2 Apr-1 May 1687). For comparison, the weekly output of coal is measured in 'tickets', not bolls, but Brunstane's output was valued at £19/5/10 Scots, in the week ending 7 November 1686. In that week, Scott transported 141 bolls of small coals to the salt pans, *'att 1/10d per Loade*', (although Scott's loads and bolls seem synonymous and cost the same), costing £12/18/4d, or about two thirds of the valued

output of the Brunstane pit (Tollemache, No 613, 31 Oct-7 Nov 1686).

At Maitland Pans saltworks during one week in June 1687, the burning of small, or panwood coals, measuring *'180 Bolls (coal) produces of Salt, 38 bolls, 2 firlots, ½ peck*', of which 28 bolls were sold, and the remainder *'Laid in the Ester Girnall (store) 10 bolls*' (Tollemache, No 615, 19-26 Jun 1687). The marked inefficiency of the process was repeated in July: *'To the Pans ... 207 Bolls Panwood (coal) ... produces of Salt 44 bolls 1 firlot ½ peck*', costing £66/8/4d Scots. 120 bolls of salt were sold from the Western Girnall, at £1/-/8d per boll, earning £168 Scots, with that week's profit at £212/9/- Scots, or about £17 sterling (Tollemache, No 615, 29 Jun-3 Jul 1687). As they are omitted from the 1686-7 coal accounts, Magdalen Pans may have opened later, and their 'bucket pots' consumed 266 bolls of coal, to evaporate 57 bolls of salt in one week in May, 1695 (Tollemache, No 616). The ratio of coal to salt produced was only around 20-25%, surely belying a cumbersome operation in need of improvement.

The coastal location also had disadvantages, such as damage caused by storms: *'For 1 Cart and Horse Bringing Home the timber that the sea tooke from the Dyke, 12/- ... To Martin Bryson for 3 dayes worke mending the Dyke, £2/2/-; 3 Bags Lyme to the Dyke*' (Tollemache, No 613, 12-19 Mar 1687).

Surprisingly, the later career of one of the colliers can be traced. There are several families that were long-term tenants of Duddingston and Brunstane, among them the Horns, Scotts and Sheills. Andrew Horn(e) frequently appears as the second highest-paid worker (at £3/12/- or £3) after oversman William Marstan (paid £4/16/-), although he is not given a trade like *'ridsman*' (cleaner), or wright (e.g., Tollemache, No 613, 31 Oct-7 Nov; 12-19 Dec 1686). Unlike Marstan, Horne does not work underground, and may have been the grieve, as this post was paid the same and appears in the same position in the wages list (Tollemache, No 613, 26 Feb -5 Mar; 5 Mar-12 Mar 1687; 6-13 Jan 1689). In *'Andrew Horn Coall Grive at Magdalen Panns*', died there on 6 October 1733, leaving his widow Eupham Sheills, and a detailed list of customers in Edinburgh, to whom he supplied coal (see below; NRS, Horn 1734, 330-3).

Ownership of Brunstane

The Dutchess of Lauderdale preferred to stay at Ham House, Surrey, after her husband's death in 1682, and nobody could be found to rent Brunstane House (Falla 1979 II, No 3204). Elizabeth's agent in many protracted legal actions was Berwickshire laird *'Sir Patrick H(o)me of Lumsden ... A wealthy lawyer of dubious morality, who allegedly had gained his estate by sharp practice'* (Hayton 2002, 835; Falla 1979 II, Nos 3265-83, 3290-3). Although the record is complicated, the Duchess conveyed, or granted Brunstane in April 1686, to be held by Home, *'in trust for, the use and behove of Lyonell, Lord Huntingtour our eldest sone'*, later 3rd Earl of Dysart (Tollemache, No 536). The ensuing complexities of the estate, the court cases 1703-1705 surrounding its ownership between Earl of Dysart and Sir Patrick Home, the latter's substantial debts, the sale of the property in 1732 and purchases by 2nd Duke of Argyll and Lord Milton thereafter, and the purchases of debt by Lord Milton are discussed by Cross forthcoming.

Lord Milton's moved his household to Brunstane between 1732-1734 (see Cross forthcoming for details of alteration to the house and external structures, including the walled garden) at considerable personal expenditure, much of which can be tied directly to Loan Shott and Whitehill Park (aka Wanton Walls/ Garden Foot Parks): the fields under archaeological examination. Loan Shott lay to the west and Whitehill Park to the east. Milton's estate accounts relate to landscape features similar to, if not identical with, the sunken ditch, lime-mortared wall and culverts excavated in August 2014.

Landscaping and groundworks 1732 and later

Runrig System

Lord Milton designed a *'Lawn with rails pipe staves'* south of the house, which envisaged enclosing the policies more than they had been previously, as the gardener in 1733 seldom specifies more than outfield and orchard (NLS, Ms 17477, ff86r, 87r). While negotiating an exchange of land, or 'excambion' in 1734 with his neighbour the 2nd Duke of Argyll, Milton had stated that *'As the Lands ... lye runrigg w(i)th the Estate of Dudinston'*, some redistribution would

be mutually beneficial (NLS, Ms 17477, f32r). This is further confirmed by his description of Brunstane incorporating *'severall parcells of Land interjected among the Estate of Duddingstone'*, which are of little use to Milton unless they were *'all laid contiguous ... to the House of Brunstain'* (NLS, Ms 17477, ff30r, 32r).

As the runrig system typically involved small, separate plots distributed across a landscape, Milton *'had a mind to have added to the garden'* a conveniently-situated *'three or four Acres'* to satisfy *'my little projects'* (NLS, Ms 17477, f30r). The surrounding estates were also set to strip fields, as Milton records buying *'Bear ... 2 rigs Wauchops (Niddrie estate)'* (NLS, Ms 17477, f81r). The Home's entail of Duddingston in 1718 mentions *'six rigs ... in the Clays, not cut into 4 rigs, now called the West Mains'* (NLS, Ms 17729, f1r). Other narrow holdings were *'Nine riggs ... part of fifteen riggs ... betwixt the two ways ... towards Niddrie and the other (to) Musslebrugh'* (NLS, Ms 17729, f133r). The excavation revealed rig and furrow cultivation marks, and ploughmarks for the same, in Areas 1 and 2 (Hunter Blair 2014, 14-15, 22, 24, 28, 31, Fig 2). Super-imposing the estate plans of 1764 or 1879-82 upon the excavation area, shows that the ploughmarks follow the curved southern edge of Loan Shott and Whitehill Park as they existed before the railway created new linear barriers (NRS, RHP85500/1, RHP14979).

Two of Milton's judicial colleagues supervised the excambion, John Hay, the 4th Marquess of Tweeddale (Lauderdale's descendant), and Duncan Forbes of Culloden, owner of the eponymous battlefield. In July 1734, Forbes drew a sketch that names the constituent acres, including 'Wheel Flat', and 'Loan Shot', site of the western part of the excavation (NLS, Ms 17477, ff99-100). Robert Robertson's 71-acre farm *'consists of severall parcells ... formerly let separately to small tennents'*, of which *'Loan Shott'* (the excavation site) measured 11 acres 1 rood, and adjacent to the east, Wheel Flat contained 6 acres, 3 roods (NLS, Ms 17477, ff67r-v). A *'shott'* was Scots for a piece of ground cropped rotationally (Robinson 1996, 612). Milton received these areas, as well as the contiguous and smaller Lady Acre, Graystone and Meadow 'Shotts', and Brunstane Barns (NLS, Ms 17477, f68r). The first *Statistical Account* places the enclosure of the fermtouns of Easter

and Wester Duddingston between 1751-62, during Abercorn's lairdship, transforming them from *'run-ridge or run-dale'* into *'commodious farms ... (in) a regular and progressive state'* (Bennet 1796, 363-4). Rectilinear fields also had the advantage of allowing the easier ploughing of straighter, less labour-intensive furrows.

Among Milton's first acts was to commission a house in 1733 for Alexander Sheills, an employee of William Horn junior, the principal tenant of Wester Duddingston (his father, William Horn senior rented Easter Duddingston; NRS, Horn 1747, 504). Indeed, an area of 7 acres was named 'Sheills Acres' (NLS, Ms 17477, f68r). It is quite clear that the house was built on the footprint of, and reusing the foundations of, the previous house on the same site, which may explain the paucity of early-modern house remains in some areas. Archibald Handyside, a mason, constructed two side walls 8 ft 5 ins high, and 22 ft long, *'top of the gavle (gable) 18 ft Perpendicular height 11 ft... Height of the chimney 21ft'*, with *'pinning and harling of the old gavle'*, costing in all '£25/10/- (Scots)' (NLS, Ms 17477, f40r).

There were 3 glass windows (10/-), a locking door, ten loads of lime for the mortar, and *'reding (clearing) out the house and Casting (digging) the foundation of the new one'* cost 5/-, altogether totalling £2/14/1d sterling (NLS, Ms 17477, f64r). Using twenty sheaves of home-grown thatch (costing £1/18/- sterling) from Wester Duddingston, two thatchers from Fisherrow roofed Shiells's house in five days, at a cost of £5 Scots (NLS, Ms 17479, ff168r, 170r). Another estimate *'for rebulding of (three) houses in wester mains of didistown'*, dated 1733, showed that even lower status, smaller dwellings still required 40 cartloads of stone and twelve of lime, and that *'takin down the old wals and redin (clearing for re-use) the (pre-existing) fundatien'* was the still the preferred method of working (NLS Ms 17477, f66r).

Labourer's daily diary winter 1735-6

With a self-contained estate, Milton arranged his workforce, which consisted of about 8-13 day labourers as required, and for whom voluminous weekly wage returns exist. Each worker's name, activities and number of hours are recorded, for various years in the 1730s-50s. These men (women are infrequent guest-workers) laboured

on Whitehill Park and adjacent Loan Shott, which were the archaeological targets. The entire agricultural calendar can be followed in the workmen's accounts, and the extreme cheapness of hired hands and unskilled manual labour, stands out.

For 9 men working 5 or 6 days each in February 1735, the wages bill was £1/6- sterling, and in one of their very rare mentions, *'a womman 4½ days at the stons, 1/6d (sterling), 7 boys and girrells 6 days each 7/-'*; almost the only mention of 'child labour' (NLS, Ms 17477, f148r). For a 6-day week that June, ten men plus a 'wright' or woodworker, earned at total of only £1/10/6d sterling, despite two of them receiving part-payment in oatmeal, and during harvest time, 16 men for a week cost only £2/4/7,½d (NLS, Ms 17477, ff161r, 169r). In the 1740s, the same pattern repeats – for April 1741, twelve men cost £2 sterling for six days carting, planting and in the barn, and in August, a dozen workers earned £1/15/7d for the same time, ploughing, shearing sheep and quarrying and helping visiting masons (NLS, Ms 17479, ff11r, 29r).

By comparison, the skilled craftsmen working for William Adam were paid far more. John Paterson, carpenter, earned 1/4d per day in early 1735 for making and installing window shutters, receiving £6/9/4d sterling over three months (NLS, Ms 17478, Ms 17478, f60r). This was many multiples of the field-hands' cumulative wages for a similar period. The *'white & veined marble Chimney'* of 1735 cost £11/1/4d, of which the marble cutter's three days cost 7/- (NLS, Ms 17478, f60a, recto). Eighteen years later, the marble-cutter who installed Adam's *'dove Colour marble Chimniy'* in May 1753, was hired at 7/- for three days with travelling expenses (NLS, Ms 17481, ff116v-117r). In 1735-6, Adam's masons received between 9d and 1/4d per day, depending on seniority, but two of them working shorter 'winter days', still managed to earn 12/- by December 1736 (NLS, Ms 17478, f60a, recto). Meanwhile, in the same month, the day-labourers were receiving 2/6d per week, or 5d per day (NLS, Ms 17478, f40r).

The Brunstane local estate workers (one of whom is named a variant of Burnston or Bruntain) worked for 6 days a week, their timetable appearing in a remarkable work-diary, kept by a senior, educated labourer, for Lord Milton's

own perusal. It is worth quoting at length, for its vivid picture of the winter routine. On 15 January 1736, the unidentified diarist explains *'The workmen enters to Lobour for ordiner about sevn a clock in the morning rests about half on owr after nine and about one owr when they tak their deiner then at work till about five at night'* (NLS, Ms 17477, f235r). Either six or seven men are consistently named, none of whom appear to be the anonymous writer.

The narrative starts typically (punctuation added): *'Brunston December 1735, 8 day, entred to work about 8 aclk, rists som mor then half an our at 9, at work till near to one no mor work ... the wather being so bad; ... 12 day, Da(vid) mudiey, Jo(hn) brunstin, Jo(hn) Robison andrew Dobie, wi(Illiam) Nicolson at work in the avenew till after nine a klok and then andrw dobie & Jo bruntin went away to the wrights the rest of the day. Jo ripeth (Redpath) is thereshing whiet in the barn. Gideon dobie is not bein at work this week yeet'* (NLS, Ms 17477, f231r).

Among the most frequent tasks are tending to the labour-intensive *'avenew'*, which took continual upkeep, gathering and quarrying stones, and carting supplies. The avenue was, as proved by the 1703-4 court case, primarily a status symbol. It was a public signal at the main gate, announcing the comparative importance of the distant, hidden dwelling house. Manicured rows of mature trees were a luxury, but one that Milton felt was commensurate with his status as Lord Justice Clerk.

'(December 1735), 15 day, david mudiey and I at work in the avenew from about 8 a klok till near a elewn then being ordred ... helped to load the carts with stons (till 1pm; then all the men) shovle together dung ... till night; ... 17 day, (5 men) gathering stons together all this day; Dawid mudiey & I was digging ground in the gardien all that day' (NLS, Ms 17477, f232r). Two men mixed *'cat and clay'* or combined straw with clay to repair a house, and from 22 December 1735, until 3 January 1736, there was work *'in the avenew'* every day, as well as *'taking up trees'* elsewhere, threshing and gathering stones (NLS, Ms 17477, ff232r-233v). On 9 January, the note-taker quaintly expressed that *'Gidion dobie was with me in the plantings helping trees that was wrong'*, as well as assisting workmen labouring at

Duddingston (NLS, Ms 17477, ff234r-v).

There is abundant detail about hedging and ditching, relevant to the Loan Shott and Whitehill Park, as they were on the march, or limit between Niddrie, Stonyhill and Brunstane. The estate boundary later moved south, probably due to the nineteenth-century railway layout, marooning the eighteenth century march along the *'ha-ha'* line, (context 023) in the middle of the excavation area. Borders were important as the acreage owned defined voting qualifications, subterranean mineral rights, liabilities for taxation and stipends for ministers, school-teachers and other parish and government burdens. On December *'18(th) day, ... after nine a cloke (diarist and colleague) went and Laid out a bordier for planting a hedg on the west marche; 19 day the work men was at Labur at the west march planting the hedge (20th December similar). ... 10 day (January 1736) I was pla(n)ting at the thorn hedge on the east march (till 9am, then avenue, then hedge at 1pm)'* (NLS, Ms 17477, ff232r, 234v).

From 14 January to 8 February 1736, six or seven men were principally *'trincing ground'*, of which it is said on 29 January: *'My Lord this ground trenching is the hardest Labour that I have sien any of your Lordships work men at yeet and I cannot say nothing to the contrair but they doe indifferent well'* (NLS, Ms 17477, ff235r-237r). Considering the soil being turned was probably frozen solid, the heartfelt statement must have been provoked by much harder-than-usual ground conditions. Another occasional activity is *'at the ston quarie'*, although no details are offered.

Although much rarer than male labour, an invoice for women working on the eastern part of the future excavation site (Whitehill Park or Wanton Walls Park) survives for May 1753. Thirteen women, most with diminutive nicknames, and one man, were *'stones gering (gathering) and clares Bricken (clearing bracken) Boeth in the Bake of wantonwas (Wanton Walls farm) and the Lone Shoet'* (NLS, Ms 17481, f90r). Their names include *'keteay keay, miseay herssen, keristey niklson, nileay (Nellie) Bereay, ketrean morson, Jeneay yeard'*, and only two of the more ubiquitous Janets (*ibid*). Most of them worked for 7-10 days, and received 4d per day. Some of the same women had been used to weed the corn and beans in June 1753 (NLS, Ms 17481, f92r).

One unexpected note records that a wife was paid in full of her husband's wages, rather than the usual lower women's rate, when she turned up for work in his place. *'June the 16th (to 5 July) 1755, Robert herper Not weell but his wife takes Care of the Cows and all as she Cane do for ... and work about the house'*, being paid at her husband's previous rate of 2/6d sterling for each week (NLS, Ms 17481, ff218v-219r). In late July, Mrs Harper was still caring for cows, sheep and *'at hey and pulling wids'*, paid at 6d a week more than the other women weeding the garden, though 8d less than the men for the same number of days (NLS, 17481, ff220v-221r).

Linear features - Ha-has, upstanding walls and march boundaries 1730s

Given the importance of agricultural improvement and land reclamation in the mid-eighteenth century, considerable detail is recorded about soil disturbances that are not directly related to ploughing, planting and sowing crops. The tools *'for the ouse of the ditchers'* are enumerated in 1733, as *'3 spaidis, 2 airn (iron) shovells, 4 wodden shovells, 8 picks (only 7), a kavell mell (heavy stone-breaker's hammer), 2 pinches... 4 new spaidis 16 Octr 1734 ... In all 20 spaidis ... 3 airn shovels ... 7 wodden shovels'* (NLS, Ms 17477, f38r). Of these, some had been delivered to the grievie and had gone missing by 1734 (*ibid*). It cost 9/6d Scots to *'lent(hen) of a houe and sharpen 7 houes for the Duchers (ditchers)'*, in 1734 (NLS, Ms 17477, f117r). Other utensils were made by blacksmith William Neill, who in 1734 charged for mending *'a quarie mell (hammer), making tow ston of quarie wages (wedges) ... tow igers (augers) and tow speets (skewers) for the quarie ... making 3 smal guflecks (meaning untraced) ... for 43 wages Rouen (round wedges) and picks Sherpen for the Quarie'* (NLS, Ms 17477, f116).

The excavated feature (context 023) was identified by Hunter Blair (2014, 13-14, 18-19, 23) as a *'proto ha-ha'*, or livestock barrier, comprising a ditch (027), with a wall revetting one side, designed to be invisible from the prospect of the house. It may be better described as a *'sunk fence'*, which as the name implies, was below ground-level, and did not interrupt the sight of the designed landscape when viewed from selected vantage points. Ha-has are also recorded at Newhailes to the east (SNH 2001, 67-8). Sunk fence (023) could have demarcated the march, or edge of

the estate as it existed in the eighteenth century, because map overlays indicate that the southern part of the modern excavation area lay outwith the original core estate.

In January 1739, George Mortimer and John Young, two of Brunstane's day labourers, spent fifteen days in total *'at sunke fence'*, which seems to be a site-specific feature, as it is infrequently mentioned (NLS, Ms 17478, f146r). Considering that Brunstane used locally-sourced building materials from its own quarry or nearby Craigmillar whenever possible, (NLS, Ms 17477, f19r), it is all the more obvious that the estate overseers commissioned outside expertise whenever they required trained craftsmanship, whether for stone-cutting or anything else. They reserved their own agricultural workers purely as unskilled *'extra'* hands. Particular estate day-labourers may have had a talent for woodwork or *'assisting'* masons, but they were never employed to manage building works. They are only there as ancillary helpers. Thus the mortared wall of coursed rubble at the ha-ha, and the lime-mortared, dressed stone culvert, with its massive capstones, were quite feasibly engineered by specialist masons from Fisherrow, or Edinburgh.

In the mid-1730s, when Milton, as is common with new property owners, was arranging his domain to suit his personal requirements, he employed such artisans to build walls and drains located away from the mansion, which was itself undergoing improvements by William Adam and his workforce. As the quarries were already being worked to execute Adam's designs, it would have been cost-effective to use his on-site experts to construct the culverts and covered drains such as (145) and (086) and the sunken wall (023) (Hunter Blair 2014, 15-18). Some of the masons working *'in the fields'* were indeed Adam's men, because simultaneously, there are labourers assisting at *'Quarry ... (assisting) Massons at dike ... Massons at howse'*, in September 1736, and John Millne, manual worker, had been given *'3 days payd ... by Mr Adams'*, for helping the masons the previous month (NLS, Ms 17478, ff28, 30). As opposed to ditches, *'dykes'* were upstanding stone or turf walls, and feature in the Saltoun muniments almost as frequently as their *'negative'*, downward-cutting ditch counterparts.

The march dykes, delimiting the land for which Milton was responsible, merited considerable

expenditure, and the 'ha-ha' or sunk fence (023) may have formed part of the contemporary borders. The estate expanded a few metres southwards when the railways were laid out in the nineteenth century, 'stranding' the sunk fence (023) deeper within the excavation area. The new fence lines changed the layout of Whitehill Park and Loan Shott, and the sunk fence, north of the present field limits, is now far less obvious as the former 'march-dyke'.

In February 1737, mason John Pirnie and his father charged 16/8d sterling 'To 15 days work at the dick', and in July, William Adam signed a receipt for his masons 'Building the dyke on the March, £34/11/8d' (NLS, Ms 17478, ff65r, 74r). Similarly, James Davidson, another mason, received £5 sterling in July 1737 'for winding (probably extracting) stones and bilding a dick from newhails park dick to his Lordship's Inclosure' (NLS, Ms 17478, f80r). John Pirnie, working with Davidson, charged '8 dayes ... for Bullden the Geat at neu haells', in September 1737 (NLS, Ms 17478, f88r). Davidson used less refined material for a less prestigious project in the same year. For 'building a wall w(i)th stones & clay 20 rood in length', (about 762 yds²), of which 4½ roods of stones came 'from the coal pits', but 'because of the Expence of Tirring (working) the Quarry', for the rest of the job, no discount was being offered for the inferior stones (NLS, Ms 17478, f95r). Such work may have been appropriate for a sunk fence, or a subterranean drainage channel.

James Smith (mentioned above), a less-famous architect than Adam, had lived at Whitehill, south of Brunstane until his death in 1731 (DSA 2014, Smith). His second wife Ann, mother of 14 of Smith's 32 children, in 1738, 'received from Lord (Milton, £213/10/- Scots) his share of ... straighting the marches betwixt Whitehill and Brinstane' (NLS, Ms 17478, f135r). Milton had generously refunded Smith's 'half of the expence of building the march dyke ... out of kindness... for her ... childreens behoof' (NLS, Ms 17478, f135r). He stated in October 1738, that in recycling existing materials, 'he has received payment for the Stones of the fire Engins which were made use of in building the said Dykes', (*ibid*). James Smith had invested heavily in unsuccessful collieries, and their rubble was redistributed as a perimeter wall, possibly along the southern edges of the excavation areas at Loan Shott, Whitehill Park

and Weaver's Park (NRS, RHP14979).

Further work was done on the 'sunke fence' in January and February 1739, suggesting that its construction along the estate periphery could be part of the general landscape reorganisation south of the mansion (NLS, Ms 17478, ff146-7, 149). There may have been more than one sunk fence as that 'at the bridge' is uniquely specified on 25 January (NLS Ms 17478, f47r). The later 1730s show a concentration on securing and marking Milton's curtilage limits, and capital expenditure to provide infrastructure, both utilitarian, like water-supplies, and luxurious, such as the walled garden, discussed below.

Walls, and upstanding barriers, 1740s-50s

It is noticeable that there are more bills in the 1740s-50s for repairing wooden fencing, or paling. It may be that such field dividers, having reached the end of their useful lives, required replacement at the same time, or that they required less upkeep than hedges. George Hill, 'wright in fiseraw to 6 days work at the pelen at Borunston mill inclosing the dam head', invoiced Milton in late 1741 (NLS, Ms 17479, f66r). A wright had been hanging windows and mending carts in 1744, as well as 'puting up the payling in Swintan Hoal parke and mending all the payling about the (ferm)toun' (NLS, Ms 17479, f161r). Swinton Hole Park must have been named for the row of 6 (of 8), old mineworkings running across it, in the 'productive', or agricultural eastern part of the estate (NRS, RHP14979). Map superimposition shows that the same coalpits are almost certainly those on the Slezer c.1672, Roy 1750s and Leslie 1764 maps, albeit landscaped with trees by the latter date (RCAHMS, EDD/18/12 P; NLS, Roy 1752-5; NRS, RHP14979). In 1750, two wrights spent a day 'mending pealing & the hinging gate at the back burn', along with 'Nidry Gate' and 'Doors in the park' (NLS, Ms 17481, f9v).

The wooden gates also indicate that the grounds were mostly enclosed, and that since Milton's purchase in 1732, there was now the possibility of installing more permanent barriers than hedges and ditches. Andrew Burnet, 'wright in Fisherrow', installed a gate at 'Santansses (St Anne's) yards' (east of Brunstane Bridge), and other gates in the Butcher's and Barnyard Dykes in 1750 (NLS, Ms 17481, f11r). Hedges, as frequently mentioned, were animal barriers,

sometimes additionally equipped with fences to stop livestock eating the shrubs. The gardener in 1753 wanted *'the hedge on the west side of the avenew to be mead fenceable next the Dutches park with thorns'* (NLS, Ms 17481, f123r). Duchess Park was traversed by the main drive, and was the subject of the frivolous 1703-4 court case about trespassing. *'Cleaning (the) hedge next the loan'* (from March 1741) may refer to a planting near the Loan Shott or Whitehill Park excavation, although 'loan' like 'gate' and 'brae' is a sufficiently general road name to encompass any track about the estate (NLS, Ms 17479, f9r).

The wooden railings were nailed to uprights, and these invoices show that in autumn 1754, John Williamson, ironworker, used *'plencher nells for mending pellin at shed park geat and nethiry (Niddrie) lon gat'*, using two planks of wood (NLS, Ms 17481, f265r). The gate(s) on the south-west march beside the excavation seem to have been referred to as 'Niddrie'. He also fixed fences and gates at *'swinton holl park ... wanton was park and fit of (walled) gardien'*, both of which were immediately north east of the dig site (*ibid*). The excavation site fence was again attended to in October 1755, by Andrew Burnett, *'in lon shot and nedery geat'* (NLS, 17481, f256v).

The stone walls, or dykes were attended by trained stonemasons (see above), rather than the jobbing general hands that Milton employed. This is still apparent in the 1750s, when Thomas Dickson, a stoneworker from Jock's Lodge, repaired *'the faced-dyk north from the hous'*, over five days in 1752, as well as the dyke and gate running north from the stables (NLS, Ms 17481, f57r). As these were in the publicly-visible and high-status areas of the grounds, the wall seems to have used dressed or 'faced' stone. The sunken wall, apparently being a product of the 1730s when Milton built along his estate's circumference, seems to have been under 'rearrangement' in the 1750s, along with the walled garden's watercourses (discussed below).

Culverts, ditches and the rearrangement of the estate's boundary ha-ha, 1730s-50s

Although the culvert (context 145) discharged into the now-obsolete ha-ha ditch, and may be the latest of the three culverts uncovered, drains (086) and (145) may belong to the 1730s. Milton was ordering extensive drainage at this time, as

the work sheets make clear. Ditching, drainage and trenching are specified as separate activities, but how they were distinguished is unclear. Operations for July 1736: *'Leveling the face of a Ditch ... at Drane ... Leveling drane'*, could easily describe constructing either the culverts or the ha-ha (NLS, Ms 17478, f23). There are numerous mentions of *'Sowing Lime'*, *'screening Lime'*, and working *'with Massons'*, (e.g. NLS, Ms 17478, ff23-4), and both ha-ha and culverts have mortared stonework. Large-scale transportation of heavy materials is suggested by *'Makeing Carte way'*, and *'Carte Way from Quarry'*, for August-September 1736 (NLS, Ms 17478, ff25, 29). The higher-status roads were also being improved, such as *'Makeing Coach ro(a)d to bridge'* (NLS, Ms 17478, f32r).

Robert Brisbane or Brisbane, factor to the next owner, the Earl of Abercorn, described the ideal dimensions of ditches planned for Duddingston, in October 1755: *'Thire has been only two Hands Employed at the ditching this wicke, at 6 pence p(e)r rood, one triall, (should) the whole of the ditching, to be 5 by 4 depth - its thought, 6 broad by 4 depth makes a better ditch'* (PRONI, D623/A/49/48). New features appeared in early 1739, when Dougal Gray and Mungo Grant were *'trinchng at the Cunals'*, as well as at the avenue, showing *'canal'* as yet another component of the water-management, or as a synonym for culvert (NLS, Ms 17478, f151). Four casual hands were *'at water pipes'* for three days in March 1741, and again in June (NLS, Ms 17479, ff11r, 21r). A smith fitted metal bands and iron grates for the water pipes in 1743-4, although there is no mention of whether this was for the household, or the park's outdoor supply (NLS 17479, f130r). The culvert (086) also had metal bars fitted to prevent the ingress of animals or unwanted material (Hunter Blair 2014, 15).

Tasks for February 1741 included *'casting (digging) a drain'*, attending the *'ditch on nedrys march'* and weeding the hedges (NLS, Ms 17479, ff5v-6r). There was a gradual recasting of the trenches and ditches in the early 1750s. This was in all probability influenced by the waterworks required for the large walled garden (discussed below), and conceivably by the changing priorities of an ageing Lord Milton. Five visiting workers from the Duke's Whim estate undertook *'trenching the Wester garden'*, and *'leveling the*

avenew, in March 1752 (NLS, Ms 17481, f34r). The 'Wester Garden' was the field between the modern excavation at Loan Shott and Whitehill Park and Milton's walled garden (NRS, RHP14979). Map overlays show that the excavated Whitehill/Wanton Walls Park area is confusingly labelled 'Garden Foot Park', in Leslie's 1764 estate survey (*ibid*).

The water supply for both the walled garden and the house flowed through channels in the southern fields, and culvert (145), running due north, and various other ones may be linked to this hydraulic system. The wooden water pipes for the walled garden were made in Alloa, and laid around April 1741, which is described later in the garden description (NLS, Ms 17479, f57r). There were also horse, lint and decorative ponds, which are discussed below with the walled garden. The horse pond was created in summer 1754, and some of the culverts and ditches were doubtless intended to serve it (NLS, Ms 17481, ff152-4).

A list of 'work to be done' for August 1753 explains how some of the water flowed. *'The water ditch (needs) Clenned in west park that brings water to the house and ponds; the Main drain bel(o)w grownd to be Cleaned when the wather is warm ... the drain on the west side of the avenew to be Clened out and mead Louer; Both the ends of the New avenew to be shut up'*, (NLS, Ms 17481, f123r). Although the 'New avenew' is mentioned elsewhere in passing, it is most likely being turned into a shelter-belt or windbreak, because of the ongoing cost of maintaining a decorative, but unnecessary tree-lined passage.

The timesheets for April and May 1752 show, as well as the continual *'Cleaning the avenew hedge'*, *'Leveling ground about the hows'*, and *'filling up the ditch before the hous'* (NLS, Ms 17481, f24r). Throughout May-June, there are intermittent mentions of *'Leveling the ditch ... filling the ditch'*, as well as levelling ground, digging foundations, *'leveling Cloas'* (around mansion), and filling wheelbarrows with earth (NLS, Ms 17481, f27). This is followed by *'Clening the water ditch'*, and in November, *'filling up the dutch'*, both taking only one day (NLS, Ms 17481, ff29, 33). These trenches, initially excavated at such great physical labour, were now being used for other purposes in 1754, such as *'filling Rubish at west park ditch'*, (NLS, Ms 17481, f149r).

A major earthmoving project was undertaken between December 1752, and January 1753. It was labelled *'Leveling work ... at the big ditch and holing out stons ditto'*, holing maybe referring to 'digging stones out of the same ditch' (NLS, Ms 17481, ff70-1). Nine workmen had been imported from the Duke of Argyll's estate of The Whim, and from Milton's ancestral seat of Saltoun, and they received boarding allowances. Most of the regular Brunstane men were attending farmwork, but apart from the uninformative *'at Leveling work'*, the site concerned is not pinpointed. The local wildlife was less fortunate, as Thomas Jameson was *'spreding mooll hills some days in garden'* (NLS, Ms 17481, f73r).

It seems unlikely that this 'Leveling' project refers to building the already-extant sunken wall (O23) on the southern curtilage extremities, but additional hints indicate this may be the reworking of this existing ha-ha or sunken wall (O23), as a new soakaway (160) to serve the culvert (145) (Hunter Blair 2014, 18). In April 1753, various workers are *'at Leveling and Drains ... at Leveling ground, Carr(y)ing stons out of ditch Bridge ... Car(ry)ing stons out of the Ramper ditch, Leveling ground ... at water Run ... Casting (digging) found(ations) and water drain'* (NLS, Ms 17481, ff74-5). Although 'ramp' or 'rampart' ditches, and 'ditch bridges' are not immediately obvious structures in the Brunstane landscape, they are suggestive of the causeway or interruption to the sunken wall or ha-ha, labelled feature (O75) (Hunter Blair 2014, 13). This coincidence may be reinforced by *'September 1753 ... Alexander henderson ... Reding (cleaning) the drain and ditch in West Park'*, beside Loan Shott (NLS, Ms 17481, ff84-5). On 24 September 1753, we find *'Andrew Cowper Clening the sunk drain'* with another two colleagues, who in total spend ten working days *'at the drain ditch'* (NLS, Ms 17481, ff74-5). The interruption to the line of the sunk fence/wall created by causeway (O75) may indicate a gate leading to the loan or road along the estate's southern bounds.

As the gardener's list of upcoming tasks from August 1753 showed, the *'Main drain bel(o)w grownd to be Cleaned'*, associated with the channel through the West Park (immediately north of the eastern excavation Area 2), would match the culverts and artificially channelled Newhailes Burn and culvert (145) and associated

cuts (NLS, Ms 17481, f123r). The likelihood that the canalized Newhailes Burn, north of Whitehill Road, Niddrie Bowling Club and Wanton Walls, relates to the early-mid 1750s is substantiated by a mining contract from April 1751.

John Biggar of Woolmet, purchased the right to work Brunstane coal-seams, but Lord Milton retained the ability *'To Convey by any Machine or Engine Water from the Lead (lade) in Niddery ground to their inclosures at Brustaine which in time of Summer or Drought is to be Restricted to an Inch and half Inch Bore, so as the Coall Engine may not be hurt'* (NLS, Ms 17481, ff2v-3r). As the Newhailes Burn at the south of the estate, and the Brunstane Burn at the north, both pass through the Niddrie land, this clause could apply to either or both streams. The massive drain (145) contained coal detritus, which would definitely not exclude an association with 1750s shift from leisured landscape to more organised, industrial-scale mineral extraction (Hunter Blair 2014, 19).

A parallel, or twin example of the massive, professionally-built and lime-bonded culvert (145), may be the watercourse described by the Earl of Abercorn's factor, Robert Brisbane in 1755. Brisbane, who seems to have been an Edinburgh lawyer or legal clerk, also served Lord Milton in various estate-management matters, but became the Earl's factor when the latter purchased part of Brunstane estate in 1745 (PRONI, D623/A/48/1, 7, 9). In December 1755, Brisbane visited a recently-purchased house at Duddingston. He suggests that *'In place of the town water Running, down the lenth of the back Court and gardins wall, to turn it from the Gardin wall ... by an oppin drain or Laid over w(i)th flags and Covered above w(i)th Earth, to make the plantation Regular, so that the water Runs through this oppen or Covered drain to the west ditch to the (Duddingston) loch'* (PRONI, D623/A/49/50). If such capped and coursed channels were 'best practice' in the 1750s, then culvert (145) would seem to follow that design.

The culverts, for the reasons stated, namely lime mortar, cut and tool-marked stone, regular courses and regular planning, seem to have been professionally engineered, using the outside craftsmen that Milton employed for specialist projects outwith the remit of his general estate hands. The culverts (145) and (202) may be part

of the estate boundary-marker works, controlling water and if so would (145) would have continued south to the pre-railway field fence-lines. Culvert (086) lay outwith the excavation site, but in the nineteenth century would also have lain within Milton's grounds, which terminated further south, underneath the later railway.

Lime-production and seaweed

Whether or not lime was being used as fertiliser, seaweed, called 'wrack', or 'ware', certainly was. Being a seaside estate, five men spent a Saturday in March, 1741 *'Gathring wrak'*, and others were *'at sea War'*, and then *'spreading'* it, in November 1745 (NLS 17479, ff8-9, 158). Collecting fertiliser is also, rather misleadingly to modern ears, called *'at seasid'* (NLS, Ms 17479, f30). The legal right to gather seaweed for agricultural use was jealously guarded, and was written into sale documents, being mentioned in some at Brunstane (PRONI, D623/A/48/1). When women were employed to gather wrack in May 1752, they seem to have been paid the same as the (conceivably elderly) man alongside them: *'marget marke 1/- ... maren miek, 1/- ... John Berfiesh 1/-'* (NLS, Ms 17481, f35r).

Although lime production for fertiliser or mortar is consistently mentioned from the 1730s until the 1750s there are also references to the limestone quarry, and to tending limekilns. Earlier instances have been quoted above, such as James Skad *'sifting Lime'*, and Walter Grinly *'feeding Lime kill'*, both in October 1736, and James Hill *'slaking Lime'*, that December (NLS, Ms 17478, ff34r, 36r, 40r). A limekiln was in use in July 1741, being supplied from the lime quarry, which appears to have been on Brunstane land from its frequent appearances (NLS, Ms 17479, ff24-5).

There were several different quarries, one of which was north of the house beside Brunstane Burn, in all likelihood the location for *'cuting weeds in Quarry park'* (NLS, Ms 17479, f29). There was also the *'new quarry'*, the *'Lime Quarry'* and the *'free Quarry'*, or sandstone (*'freestone'*) extraction site, all being worked in 1741 (NLS, Ms 17479, ff21, 24, 27-8, 31). More usually, however, the type of material is not specified, being simply *'In Quarry'*, for timesheets for September 1741 (NLS, Ms 17479, f30).

The opening of a 'new' quarry about 1750, and

an estimate from 1753 of material remaining in the *'Easter Quarry at Brunstain'*, both suggest that easily accessible sandstone on the estate was running out. The quarry retained *'about 500 piece of Ashler Computed to 18 stones five foot long ... 2½ roods of wall Stones'* (NLS, Ms 17481, f133r). The nearby, partly-dismantled Charteris family mansion of Stonyhill would also yield *'several pieces of hewn work and what walls is to take Down may produce if Carfully Managed about 12 rood of wall stone'*, although Milton's intended use for the material is not given (*ibid*).

In 1743, tenant farmer William Horn (junior) of Wester Duddingston hires or purchases from *'John wight two lime Kilnes for yr Lordships use, £6/13/4d, To Stokning out Ditto Kilnes, 7/-'*, Sterling (NLS, Ms 17479, f186r). The Wight family was *'tenant in cousland'*, and occasionally appear as sold large quantities of lime to Brunstane (NLS, Ms 17479, f188r). *'Lime from Cousland'* amounted to 250 bags over four months in 1736 alone, for which John Wight charged 10d per bag, amounting to the considerable sum of £9/18/4d sterling (NLS, Ms 17478, ff48r, 50r). The kiln had been manned by *'16 work pipel (with) 1/- for sup(p)er'*, using two sieves and two riddles, for all of which Milton was charged a further ½ guinea, or 10/6d sterling (NLS, Ms 17478, f49r). Lime production was clearly a very profitable side-business for farmers.

One of the kilns bought in 1743 is perhaps that being worked for the ever-present masons in July 1745, *'at Lim stons'*, and *'at Lyme kiln'* (NLS, Ms 17479, ff142v-143r). The other parts of the process appear in other vouchers that summer, two men *'Rading (cleaning) out limekill'*, others *'souring lime'* (NLS, Ms 17479, ff134v-135r, 137v-138r). The unending need for lime meant that in spring 1753, connection with a new barn and the principal forecourt, labourers were carting lime and sand, digging foundations, *'Ridling Lime'*, making mortar and carrying stones to the masons (NLS, Ms 17481, ff74-5, 76-7). In August 1752, thirty-two cartloads of stone had been purchased for *'Bulding the Diek Aboutt the Couert Afoer the houes'* (NLS, Ms 17481, f61r).

There are scattered mentions of *'Sowldiers'* working as common labourers, e.g. August 1736, or the illiterate *'Robert Finny, souldier ... 7 days at brickmaking'*, in 1735 (NLS, Ms 17478, f27;

Ms 17477, f206). Others like *'John Willieis Castell Souldier ... 24 days blowing Rocks, £1/6/-'*, in the autumn of 1735 are presumably using gunpowder to expedite quarrying (NLS, Ms 17477, f204). *'The barracks'* are occasionally mentioned in the Brunstane accounts, e.g. mending windows there in August, and *'macking ... on long manger for the bareckis'* in December, both in 1754 (NLS, Ms 17481, ff234r, 235r). The *'Old Barracks'* appear near Brunstane Mill on Leslie's plan of 1764, although the soldier-labourers seem to come from Edinburgh itself (NRS, RHP14979).

Coal extraction 1730s-50s

Andrew Horn, an underground miner in the 1680s, had risen to become a manager or overseer, the *'Coall Grive at Magdalen Panns'*, by his death in 1733 (Tollemache No 613, e.g. 5-12 Sept 1686, 1-7 May 1687: NRS, Horn 1734, 330). His posthumous inventory of debtors lists his customers in Edinburgh, many of whom were prosperous merchants who did not enjoy meeting their debts on time. This also shows where the hard-won Brunstane and Duddingston coal was actually consumed, and in what volume. Frequently, the end-users and domestic customers are unrecorded.

Horn had initiated several court cases for bad debts, including those against local Duddingston coalmen William Johnston (for £9/-/4d) and David Greig (£5/12/7d), both of whom may have been the delivery carters taking the loads to customers' homes (NRS, Horn 1734, 332-3). The list of money due to Andrew Horn ends: *'£212/4/2d (sterling) ... Summa of the debts owing to the dead'*, which in 1733 was a very substantial amount of money (NRS, Horn 1734, 333).

The Brunstane farm horses were used for both ploughing and hauling coal-carts, as in April 1735: *'the horses at the pleuch for noun (forenoon) at the Coalls afternoon ... being scarse Got only 3 tubs'*, (NLS, Ms 17477, f155r). The colliers themselves multi-tasked by working at the quarry in November (NLS, Ms 17477, f209v). The general estate hands also carried coals, and in 1736, worked *'at Coal hill'*, alongside driving dung carts or woodworking, as David Leithan often did (NLS, Ms 17478, ff34-5, 42r).

Although Lord Milton was never as engaged with coal mining as his successor, the Earl of

Abercorn, he did commission a report from Easter Duddingston farmer William Horn senior in late 1736. *'When I got (the Argyll estate's coal griever) Angus (Beaton) they were either at work or drinking ... I met ... and all agrees that the Coall of Brunstan is irredeemable by reason of the burden of water ... it is the oppinion of the two oldest workmen In the ground'* (NLS, Ms 17478, f61r). The experts, *'Robert Taylour late oversman to ... the Dutchess Dowager of Argyle and Alexander Anderson Coalier in Duddingstou'* felt that *'none of the Seems of Coall within ... Brunstone Can be wrought to any profite either by Horse or water Engain'* (NLS, Ms 17478, f62r). Both of the aged miners were illiterate, and the present griever, Angus Beaton, had to write their statements in December 1736 (*ibid*). Stones from the coalpits were used for building work in 1737, *'because of the Expencc of Tiring the Quarey'*, tiring being removing turf and overburden to expose quarry-stones (NLS, Ms 17478, f95r).

William Horn senior was acting as steward or agent for Milton's Duddingston colliery, from 1740-45. His coal accounts for twelve months, awarded in March 1741, compute Horn's share of *'723 Tubs of Great Coale is £325/7/1d (Scots)'* (NLS, Ms 17479 ff182v-183r). That was worked out as *'1150% Tickets (parts of return portages to the surface) off Great Coale'*, being £47/11/5d sterling (NLS, Ms 17479 ff182v-183r). Although Horn managed the accounts, he died in June 1746, and was evidently already physically unable to collect monies owing by 1745, when his wife signed in his place (NRS, Horn 1747, 499; NLS, Ms 17479, ff174r, 175r, 178v, 181r).

By his will, Horn obliged his widow Marion Heriot to act as trustee for their eight youngest children. She inheriting all of his assets beyond the legal minimum bequeathed to her stepson, William Horn junior in Wester Duddingston (NRS, Horn 1747, 500-1). However Horn senior was very parsimonious, as Marion had distribute the estate to the children when they became adults, and her short-term *'mantinance ... was for her encouragement to the more carefull manadging the matters committed to her trust'* (NRS, Horn 1747, 502). Unusually, Marion was also charged with *'establishing in her person ane legall and valid right and title'* to money owed to her (NRS, Horn 1747, 502). Women's legal entities were subsumed within their husband's persons, and it

was unusual to specify that a widow, albeit legally able on act on her own behalf in certain matters, should seek independent official recognition for debt recovery (*ibid*).

Fortunately, Mrs Horn was more than equal to the task, proving an astute businesswoman who ran several large-scale operations in her own name, but unlike the similarly canny Duchess of Lauderdale, she is condemned to obscurity due to her modest social station. Milton paid her in 1745 the excise duty on the Horn family's *'making ... 8 steeps of Malt consisting of 81 boles of Bear (barley)'*, which produced 606 bushels of malt for brewing beer, as well as 56 Boles of draff, used as animal feed (NLS, Ms 17479, f174). She notes that she received *'ten pints of Aquavita'*, or concentrated alcohol, from Mr Brisbaine in 1743 (*ibid*). In the 1750s, Marion Herriot or Horn was supplying ale from Easter Duddingston, malting around 10 bolls of barley at a time, six times in 1752, and twice in 1755 (NLS, Ms 17481, f248r). She also charged Milton for making 45lbs of butter (*ibid*). The industrial scale of her production is suggested by her paying excise duty of £8/15/10½d over three years, on 117 bolls of malt over 3 years (*ibid*).

Marion Horn's further commercial activity is shown by Lord Milton's coal accounts from May 1742-February 1744, which are headed *'Ac(oun) tt with Mrs Horn ... includeing Coal acctts ... being £81/4/9d (sterling) ... Received the above ballance (£101/11/7d) ... Marion Horn'* (NLS, Ms 17479, f181r). The coal output from May 1742 until January 1744 was 101 tubs of great coal at 9/- sterling each, 27 tubs of small coal, and 4432 tickets, amounting to £81/4/9d sterling for Marion, signing on her husband William 's behalf (NLS, Ms 17479, f178v).

In 1751, Lord Milton sold to coalmaster John Biggar of Woolmet *'six seams of Coall called the Corby Craig, Black Chapple, Stairhead, Great Seam, Rumbles and Fleecks, All lying within ... Brunstaine'* (NLS, Ms 17481, f2v). Milton granted Biggar *'full powor and Liberty ... to work all the said Seams down to the Sea Levell ... Black Chapple & Corby Craig ... (Biggar is) Impowered to work so deep as his Engine ... shall require'*, (NLS, Ms 17481, f2v). John Biggar was forbidden to dig new mineshafts at Brunstane, or *'Sett down any pitts or Sinks upon (Milton's land), But (Biggar could)*

work the said Coall by Communication with the pits ... belonging to the Earle of Abercorn and Mr Wauchop of Niddery (NLS, Ms 17481, f2v).

Forbidding new surface workings preserved the 'visual amenity', or picturesque quality of the designed landscape surrounding Milton's house. Subterranean tunnels stretching from outwith the Brunstane policies also meant that there were no engine houses, rubbish tips or new roads scarring the new gardens. The neighbours would have the noise and unsightly pollution generated by an industrial colliery. The motivation for this rule is shown by Lord Somerville, of nearby Drum House, Gilmerton. In the 1740s, architects John and William Adam leased the colliery at Pinkie House, for £100 per annum, but Somerville wrote, *'the ground near the house is a good dale defaced with Coal Pits, so much as to make a Difference to me, as to living there'* (PRONI, D623/A/48/40). Then as now, industrial refuse lowered the potential value of the property.

For this grant of 1751, Milton was paid a mere £200 sterling, although Biggar did have to *'put in Sufficient Repair the Road Leading from the Mansion house ... down to the Links ... for conveying and Transporting ... Coall'* (NLS, Ms 17481, f3r). Milton had to restrict his horticultural water supply from Niddry Lade, *'so as the Coall Engine may not be hurt'*, (NLS, Ms 17481, f3r). This provision may be connected to the various lades uncovered at Area 2, namely (086), (158) and (145), which ultimately led off the estate and entered the adjoining Niddrie and Whitehill policies.

By 1755, Milton was merely consuming or producing coal on a small, domestic scale, as shown by two workmen occasionally visiting Edinburgh with coals, or *'at coall cart'* on the estate (NLS, Ms 17481, ff210-13). There are charges for 'customs', or transport taxes of 1d per vehicle, for driving two cartloads of coal a week to Edinburgh (NLS, Ms 17481, f200v). This may be fuel for Milton's townhouse in Edinburgh, rather than for sale. The exploitation of the Brunstane coal seams was thereafter in the hands of lessees, and the more dynamic Earl of Abercorn.

Purchase of Brunstane land by 8th Earl of Abercorn in 1745 and 1767

The 3rd Duke of Argyll sold land to Lord Milton

in July 1745 (registered in 1747), which Milton had only previously rented (NLS, Ms 17479, f165; White Collection, Abercorn 1875, ff149r-v). Both Argyll and Milton in turn sold part of their holdings, also in 1745, to James Hamilton (1712-89), the 8th Earl of Abercorn (PRONI, D623/A/48/1, 3, 6, 9, 10, 38). These sales to Abercorn were registered in 1747 (White Collection, Abercorn 1875, ff149r-v). According to surveyor Robert Johnston's list of households, compiled in early 1752, Abercorn possessed Easter and Wester Duddingston, the two farms north of Brunstane Burn (PRONI, D623/D/10/1). Lord Milton retained the core estate of Brunstane and its gardens, including Brunstane Mill, the home farm, Loan Shott and Whitehill Park (the excavation areas north and south respectively).

Abercorn employed Walter Scott, father of the famous novelist, as his factor at Duddingston. Scott seems to have been lacklustre in performance, slow to reply to questions and in forwarding necessary information. Abercorn was nonetheless actively engaged in the performance of the coal mines, and the management of his Paisley and Irish estates. Scott was succeeded by his even more lackadaisical son Thomas, who was eventually sacked for incompetence by the first Marquess in 1807.

John Biggar of Woolmet believed that he would have Abercorn's salt pans at Duddingston in working order by January 1746, but required a proper lease to sink a new mine, using 8 or 10 of Abercorn's colliers (PRONI, D623/A/48/2). Robert Brisbane continued to act jointly as Milton's and Abercorn's factor, and self-described accountant Francis Farquarson, an Edinburgh lawyer, was also managing affairs (PRONI, D623/A/48/3, 6, 38). In Farquarson's opinion, the nearby Battle of Prestonpans appears not to have unduly affected Duddingston: *'the Commotions wherewith our unhappy Countrey is distracted ... altho' the Rebels when they were here dwelt mostly upon your Estate, I don't hear that your tennents met with any dammage'* (PRONI, D623/A/48/3). Brisbane was unsympathetic when the locals nevertheless submitted compensation claims to Abercorn, Milton and Argyll. They demanded recompense for *'the damgages they Sustained by the Rebbells ... (but) many of the articules may be over Charged and that they ought themselves to suffer a part of the loss'* (PRONI, D623/A/48/19).

In April 1747, Biggar used *'information from ... the Coalliers that appeared to be most intelligent of what seams of Coals have been already wrought, at what depths'*, but despite this, he had only made unsuccessful test bores at Duddingston (PRONI, D623/A/48/13). He hit one old seam two feet thick, and was *'setting it agoing by sinkeing pitts and driving mines'*, as fast as possible to feed the saltpans, thereby avoiding importing coal *'to no advantage'* (*ibid*). John Biggar of Woolmet began work *'very nigh the Lord (Milton's) north gate'* by April 1748, paying Abercorn royalties of one tenth of all coal raised (PRONI, D623/A/48/24). The earl's share seems curiously small, coming to £7/17/7d over 1747-8, though *'we hope it will increase more and more'* (*ibid*). This soon multiplied to the *'tenth of all the Coall Raised from 27th Aprill 1747 to the 30 July 1748, (being) £26/12/5d'*, with a similar amount for 1749 (PRONI, D623/A/48/33).

John Adam, the architect, reported on the condition of Duddingston House as a residence for Abercorn in 1748, as Brunstane was still owned by Milton. The old part was thatched, its walls *'in an extream bad state & ... must tumble down, being built with mud in place of Lyme'*, with only the Duke of Argyll's addition of the 1720s being *'tollerably sufficient'*, (PRONI, D623/A/48/27). Neighbour Lord Somerville refers to Duddingston House as *'the Straw Palace'* on account of its roof in 1749, when he also calls it *'scarce habitable'*, although the parish minister was temporarily lodging there (PRONI, D623/A/48/40).

Abercorn was also interested in rival colliery proprietors' royalties and leases, of which Farquarson explained that fixed prices were not used, but *'a Stamp price ... (such as) Prestongrainge ... coal ... rentalled at a medium of the neat produce for 12 years preceeding ... about £214 per annum'* (PRONI, D623/A/48/45, pt 1). This was due to the risks entailed by paying for an unknown quantity of coal reserves, and the possibility of mines failing. Neighbouring laird Ronald Crawford WS, of Restalrig, owned ground adjoining King's Park, which is now within Holyrood Park. In 1754, the colliers from Duddingston were using a road which was *'Steep Craggy (and) ... only used for ... Empty Carts ... no loaded Carts ever pass ... these rather to go the low Road, tho' a little longer ... rather than Climb ... a Rugged Rock of 130 foot ... this upper*

Road ... is hashed in a terrible manner ... by the poor Coal Driver's empty Carts returning from Edinburgh' (PRONI, D623/A/49/28). Crawford as a gentleman, naturally did not travel by coal cart but by coach, but despite this, *'every body knows, how proper it is to shun all ascents in Carriages, Even at the Expençe of going a few yards about'* (PRONI, D623/A/49/28).

The Abercorn family's possession of Brunstane is well-documented, although they themselves did not live there during the nineteenth century. Their correspondence refers to access and road-maintenance disputes with Andrew Wallace, the tacksman of local salt-pans who used coal from Niddrie in the mid-1750s (PRONI, D623/A/49/40). Wallace's half-brother, John Biggar of Woolmet also threatened to withdraw his labourers and redeploy them in a different colliery (PRONI, D623/A/49/41; D623/A/15/1). Water rights, and the use of the tiny rivulet, the Newhailes Burn, occasioned site visits from arbiters (PRONI, D623/A/49/41, 45; D623/A/15/27-8, 50). There were also disputes over subterranean tunnels passing under estate marches, and who had the right to link different collieries, which also had an effect on water levels in the workings and gravity-controlled drainage (PRONI, D623/A/49/45, 49; D623/A/15/27, 37).

The redoubtable Marion Horn was still working in 1755, and was now Abercorn's tenant as he had bought Easter Duddingston from Lord Milton in 1745-7 (discussed above). The Earl's agent, Robert Brisbane wrote, that Andrew Wallace, the salt-grieve, *'is supplayed with Coall for the salt pans, from Nidry ... his carts drives ... through Mrs Horns land where thire is a made road'*, and compensated her for this traffic *'by taking some of her alle to the Sutlery (tavern) one the Coall hill'*, where the miners could purchase this beer (PRONI, D623/A/49/40). However, Brisbane felt that such unofficial trespassing was without permission or wayleave payments to the Earl, and *'not withstanding of satiefing (satisfying) Mrs Horn'*, such unofficial mutual arrangements did not generate any money for the laird (*ibid*). This, to Brisbane, was too unacceptably unorthodox for the period.

During the late 1750s-early 1760s, Abercorn and Andrew Wallace again argued over the diversion and lowering of watercourses on

their joint perimeters, which Wallace was using to power a steam engine on Niddrie estate (PRONI, D623/A/16/10, 19; D623/A/17/3, 10; D623/A/18/79). William Brown and 'Mr Key ... an English builder' (perhaps Scotsman Robert Kay, 1740-1818), erected an engine at Duddingston in 1763, while Key's employer, William Chambers, was redesigning Duddingston House (PRONI, D623/A/17/80, 84; DSA 2014, Kay). The following year, two old pits were in use, with '*an exceeding great consumption of coals (by) engine*', (PRONI, D623/A/17/130). The Earl advised William Brown's overseer to alter '*one of the boilers ... to contract the flue*', and therefore use less fuel (PRONI, D623/A/17/130). The Duddingston parish minister described Brown's engine: '*About ... 1763 the Earl ... erect(ed) a steam engine ... to the depth of 52 fathoms (306 feet) ... rendered useless in (March) 1790, when ... whole seams of coal were overflowed*', when the 'levels' or drains flooded (Bennet 1796, 368-9).

Andrew Fletcher of Milton and Saltoun, Lord Justice Clerk, died in December 1766. George Burgess had purchased the remainder of Brunstane at the Fletcher of Saltoun estate sale in April 1767, and he quickly resold Brunstane to Abercorn in May 1767 (White Collection, Abercorn 1875, ff149v-51v). The Earl of Abercorn contemplated letting Brunstane House as early as 1767, for he already had the recently-modernised Duddingston House for his principal Edinburgh residence (PRONI, D623/A/18/98). One of his local officers or stewards, Mr Hamilton, was living at Brunstane in 1777 when he was released from the Earl's employment (PRONI, D623/A/22/113, 125-6).

The Earl ordered a second, larger steam engine at Brunstane: '*The shaft of this engine pit (in 1796) reaches ... 60 fathoms, and intersects three seams of coal ... The porous quality of the (surrounding sandstone) and the inauspicious communication of the fatal level, admit such an influx of water, as has all along rendered (mining here) laborious and expensive*', (Bennet 1796, 369). Because Brunstane lay deeper than the surrounding workings, water gathered there from neighbouring mines with interlinked 'levels' or drainage tunnels, causing flooding (the '*fatal level*'). Before 1790, around 270 miners and workmen were employed mining at Brunstane and the southern edge of Duddingston parish,

but the technical problems eventually '*greatly reduced*' the activity (Bennet 1796, 369). A plan and section of coal seams from Duddingston, Brunstane, Niddrie and Woolmet to the Forth shows the intensity of surface and subterranean coal extraction by Abercorn and his neighbours in October 1776 (NRS, RHP600).

Conclusions

The succeeding history of coal extraction can be followed in the copious Abercorn Collection in Belfast. John Grieve, an Edinburgh civil engineer, produced a report for John James Hamilton, first Marquess of Abercorn, in early 1808 (PRONI, D623/D/10/14). Another was commissioned from mining engineer John Williamson of Newtongrange Colliery, in June 1831, both of which are relevant to Brunstane, and would avail future research (PRONI, D623/A/222/6, pt 5).

The 8th Earl's successors became Marquesses, and subsequently Dukes of Abercorn, and Sir John Hope of Pinkie House leased the coal rights from one of them, building the village of Newcraighall to house his workers from the late 1820s-30s. In 1839, Newcraighall Colliery boasted '*the largest steam-engine (in) the country*', an enormous 140hp machine by Girdwood & Co, Glasgow, worth £6,000, which drained the mine (Moodie and Beveridge, 1839, 252). Female and child mineworkers at Newcraighall were among those interviewed for the Children's Employment (Mines) Commission, of 1842, which gives a vivid picture of the appalling conditions in Hope's and other contemporary collieries (Duncan 2005, 94-5, 98-9). The employment of women and boys under 10 working underground was banned by Act of Parliament that year. The later mining and social history of Newcraighall has been examined by local historian and community activist, Helen Crummy (1989; 2004; 2008). The then-Duke of Abercorn sold Brunstane estate to the Benhar Coal Company in November, 1875 (White Collection, Abercorn 1875).

Several new discoveries have emerged from this consideration of Brunstane's documentary record. The detail and completeness of the mining records for the 1680s and 90s, including weekly-output per named miner, and the early mechanical drainage by water-wheel have escaped notice as the Tollemache papers are privately-held in Lincolnshire. This seems to

be still awaiting expert economic analysis. Most academic attention on early-modern coal extraction has, to date, focussed on Fife and East Lothian. The later mining history of the eighteenth century Abercorn regime is curated in Belfast, and contains much valuable material.

An important finding is that the John Slezer map (RCAHMS, EDD/18/12 P) is actually earlier than previously thought, and can convincingly be placed among the other maps of Thirlestane and Lethington, from the early 1670s. More exactly, it may date to 1672, when Sir William Bruce and the Duke of Lauderdale were discussing the detailed layout of the gardens and rooms at Brunstane. Little attention has been paid to either Bruce's or Slezer's work at Brunstane since John Dunbar's major study in 1975, and Brunstane House and grounds are long overdue for a re-assessment of their significance in various cultural fields.

Architectural data on Duddingston House and Brunstane is scattered throughout the Abercorn and Fletcher of Saltoun archives, including condition reports by John and William Adam on both buildings. While not central to the excavation, these archives have already provided the authoritative *Dictionary of Scottish Architects* with new material, including work by nineteenth century architect Thomas Brown on various estate buildings. More humble dwellings are fully enumerated, showing they re-used existing house stances and foundation trenches in the 1730s.

Other findings include clarifying dates of property-purchases and the reasons for the considerable confusion surrounding ownership dates. Many of the pre-Lauderdale papers were ruined by water while buried before the Battle of Dunbar. Disputes over residency rights, inheritance, using a tree-lined avenue and the colossal debts of the Home family added to the tangle, as contemporary remarks attest. Placing Lord Milton's entry at 1732, and William Adam's first work there to shortly after, should help clarify matters. Milton's ingenious debt-repayment schemes to safeguard his estate in the 1730s-40s demonstrate the acuity of a lawyerly mind, and the anxiety-inducing extremes he undertook to avoid losing Brunstane because of debts he voluntarily purchased from someone else, namely Sir John Home.

The landscape has also rendered unexpected results, not least being the remarkable daily

'work diary' from the winter of 1735-6, showing the daily routine of estate workers, hour by hour. The walled garden, of considerable extent, was previously unnoticed because it had been reduced to a mere curve in a fenceline by the first edition Ordnance Survey map (OS 1854). The designer of the garden would be an interesting find, possibly Milton himself or an associate of William Adam, who was working at Brunstane during this period. The identification of a still-extant cropmark (RCAHMS, Canmore ID 53898) as the 1740s moated 'water-feature', rather than an early enclosure, is also valuable in tracing the evolution of the gardens.

Considering the enormous volume of Brunstane estate papers split between various collections, the archaeology links unusually closely to dateable events in the written record. From a landscaping or gardening perspective, the overwhelming impression is of 'dynamic earth', and in following the soil from one place to another. Whatever is excavated is re-used, the obsolete mansion of Stonyhill is demolished and recycled, as are the demolished engine houses for Mrs Smith of Whitehill's 1730s march dyke. Quarries are exhausted, limestone burnt and spread, bricks and mortar manufactured, and coal is taken to the nearby salt pans to evaporate seawater. The detailed Fletcher of Saltoun archives allow this process to be traced across more than two decades in the mid-eighteenth century, to an extent usually unprecedented in historical and archaeological reports of this kind.

Appendices

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- Ms 17478, mainly farm labourers' and gardeners' timesheets 1736-9, masons and joiner's bills, Adam fireplaces and plastering c.1738.
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- Ms 17481, mainly agricultural workers' accounts, tradesmen's repairs to houses, fences, equipment, c. 1749-56.

Ms 17729, principally debts of Sir John Home of Manderston, 1710s-c.1747, creditors including Francis Charteris; repayment of creditors 1730s-40s; Milton's purchase of Brunstane, debts secured against estate.

OS 1854 = 1st edition Ordnance Survey map, Edinburghshire (includes Edinburgh, Inveresk, Newton), Scale: 25 ins to 1 mile, surveyed 1853, published May 1854. OS 1894 = 2nd edition Ordnance Survey map, Edinburghshire (includes Edinburgh; Inveresk; Newton), New Series, Scale: 25 ins to 1 mile, survey revised 1893, published 1895. Available from: <http://maps.nls.uk> [Accessed 01/05/2018].

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E73/40 = Exchequer Records, Account of Charles Murray of Hadden, tacksman of HM Customs and Foreign Excise, general with vouchers, 1 Nov 1681-1 Nov 1684.

GD29/1897/6 = Letter from Duke of Lauderdale, Ham House, Surrey to Sir William Bruce, 23 November 1672, Bruce of Kinross papers.

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GD112/1/685 = *Rent off East Lothian & Dudiston & Brunstane lands with observations thereon, Ds Lauderdale & E Lauderdale 1685 ... The clear rental of the lands on East Lothian disposed by late duke of Lauderdale to his duchess*, includes valuations of Duddingston and Brunstane, 1685.

Horn 1734 = Andrew Horn, Coal Grieve at Magdalen Pans (died 6 October 1733), Testament Dative and Inventory, Registered 8 August 1734, Edinburgh Commissary Court CC8/9/96, 330-333

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RH8/532 = Discharge and Renunciation by Sir Patrick Home of Renton in favour of Lyonell, Earl of Dysart, of disposition for 10,000 merks over lands of Gilmerton or Brunstane, and others, 4 April 1705, Recorded in Particular Register of Sasines 2 June 1705.

RHP600 = Plan of the different seams of coal from the Firth of Forth through the lands of Duddingston, Brunston, Nidrie, Surveyor: James Landers, Oct 1776, Scale: 1:8900, 1 in = 10 Scottish chains.

RHP4425 = Plan of Brunstane, subjects in action, Marquis of Abercorn against North British Railway Co. for alleged abstraction of water, including section of drains, Surveyor: James Leslie, Edinburgh, May 1848; Scale 1:1800, 1 in = 150 ft.

RHP14979 = Plan of the Estate of Brunstane, Surveyor: John Leslie, October 1764, Scale 1 in = 200 ft.

RHP85500/1 = Plan of the farm of Brunstane, 1879, referred to in lease between liquidators of Benhar Coal Co and William Park, 13 November 1882, Lithographers: Mould & Tod, Edinburgh.

RHP85505 = Plan of the Mineral Field under Easter Duddingston and Brunstane, belonging to Marquis of Abercorn 1837, Surveyor: Robert Bald, Edinburgh, 8 December 1837; Scale in Scots chains.

PRONI = Public Record Office of Northern Ireland, Belfast

Various photocopies of the original manuscripts were included in the Denis B White Collection deposited at Duddingston Manse, Edinburgh. These copies were the primary source for quotations from the Abercorn Papers. The originals are in the Belfast record office, and some have been transcribed with varying degrees of accuracy on the PRONI catalogue website. Direct quotations in this report have been selected from the Denis B White Collection photocopies to ensure greater accuracy. The archive has been given as PRONI because their accession numbers are used throughout.

D623 = Abercorn Papers

D623/A/15/1, 27, 28, 37, 50: Letters of Earl of Abercorn, 1755-6, re coal works at Duddingston.

D623/A/16/10, 19: Letters of Earl of Abercorn to Robert Brisbaine, 1758, re neighbouring coal proprietor, Andrew Wallace.

D623/A/17/3, 10, 80, 84, 130: Letters, Earl of Abercorn, 1760-4, re colliery and rebuilding mansion at Duddingston.

D623/A/18/79, 98: Letters, Earl of Abercorn, John Biggar of Woolmet, 1767, mines drainage, test bores at Duddingston.

D623/A/22/113, 125, 126: Letters, Earl of Abercorn to factor Walter Scott, 1777, re Brunstane House tenants, estate matters.

D623/A/48/1, 2, 3, 6, 7, 9, 10, 13, 19, 24, 27, 33, 38, 40, 45 pt1: Letters, mainly Earl of Abercorn, Robert Brisbaine and Francis Farquarson, 1745-50, purchase of Duddingston, John Adam's survey of house, coal works, 1745 rebels, Pinkie estate.

D623/A/49/28, 40, 41, 45, 48, 49, 50: Letters, Earl of Abercorn, Robert Brisbaine and Francis Farquarson, 1754-5, Duddingston House repairs, drainage, coal tacks, Biggar of Woolmet.

D623/A/222/6, pt 5, Report on the Abercorn Coal, by John Williamson manager of Newtongrange Colliery, 22 June 1831, sent to factor J Guthrie Wright, WS, Edinburgh.

D623/A/222/9 Letter, J G Wright to Lord

Aberdeen, 22 August 1831, mills, Duddingston House repairs, water supply.

D623/D/10/1 Survey of Barony of Duddingston and by Robert Johnston, 1752.

D623/D/10/8 'State of the old Rents, Leases ... of Duddingston', November 1800.

D623/D/10/14 'Report on the State of the Collieries of Duddingstone and Brunstain', by John Grieve, Jan-Feb, 1808.

D623/D/10/21 'Valuation of the Estate of Duddingston', 1868-9.

D623/D/10/22, 'Report on Duddingstone and Brunstane Mineral Field and Valuation thereof', by John Geddes, Mining Engineer, 24 April 1868.

RCAHMS = Royal Commission on the Ancient and Historical Monuments of Scotland, Edinburgh

Canmore ID 53898 = Brunstane, Enclosure, Site Number NT37SW 60, visible on aerial photographs.

Collection RCAHMS Aerial Photography Digital; Category On-line Digital Images.

EDD 18/12 P = Slezer, J dated by RCAHMS to c.1690; re-dated by Cross to c1672, Photographic copy of estate plan, showing Whitehill House and Brunstane, Original in_Buccleuch Muniments, Bowhill.

RPS = The Records of the Parliaments of Scotland (Online Resource)

The Records of the Parliaments of Scotland to 1707, Brown, K M et al. (eds.) (St Andrews, 2007-2015). Available from www.rps.ac.uk [Accessed 01/05/2018].

RPS, 1661/1/43 = Charles II, 1661, 1 January, *Parliamentary Register*; Edinburgh 29 January 1661; Procedure: patents of appointment; *John Maitland, earl of Lauderdale, secretary*, Available from: www.rps.ac.uk/trans/1661/1/43 [Accessed 01/05/2018].

RPS, 1661/1/209 = Charles II: 1661, 1 January, *Parliamentary Register*; Edinburgh 9 April 1661; Legislation; *Act in favour of John Maitland, earl of Lauderdale ... anent ... his writs*, Available from:

www.rps.ac.uk/trans/1661/1/209, [Accessed 01/05/2018].

RPS, 1681/7/97 = Charles II, 1681, 28 July, *Parliamentary Register*; Edinburgh 6 September 1681; *Ratification in favour of Sir William Sharp of Stoniehill*, Available from www.rps.ac.uk/trans/1681/7/97, [Accessed 01/05/2018].

RPS, 1700/10/218 = William II: Manuscript; 1700, 29 October, Edinburgh, Parliament; *Parliamentary Register* 25 January 1701; Legislation: *Act in favour of Mr James Smith*, at www.rps.ac.uk/trans/1700/10/218 [Accessed 01/05/2018].

Tollemache = Tollemache Family Archives, Buckminster

Photocopies of various Tollemache papers, forming part of the Denis B White Collection, were consulted at Duddingston Manse, Edinburgh. Sources described as 'Tollemache No ...' refer to the Duddingston photocopies, which retain the Tollemache archive numbers. The original Tollemache manuscripts remain in Buckminster, Leicestershire.

The Tollemache papers are listed in the 1979 HMC inventory No 79/37, edited by Gillian Falla, *Report on the ... papers of the Tollemache family, Earls of Dysart ... at Buckminster, Grantham*. References in the 2015 archaeological report to 'Falla 1979' indicate the annotated catalogue entries describing the manuscript contents as listed in the HMC inventory.

Tollemache Nos 519, 521-2, Liferent of Brunstane, Duddingston etc. to Duchess, 1676-8.

Tollemache Nos 527, 530, 534 Entail of estates 1682-4.

Tollemache Nos 536, 545, Disposition of Brunstane to Sir Patrick Home and revocation, 1682-4.

Tollemache Nos 560, 562 – Disposition of Brunstane etc to Earl of Lauderdale, and draft concerning Countess of Argyll's potential ownership of Brunstane etc, c.1698.

Tollemache, No 613 Coal mine survey by William Marstane, orresman, August 1688 and weekly coal accounts, Duddingston and Brunstane, 1686-90.

Tollemache Nos 614, 615 Weekly Brunstane coal and Magdalen salt pans accounts, 1686-97.

Tollemache Nos 1630, 1631 Letters to Earl of Lauderdale from brother, concerning Duddingston 1666.

Tollemache No 1890 Letter from Sir William Sharp to Lauderdale re purchase Duddingston, 1668.

Tollemache No 3151 Letter to widowed Duchess of Lauderdale about inheritance dispute, 1683.

White Collection = Denis B White Collection, Duddingston Manse, Edinburgh

White Coll, Abercorn 1875 = No 42 Disposition by Duke of Abercorn to Benhar Coal Co., At Ed 11 Nov 1875, ff137-152, this is a photocopy but the original source is not given, possibly Books of Council and Session 1875, or Particular or General Register of Sasines 1875, all of which are at the National Records of Scotland, Edinburgh.

Appendix 1: Lithics catalogue

Catalogue No	Location	Description
	Pit 2075, Fill 2066	
1	SF 46	Scale-flaked knife on tertiary hard percussion blade (69 by 32 by 7 mm); fine-grained, light-grey mottled flint. Yorkshire flint; Levallois-like flake. Neat scale-flaking along the entire right lateral side. Slight overhang along this edge, dorsal face; small flat chips have been detached along this same edge, ventral face. The piece has clearly been used for cutting.
2	SF 46	Distal fragment of tertiary indeterminate blade (GD 14mm); fine-grained, light-grey mottled flint. Yorkshire flint.
4	Sample 036	Right lateral fragment of tertiary indeterminate flake (GD 11mm); fine-grained, bluish-grey chert.
	Pit 2088, Fill 2087	
5	Sample 045	Tertiary hard percussion flake (GD 14mm); fine-grained, light-grey mottled flint. Yorkshire flint; Levallois-like flake.
	Pit 2091, Fill 2089	
3	SF 66	Distal fragment of secondary indeterminate flake (GD 28mm); fine-grained, bluish-grey/orange chert. Patterning/colour indicates that this piece is from the same core as CAT 16.
9	Sample 048	Chip (≤ 10 mm); fine-grained, pink agate.
10	Sample 048	Chip (≤ 10 mm); fine-grained, bluish-grey chert.
11	Sample 048	Chip (≤ 10 mm); fine-grained, pink flint; burnt.
12	Sample 048	Distal fragment of tertiary indeterminate microblade (7 by 6 by 1 mm); fine-grained, bluish-grey chert.
13	Sample 048	Proximal fragment of soft percussion microblade (5 by 7 by 1 mm); fine-grained, bluish-grey chert.
14	Sample 048	Proximal fragment of tertiary hard percussion flake (GD 13mm); fine-grained, bluish-grey chert.
15	Sample 048	Indeterminate microblade (23 by 7 by 4 mm); fine-grained, bluish-grey chert.
16	Sample 048	Distal fragment of secondary indeterminate flake (GD 30mm); fine-grained, bluish-grey/orange chert. Patterning/colour indicates that this piece is from the same core as CAT 3.
17	Sample 058	Chip (≤ 10 mm); fine-grained, pink flint; burnt.
18	Sample 058	Chip (≤ 10 mm); fine-grained, bluish-grey chert.
	Pit 2092, Fill 2068	
6	Sample 046	Chip (≤ 10 mm); fine-grained, light-yellow flint.
7	Sample 046	Chip (≤ 10 mm); fine-grained, bluish-grey chert.
8	Sample 046	Chip (≤ 10 mm); fine-grained, bluish-grey chert.

Appendix 2: Medieval pottery catalogue

Fabric	SF No.	Area	Context No.	No	Rim	Base	Handle	Sherds	Weight (g)	Description
Scottish White Gritty Ware	15	1	30	1	1				4.8	up-right rim from cooking pot or storage jar
	18	1	30	1				1	1.8	thin walled, reduced with green glaze
	19	1	39	2				2	44.2	conjoining, reduced grey interior with yellow/brown glaze - late medieval
	71	2	u/s	1				1	5.5	light green glaze
	84		187	1				1	3.1	green/brown glaze, burnt on interior
	102		u/s	1				1	10	reduced interior, green glaze, late medieval
	1	1	1001	1				1	2	undecorated body sherd with some smoke marks possible medieval cooking pot
	7	1	1015	1				1	2	undecorated body sherd with throwing marks, medieval storage jar

Fabric	SF No.	Area	Context No.	No	Rim	Base	Handle	Sherds	Weight (g)	Description
	23	2	2023	1				1	8	white/pink fabric, undecorated, storage jar
	33	2	2041	1				1	6	grey fabric with white margin and green glaze -late medieval jug
	51	2	2021	1				1	10	reduced & burnt fabric with white margin and green glaze
				12	1	0	0	11	97.4	
Scottish Medieval Redwares	18	1	30	1				1	9	spots of glaze on both sides - possibly from a base
	55	2	144	1				1	10	smooth red fabric with green glaze
	79		182	1				1	8.3	glazed both sides, external cordon
	41	2	2053	1	1				16	rounded rim and neck with decorative cordon, patchy light green glaze 14thC
				4	1	0	0	3	43.3	
Scottish Post-medieval Oxidised Wares	1	1	3	1				1	11	interior glaze possible rim/handle scar - cooking pot
	20	1	39	3	1			2	35.5	heavy out turned rim -bowl, 2 thin walled sherds
	85		187	1				1	3	thin bodied, smooth orange fabric
	89		u/s	1				1	7.7	smooth fabric thin walled, interior green glaze
	103		u/s	1				1	28	thick walled green glaze on interior and purple heat skin
	12	2	2005	1		1			48	fine reduced grey fabric with uniform red heat skin on surface and spots of glaze, post-medieval jug
	51	2	2021	3				3	48	2 thick walled with orange fabric and brown glaze bowl or platter, 1 thin walled and undecorated
				11	1	1	0	9	181.2	
Scottish Post-medieval Reduced Wares	9	1	1018	3		1		2	60	reduced grey fabric with green glaze, base has kiln scar on side, slightly warped base
	015	Tr 37	3701	1				1	2	thin walled with grey reduced fabric and brown/green glaze on both surfaces - post-medieval
	22	2	2023	1				1	4	grey fabric, green glaze, very thin walled
	44	4288	2	1				1	22	grey reduced fabric with brown/green glaze on exterior, post-medieval jug
	59	2	2021	1		1			48	shallow sides with kiln scar on base green glaze with purple heat skin
				7	0	2	0	5	136	
Rhinish Stoneware	3	1	12	1				1	7.4	brown speckled salt-glaze
	101		u/s	2				2	27.5	1 brown speckled the other grey

Fabric	SF No.	Area	Context No.	No	Rim	Base	Handle	Sherds	Weight (g)	Description
	18	2	2011	1				1	2	grey fabric with brown glaze, neck from a bottle/jar
				4	0	0	0	4	36.9	
White Earthenware	81		181	2	1			1	8	1 blue transfer and 1 undecorated
	10	1	24	2				2	5.1	1 hand painted with blue, green and orange, the other blue transfer
	91		193/194?	6				6	14	2 with blue transfer print
	78		176	6	4			2	22	4 transfer prints blue and purple, 2 hand painted - same vessel
	72		72	19		7		12	49.7	8 blue and white transfer print, 2 prints, 11 undecorated
	51	2	118	1		1			12.6	blue and white transfer print
	47	1	85	2				2	6.1	Blue transfer print
	26	1	51	1		1			4.3	blue transfer print
	35	1	79	1	1				1.9	blue transfer print, flatware
	31	1	78	1		1			4.8	blue transfer print, jug/mug
	gen		1		16	7	2	40	252	mainly blue transfer print and undecorated, various vessels
	58	2	144	8	5	1		2	96.5	brown glazed base from teapot, 4 sherds from banded and rouletted planter, flatware rim and blue sponge printed sherd
	31	1	79	1			1		5	brown glazed 'rustic' teapot handle
	34	1	79	1	1				1.1	brown painted band, unfired biscuit ware?
	36	1	79	2				2	1.5	fragments
	37	1	79	1				1	0.6	hand painted red
	27	1	61	2				2	2.8	undecorated flatware
	54	2	102	4				4	17.3	undecorated flatware
	24	1	54	1				1	4.2	undecorated marble/bottle stopper
	22	1	52	1				1	0.8	undecorated, post-depositional burning/damage?
	25	1	54	4				4	16.3	undecorated flatware
	3	1	12	1				1	3.3	yellow glaze
	001	Tr 12	001	1	1				1	rim with blue hand-painted decoration
	11		10	1				1	4	blue transfer printed decoration, from a bowl or plate
	15	4288	15	5		1		4	8	fragments, 3 with blue transfer printed decoration
	17	2	2011	1				1	1	undecorated small fragment
	34	2	2041	1	1				2	rolled rim with flaking light blue tin-glaze, late 18th century?
	39	2	2050	5	2	3			42	1 with blue tinge to glaze, 1 with applied lilac coloured spriggs, 3 undecorated
	58	2	2109	4		1		3	6	all undecorated 1 blue tinge possibly porcelain?

Fabric	SF No.	Area	Context No.	No	Rim	Base	Handle	Sherds	Weight (g)	Description
	60	2	2112	1		1			86	heavy base, undecorated large bowl, cracking on both surfaces
			2068	1				1	0	small fragment from sample 46
			2087	1				1	0	small fragment from sample 59
			2097	1				1	0	small fragment from sample 49
				89	32	24	3	95	679.9	
Red Earthenware	91		193/194?	1	1				14	heavy out turned rim with abraded green glaze - could be post-medieval
				1	1				14	
Red Earthenware	General		1	2	1			1	28	slip-lined bowl badly abraded
	91		193/194?	1			1		16	slip-lined bowl with external brown glaze and lug handle
	31	1	78	1				1	5.1	slip-lined dairy bowl -cream
	51	2	118	1	1				43	slip-lined dairy bowl -cream
	54	2	102	1				1	12.2	slip-lined dairy bowl -cream
	58	2	144	1		1			16.2	slip-lined dairy bowl -cream
	72		72	1				1	0.8	slip-lined dairy bowl fragment
	General		1	1	1	1		4	54	slip-lined dairy bowls
				9	3	2	1	8	175.3	
Brown & Red Earthenware	33	1	79	1	1				12	brown glazed bowl or large storage vessel
	10	1	24	1		1			23.8	brown glazed jar or mug with lather turned inscribed decoration
	26	1	51	1				1	23.7	brown glazed storage jar
	63	2	u/s	1		1			26	brown glazed storage jar
	72		72	2				2	109	brown glazed storage jar
	3	1	12	2		1		1	72	brown glazed storage jars
	87		197	2				2	6	brown glazed storage jars
	General		1	8	1	1	1	5	50	brown glazed storage jars
	103		u/s	1				1	24	brown glazed storage jar
	54	2	102	1	1				1.9	brown glazed, delicate neck and rim of small jar
	016	Tr 37	3706	1				1	28	brown glaze on both surfaces, large storage jar or bowl
	27	4288	21	2				2	20	brown glaze on both surfaces, storage jar
	39	2	2050	1				1	5	cream slip -lined interior, dairy bowl?
	52	4288	17	1	1				10	everted rounded rim from a bowl with brown glaze on both surfaces
				25	4	4	1	16	411.4	
Industrial Stoneware	72		72	1		1			38.4	grey/green interior,brown exterior - storage jar
	93		u/s	1	1				284	complete stoneware bottle
	103		u/s	2	1	1			58	complete rim from a bottle and base of small jar
	General		1	8	2	1		5	200	complete rim from a flagon, other sherds from various bottles

Fabric	SF No.	Area	Context No.	No	Rim	Base	Handle	Sherds	Weight (g)	Description
	006	Tr 2	202	1		1			76	white fabric, base from a bottle or jar - undecorated
	39	2	2050	1				1	18	undecorated - neck from large storage jar
	48	2	2053	1				1	36	large body sherd with slightly speckled glaze and burning, storage jar/flagon
	51	2	2021	1	1				26	rim and neck with brown glaze - bottle
	63	2	1005	1				1	36	bottle /jar with part of inscription/stamp possibly from manufacturer
				17	5	4	0	8	772.4	
Kiln furniture	53	2	1005	1				1	12	1 kiln furniture, part of 3 armed stacking spacer, no maker's mark or number
				1	0	0	0	1	12	

Appendix 3: Catalogue of Finds from the Metal Detecting Assemblage

Lead Projectile

SF No: 251

Context: 001

Dimensions: 21.19 by 6.25 mm

Weight: 22 g (0.8 oz)

Condition: Calcified patina. Rough and pitted surface.

Period: Mid-sixteenth - early nineteenth century

Description: Flattened and slightly oval in shape, almost fanned out. Curled upwards at edges. Flattened side has some indication radial striations originating from a central point like fan. Also multiple grooves and scuffs. Scuff on opposite side and a small pit, possibly remnants of a sprue.

Interpretation: Small musket ball which has been heavily distorted due to impact with hard surface. Surface has been corroded and is in a relatively poor condition. As the projectile has been heavily impacted it is not possible to determine its calibre or bore. The weight, however, suggests it was fired from either a small musket or carbine. As this is an isolated find it is not possible to interpret this projectile as being part of a wider battle related assemblage.

Buckles

SF No: 54

Context: 001

Material: Iron

Dimensions: 59.7 by 42.74 by 6.9 mm

Weight: 34 g

Condition: Heavily corroded with some loss of surface area and mass.

Period: 1500 - 1750

Description: Iron D-shaped buckle. Rounded in section. One edge straight with the main body long and curved. Corrosion has degraded the main body.

Interpretation: Single looped buckle with tongue missing. Corrosion has concealed any remnants of the tongue groove on opposite side. Potentially a wide ranging date as this simple form and style was adopted extensively from the thirteenth century. Due to iron condition across the site, however, it is unlikely this buckle dates earlier than the sixteenth century.

SF No: 346

Context: 001

Material: Iron

Dimensions: 43.79 mm

Weight: 6 g

Condition: Heavily corroded and fragmentary.

Description: L-shaped fragment with a rounded section.

Interpretation: Possibly a fragment of a rectangular buckle; this fragment potentially representing a corner.

SF No: 139

Context: 001

Material: Cu alloy

Dimensions: 37.84 mm

Weight: 8 g

Condition: Slight corrosion of surface. Object has been damaged and is cut in half.

Period: mid-seventeenth - eighteenth century

Description: Square centre with shaped rounded outer edges. Central bar extending outwards possibly to accommodate a leather belt. One half missing and appears to have broken or snapped off rather than cut. Possible traces of gilding.

Interpretation: Small square buckle with shaped decoration, possibly for small belt. Tongue is missing from central bar. Style similar to buckles recovered from mid-seventeenth century sites of conflict.

Misc.

SF No: 319

Context: 001

Material: Lead

Dimensions: 20.82 by 48.17 mm

Weight: 66 g

Condition: Oxidised patina formed on surface. Surface rough and pitted.

Period: Unknown

Description: Rough rectangular lead object with one part, which is flattened and pointed, protruding from one end. It is not clear whether this protrusion is integral to the piece or has been fused or soldered on. Likely it is integral as one piece. The protrusion appears to be broken, which has created the point.

Interpretation: The squarish shape and rough nature of object suggests it may be the core of another object, with the lead providing weight and balance.

SF No: 39
 Context: 001
 Material: Iron
 Dimensions: 92.87 mm
 Weight: 304 g
 Condition: Heavily corroded and surface fragmentary. Main body of object stable.
 Description: Triangular object with flattened sides which taper to a rounded point at one end. Other end widens out into two parts and appears to be a fragmented socket or hole.
 Interpretation: Object is broken but still retains some degree of shape. May represent the rear piece of an axe head, with the main body of the axe head missing as the socket has broken.

Coins

SF No: 36
 Context: 001
 Material: Cu alloy
 Dimensions: 20.6 mm
 Weight: 2 g
 Condition: Corroded with surface deposits. Slightly distorted in shape.
 Description: Small thin copper alloy disc with trace of gilt.
 Interpretation: Small coin. Very thin and distorted. Possibly a late seventeenth/early eighteenth century coin. Based on size it is similar to coins dating to the reign of William III.

Lead

SF No: 202
 Context: 001
 Material: Lead
 Dimensions: 41.9 by 7.68 mm
 Weight: 74 g
 Condition: Oxidised with white surface patina. Surface rough and pitted.
 Description: Lead strip folded in half. Rough and angular edges
 Interpretation: Strip of lead possibly removed or cut from building or lining. On seventeenth century sites of conflict folded strips of lead are interpreted as rations of lead material for the manufacture of lead projectiles. However, in this context it is more likely to represent isolated scraps.

SF No: 207
 Context: 001
 Material: Lead
 Dimensions: 41.2 mm
 Weight: 28 g
 Condition: Oxidised in patches with white surface patina. Areas have not oxidised and remain dark in colour and smooth.

Description: Rectangular strip with clean cut edges, slightly folded at one end.

Interpretation: Fragment of lead strip possibly removed or cut from building or lining. On seventeenth century sites of conflict folded strips of lead are interpreted as rations of lead material for the manufacture of lead projectiles. However, in this context it is more likely to represent isolated scrap.

Appendix 4: Glass Catalogues

Abbreviations:	WB	Wine bottle
	WG	Window glass
	SR	String ring
	u/s	Unstratified

Newcraighall North		
SF No.	Context	Description
9	24	Four shards from probable WB in 'black' glass, three with belling, original diameter c. 90 mm, 1800-1840. Three further bottle shards greyish green, probably mid-nineteenth century.
12	24	Base shard WB, dull mid green, belling, secondary outer surface, patches of light corrosion, original diameter c. 85 mm, late eighteenth century.
16	30	Body shard bottle, 'black' glass, probably mid-nineteenth century. Body shard bottle, greyish glass, quite thin, probably late nineteenth century.
29	74	Body shard WB, mid-green, moderate corrosion, prob mid-eighteenth century, possibly slightly earlier.
30	78	Lower body shard WB in mid, rich green patches of light corrosion and secondary surfaces. No belling and moderate curve into base ring, probably first quarter eighteenth century. Shard WG type D clear?, firebright, 1.2 mm thick.
32	79	Shard WG type B, very pale green tint, firebright patches, 2.4 mm thick. Tiny shard WG type C, very pale green tint 1 mm thick. Bottle shard in 'black' glass, probably mid-nineteenth century. Bottle shard in firebright olive glass. Probably late nineteenth century.
41	76	Glass marble, pale green, moulded in two piece mould, probably internal stopper from 'Codd' bottle. Late nineteenth century.
42	35	Body shard WB, dull mid green, dulled surfaces, belling. Mid- to late eighteenth century. Tiny shard very thin (0.8 mm) in firebright clear glass. Possible drinking vessel but could be oil lamp glass. Most likely nineteenth century.
50	118	Probable WB neck in black glass, height 67 mm, handblown upright enhanced lip. Similar shaped string ring, with neck striations. 1800-1840.
53	102	Shard WG type F, pale dull green, some abrasion and light corrosion, 2.5 mm thick.
56	144	Lower body shard probable beer bottle in 'black' glass, 'orange peel' outer. Mid-nineteenth century.
62	u/s	Moulded bottle stopper, pale green tint, slightly dulled. Probably used with cork sleeve, mid to later nineteenth century.
64	26	Bottle neck and lip in abraded pale dull green, moderate internal corrosion. Lip tooled out over square section string ring. Neck height 73 mm, original diameter c. 75 mm. Unusual form, colour and condition would indicate late eighteenth century.
75	72	Base from probable WB in black glass, 8 2mm diameter, 32 mm conical kick, no belling, some 'orange peel' outer. Probably mid-nineteenth century. Four further shards probably from above. Thin olive green bottle shard, later nineteenth century. Clear bottle shard, very slight iridescence. Thin WG shard type E, 1.4 mm, very pale green tint.
92	193?	Three bottle shard in 'black' glass, one with 'orange peel' prob mid-nineteenth century. Shard of slightly curved crown WG rim type A, pale green tint, heat sealed edge, 2.5 mm thick.
94	u/s	One pint capacity milk bottle in clear, crimped aluminium closure. Range of decoration in embossing and applied enamel in red, blue and pink. Again from Kennerty Farm dairies. Second half twentieth century.
95	u/s	One pint capacity milk bottle, clear, crimped aluminium closure. Embossed 'PROPERTY OF E&DD Co, EDINBURGH. Mould information on base W673, e4, UGB. Mid-twentieth century.
96	u/s	One pint capacity milk bottle in clear, squat shape, crimped aluminium closure. Several patches of embossing including 'KENNERTY FARM DAIRIES 1 pt 568 ml', mould information UG SD630 U9. Second half twentieth century.
97	u/s	Beer bottle in firebright amber embossed 'ROBERT YOUNGER, EDINBURGH' Crown closure. Mid-twentieth century.
98	u/s	Sauce bottle in clear, square section, three sides indented with embossing 'TIT-BITS, SAUCE Co LTD, SELBY', first half to mid-twentieth century.

SF No.	Context	Description
99	u/s	Complete small probable medicine bottle, firebright greenish aqua, blown in two piece mould with added lip. Concave kick with flat base ring, overall height 118 mm, diameter 48 mm. Late nineteenth possibly very early twentieth century.
Gen	u/s	Part base and side wall square section bottle in firebright dark green. One surviving side indented, mid-to late nineteenth century. Shard probable WB, dull mid green, abraded, belling. Probably 2nd half eighteenth century. Bottle shard, black glass with 'orange peel', mid-nineteenth century. Possible WB neck shard, 'black glass', nineteenth century. Glass bottle stopper, clear glass with slight bluish tint, possibly mould blown but fire distorted.
Newcraighall South		
SF No.	Context	Description
4	702	Shard aerated water bottle, pale aqua, late nineteenth-early twentieth century.
8	1015	Body shard from mid-nineteenth century beer/ale bottle, black glass, some (orange peel).
14	207	Bottle shard, pale dull green, very slight iridescence, late eighteenth-early nineteenth century.
15	2011	Shard WG (type C), pale green, 2.2 mm.
18	3706	Neck shard bottle, mid dull green, probably not later than c. 1830.
24	2	Neck shard bottle, dark rich green, twist striations so earlier than c. 1820.
26	21	Shard part medicine bottle, pale copper blue, late nineteenth-early twentieth century.
28	22	Shard WG, 2.5 mm thick, clear, slight grey green tinge, probably 1870-1930.
29	2025	Shard very similar to 1002. Onion bottle shape but again no corrosion.
32	2041	Shard probable WB, pale green with moderate secondary corrosion. No later than early eighteenth possibly late seventeenth century.
37	066/003	Base and part wall WB in very poor condition, about two-thirds of the thickness has corroded. Mid dull green, mallet shape c. 1730-40, kick 45 mm, diameter 64 mm. Two further detached wall shards.
39	78	Base of WB, probable mallet shape c. 1730-40, mid rich green, diameter c. 130 mm, kick 43 mm, pontil 45 mm, good condition.
42	28	Shard WG (type A), 1.9 mm thick, pale dull aqua.
		Shard WG, (type B) 1.6 mm thick, pale green tinge, slight corrosion.
57	2109	Shard WG, (type D) pale dull green, 1.6 mm thick.
		Shard WG, (type E) very pale dull green, 1.9 mm thick.
1002	2	Unusually, it looks to be a lower body shard from a 1st quarter eighteenth century onion WB but it has no corrosion, Very dark dull green glass.

Appendix 5: Clay pipes Catalogue

Newcraighall North	
Catalogue No.	Description
N1	Bowl fragment, heeled, with relief decoration, seated Britannia on smoker's left and leaf on seam; 1800-50; 144/ 57.
N2	Bowl fragment with narrow ridge decoration and broader ridge on the seam; nineteenth century; 078/ 39.
N3	Bowl and stem fragment, the bowl has widely spaced fluting; 1800-50; 024/ 13.
N4	Stem fragment marked, in relief, TW & CO/ ED., Thomas White, Edinburgh, c. 1820-1870; unstratified/ 100.
N5	Stem fragment marked T.WHITE./ [BURN'S CUT]TY PIPE in incuse lettering; Thomas White, Edinburgh, c. 1845-1870; 001.
N6	Bowl sherd, left half of a mould-imparted mark with T in an oval; nineteenth century; 198/ 88.
N7	Plain mould with JB in an oval facing the smoker; possibly John Begg of Leith, 1867-88; 144/ 57.
Newcraighall South	
Catalogue No.	Description
S1	Stem and basal fragment, mould-imparted W/B on sides of base and poor impression of castle-style basal stamp from a worn die; William Banks, Edinburgh/ Leith; 008, SF 003.
S2	Large bowl, rim smoothed but not milled, poor impression of mould-imparted marker's mark on sides of base and portcullis-style basal stamp; Edinburgh/ Leith, 1690-1720 2102; 2102, SF8.
S3	Bowl and stem fragment of a small cutty pipe, hatched heart on smoker's right side of bowl, left side of bowl missing, no maker's mark; c. 1850 to early twentieth century. 015; 023, SF023.

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