

Excavations beside Sruth a' Mhuilinn (‘the Mill Stream’), Iona

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with contributions by Sheila Boardman & Richard Tipping

ABSTRACT

Excavation beside Sruth a' Mhuilinn recorded a man-made, sub-rectangular pool cut into the gravels of the stream course, as well as a group of large post-pits. The pool was deliberately back-filled in the course of a recent reorganization of the site. There is no salient archaeological interpretation, but discussion considers whether this is the site of a modern horizontal water mill, and weighs this possibility in the light of the well-attested tradition for the use of Sruth a' Mhuilinn as a mill stream. The excavation was funded by Historic Scotland.

INTRODUCTION

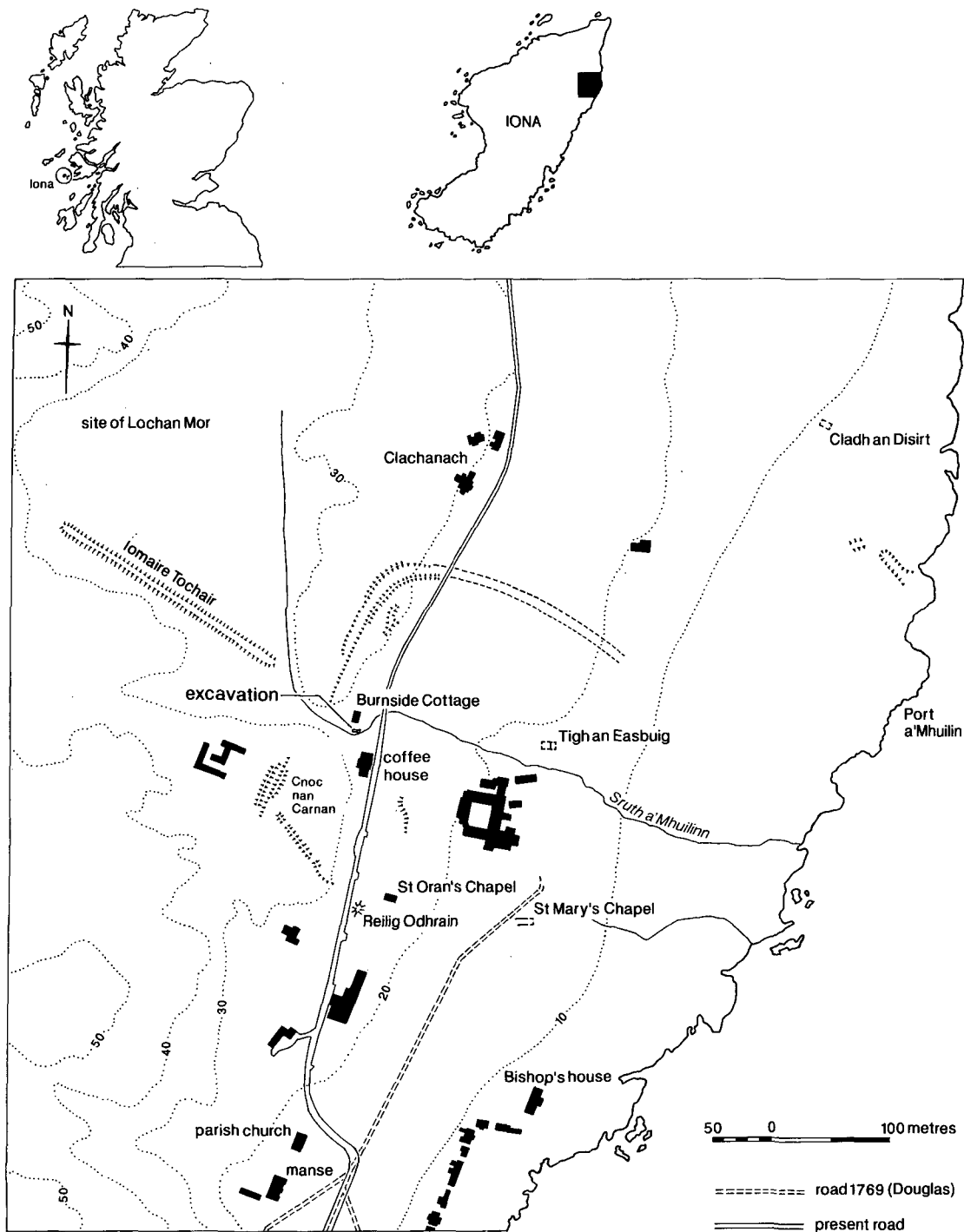
BACKGROUND TO THE EXCAVATION

Excavation beside Sruth a' Mhuilinn was conducted over two weeks in February 1991 as an archaeological response to an application by the National Trust for Scotland to carry out remedial work on the unstable north bank of the stream. This response was warranted by two factors in particular. Firstly, there is a well-attested tradition (residing not least in the name Sruth a' Mhuilinn, literally the ‘Mill Stream’) that the stream had been used for milling at various times in the past. Secondly, the intended area of the revetment work included that point where the stream passes within the prominent earthworks which enclose the environs of Iona Abbey at the north-west. These are the earthworks identified as the monastic vallum by Crawford (1933, 461).

THE COURSE OF SRUTH A' MHUILINN

Sruth a' Mhuilinn is a narrow, shallow stream, seldom more than 0.3 m deep or 1.2 m wide at the time of excavation, and accordingly carries a small volume of water. It rises in the marshy flat known as Lochan Mor, north-west of Iona Abbey (illus 1). In its route to the sea it passes through the earthworks which skirt the Abbey precincts to north and west. At this point of intersection with Sruth a' Mhuilinn, the earthworks crest the natural prominences formed to the south of the stream by the rock outcrops of Cnoc nan Carnan, and to the north by the inland cliff at the head of the

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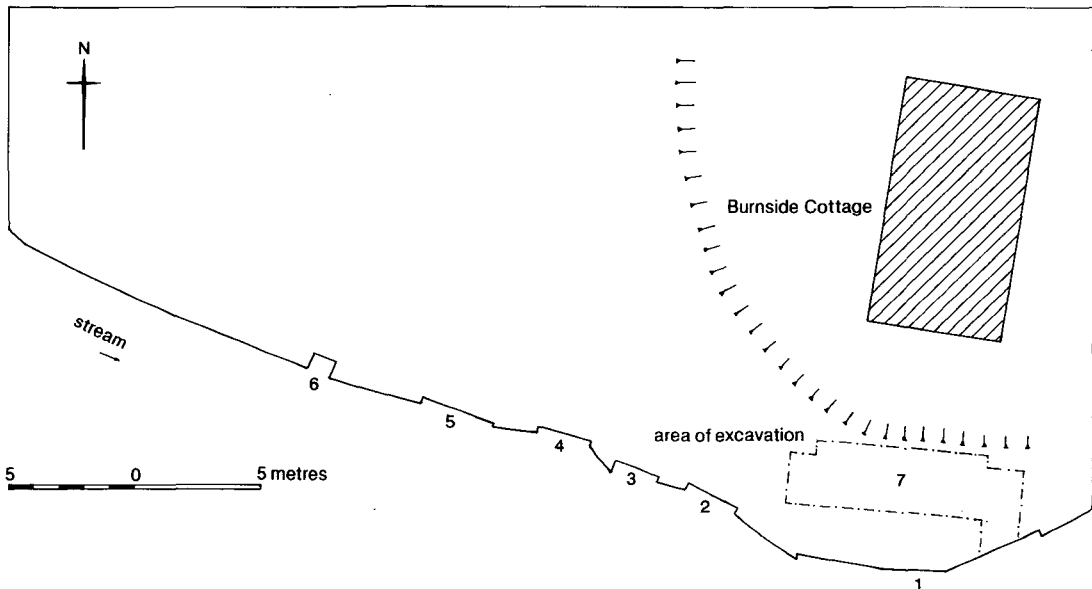
ILLUS 1 Site location map and the environs of Iona Abbey. Based upon the Ordnance Survey map © Crown copyright

raised beach terrace on which Iona Abbey is located. The stream is culverted beneath the modern road. Beyond this point it traverses the gently sloping enclosed pasture north of the Abbey, and falls to the sea across the remaining area of rough ground above the shoreline. Throughout most of its course the stream lies between steep, rugged banks. The banks are especially deep in the upper reaches (up to 4 m), in the vicinity of Lochan Mor, where modern drainage work has canalized the course of the stream. In the area to the north of the Abbey, the regularity of the present stream suggests that here too it may have been canalized, though no information is available as to when this might have occurred.

SITE LOCATION AND TOPOGRAPHY

In all, seven cuttings were made along the course of Sruth a' Mhuilinn (illus 2). Areas 2–6 took the form of sample sections, from 1 m to 3 m wide, recorded in the steep north face of the stream. These cuttings proved to be of negligible interest, and recorded only the upcast soils and gravels of canalization, as well as the remnants of 19th-century drystone revetments to the stream bank.

Area 1 was also recorded as a vertical section face in the stream bank. Here a large negative feature was identified, with deeply stratified fills, the lowest of which lay below the current water level of the stream. Further excavation of this feature was conducted in Area 7, a rectilinear cutting on the adjacent bank, an area of approximately 30 sq m. The extent of the excavation was constrained by two factors. The northern limit was determined by the presence of Burnside Cottage, and particularly by the deeply quarried house site in which the cottage was built. The southern limit of excavation was determined by the stream itself, a standing baulk being allowed to remain between the excavated area and the stream in order to allow effective drainage of the cutting by a pump (illus 2).



ILLUS 2 Location of section faces (Areas 1 to 6) recorded in the north bank of Sruth a' Mhuilinn and the fully excavated Area 7

Excavation of Area 7 revealed a large sub-rectangular basin or man-made pool, cut to intersect the present course of the stream. The excavation and interpretation of this feature constitute the chief interest of this report.

EXCAVATION RESULTS

THE POOL-BASIN AND DRAINAGE GULLIES

The pool-basin (F 101) was roughly rectilinear in plan with rounded angles (illus 3). The surface breaks were rounded, and the sides descended steeply to a base which was generally flat, though slightly irregular (illus 4). The base was 1 m in depth from the surviving edges, which were overlain by a further 0.7 m of topsoil. The projected plan of the pool-basin would extend to a length of approximately 6 m and a width of 4 m, with its longer axis orientated from north-west to south-east. This projected outline would overlap, or intersect with the present stream course at its south side (a relationship which is self-evident, given that the fills of the pool-basin formed part of the north bank of the stream at that point).

Adjoining the pool-basin at the north-east side, a narrow gully (F 102), 0.8 m–1.0 m wide, with an irregular rounded base, extended towards the limit of excavation at that side (illus 3). A second, less well-defined gully (F 100), 1.2 m wide, with a similarly rounded profile, occurred at the northern angle of the pool-basin, where it was intersected by the north baulk of the excavation (illus 3).

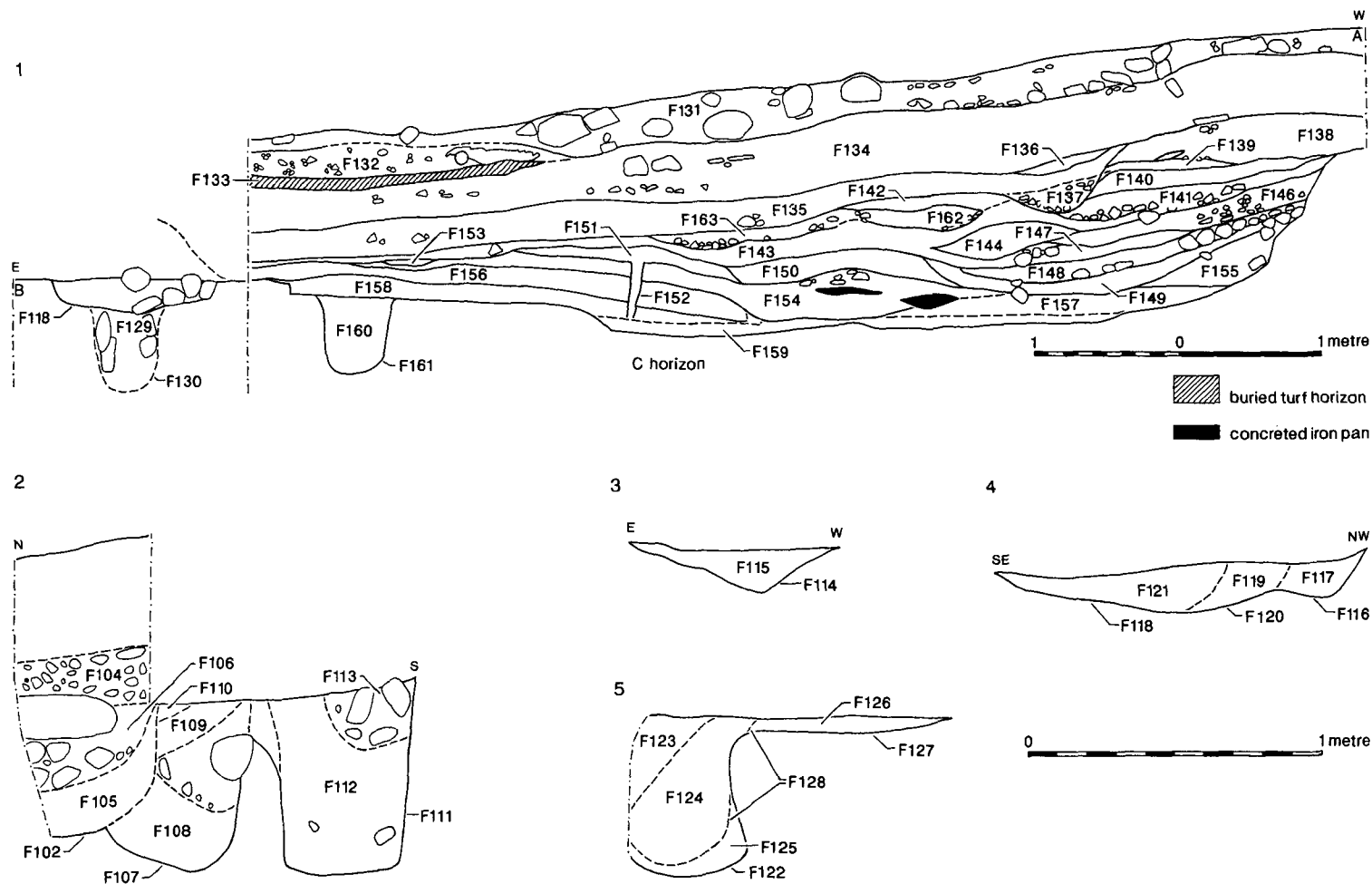
Once fully excavated, the pool-basin and its adjoining gullies lay below the present-day water level in the adjacent stream. Water seeping through the baulk filled the pool-basin to a depth of approximately 0.35 m; the gully at the north-east side (F 102) was carrying a full volume of water, which drained slowly but steadily through the baulk at that side of the cutting.

It is clear, then, that at least one of the gullies was designed as an outlet channel to drain the pool. The function of the second gully (F 100) at the northern edge of the pool-basin is less clear. This was oriented towards the sharply rising ground into which the house site of Burnside Cottage has been quarried. Obviously, the pool cannot have drained in that upslope direction. Conversely however, this gully may have served as an inlet to the pool. This would be possible had it once been the case that the stream, or water diverted from it, had flowed through the present site of the cottage.

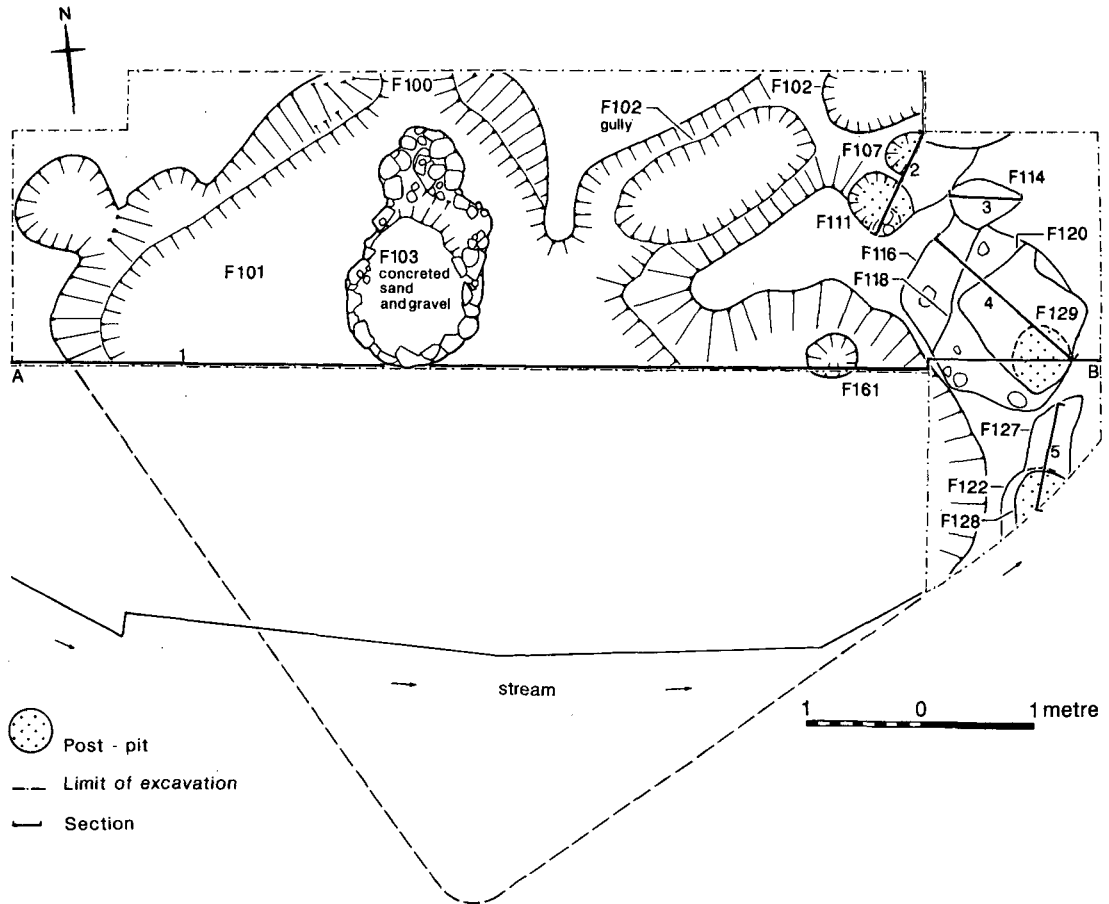
EARLY POST-PITS ADJACENT TO THE POOL

Five large pits occurred at the east or downstream end of the excavated area (illus 3). The pits generally had similar dimensions and fills. They were all large, deep, and sub-circular, with vertical sides breaking gradually to rounded or flat bases. Their dimensions ranged from 0.4 m to 0.6 m in width, and from 0.55 m to 0.65 m in depth. Almost uniformly, the fills were coarse sands and gravels. The pits were cut into natural raised beach gravels, and were physically sealed by the later backfills of the pool and its environs. Only two of the pits were unequivocally post-pits: F 129 featured large packing-stones within its fill, and F 122 had a large post-pipe (F 124) which inclined to the north-east (illus 4). Nonetheless, given their stratigraphic compatibility, their proximity and the similarity of both the pits and the fills, these five pits are regarded as a single, related group, and are all likely to have been post-pits.

A variety of inclusions was identified in the wet-sieved soil samples of the pit-fills. Minute quantities of charcoal appeared in all of them. The fills of post-pit F 122 included burnt bone



ILLUS 3 Excavated features in Area 7: the pool-basin, gullies, post-pits and miscellaneous modern features. The numbers 1-5 refer to the sections (illus 4)



ILLUS 4 Cross-sections of the pool-basin fills, post-pits and miscellaneous modern features

fragments (F 123–5), as well as particles of coal (F 125) and cinders (F 124–5). Particles of coal appeared too in the fills of pit F 107 (F 108–9) and pit F 111 (F 112–13).

The significance of these pits is either that a substantial post-built structure pre-dated the pool, or alternatively, that a substantial post-built structure featured as one element in the function of the pool. Two short, shallow, linear features (F 116, F 127) occur at this level also and may relate to the pit group, though it is not evident that they had a structural function.

PRIMARY FILLS OF THE POOL-BASIN

The earliest fills of the pool-basin and its adjoining gullies were a variety of coarse sands and gravels, with occasional water-rolled stones and local areas of iron pan (F 105–6, F 155–9). Present amongst these fills was a large lump of concreted sand and gravel (F 103), with a span of 1.2 m. These sandy-gravel fills lay to an average depth of 0.2 m on the floor of the pool-basin (illus 4). They are characteristic of a high-energy environment and were deposited by the passage of water rather than in conditions of standing water. The concreted sand and gravel lump is likely to have collapsed from the undercut edge of the pool.

LATER SEDIMENTS IN THE POOL-BASIN

In contrast to the earliest sand and gravel fills, the deposits which overlay them are dark grey layers of fine silty-sand (F 149, F 154), cumulatively up to 0.3 m deep, with occasional small stones and local areas of iron pan. These sediments are characteristic of a more sedate body of water. They may represent a period when the pool had not yet been backfilled, but its drainage had become slow or obstructed. A single stake-hole (F 152) of unknown function is cut into these sediments.

DUMPED FILLS OF THE POOL-BASIN

The uppermost basin fills comprised a miscellany of dumped soil, including sandy loams (F 135–6, 138, 147, 151, 153), darker, more organic, stoneless soils (F 139, 142), sandy or stony gravels (F 104, 140–41, 146, 148, 162–3), stones (F 137) and compacted sand (F 144, 150). Cumulatively, these fills lay from 0.3 m to 0.8 m deep within the upper part of the pool-basin (illus 4). The variety of these fills suggests that they represented deliberate dumping to infill the defunct and partly sedimented pool.

A variety of inclusions was identified in the wet-sieved soil samples of these dumps. Small quantities of charcoal appeared in all of the deposits. Burnt bone fragments appeared in F 135 and F 162. Particles of industrial slag were present in F 135. Particles of coal appeared in F 135 and F 142, and cinders were present in F 162.

TOPSOIL DEVELOPMENT AND MODERN FEATURES

The excavated area was covered by a deep, sandy loam topsoil (F 134), with an associated remnant turf horizon (F 133) (illus 3). Some conspicuously modern features occurred at this level. Overlying the topsoil on the stream bank at the southern edge of the excavated area was a deep layer of upcast soil and stones (F 131–2), with modern inclusions of metal and glass. A small group of shallow cut features occurred at the east end of the excavated area (F 114, 118, 120), where the overlying turf horizon was thinner and showed signs of disturbance (illus 3 & 4). Again, the fills of these features included modern metal, glass and hearth debris, as well as some fragments of burnt bone. A short remnant of dry-stone wall, surviving to a single course, was recorded immediately beneath the turf at the east side of the excavated area.

All of these features are attributed to the occupation of Burnside Cottage, or to reorganization of the cottage and its environs since the early 19th century.

SPECIALISTS' REPORTS

MACROSCOPIC PLANT REMAINS

Sheila Boardman

Introduction

Sixteen samples (c 0.5–28 l) were assessed for the presence of uncharred organic material. No such material was observed. The samples were then bulk processed and the resulting fractions dried and sorted. Eight samples produced charred plant remains as described in Table 1 (fiche) and discussed below. Nomenclature follows Clapham *et al* (1989).

Methodology

A small fraction of 10 samples was sub-sampled. About 100 g of each deposit was washed through sieves with mesh sizes of 1 mm and 300 µm. The resulting fractions were scanned under a low-power microscope to

ascertain whether uncharred plant remains were present. No uncharred organic material was observed. The remaining samples, including the sub-sampled deposits, were washed using a water-separation machine. The light, floating material (flot) was collected in sieves with mesh sizes of 1 mm and 300 µm, and the heavy, sinking material, in a 1 mm mesh. All fractions were allowed to dry slowly and the 1 mm fractions were sorted on completion. The quantity of plant remains present did not warrant the sorting of the 300 µm flots. Identifications were carried out at AOC (Scotland) Ltd using modern plant reference material, seed guides and keys as necessary.

Species represented

The cereals included barley, wheat and oat. The barley grains were predominantly hulled and the occurrence of twisted grains indicates the six-row species (*Hordeum vulgare* L.). Without barley chaff (rachis internodes) the presence of other species cannot be ruled out. A single floret base and grain confirm the presence of the cultivated oat (*Avena sativa* L.). Measurements were not collected from the other oat grains, so they remain indeterminate to species (A. sp.). Wheat (*Triticum* sp.) was also represented by some very poorly preserved grain. In one sample (F 121) the grains were very compact, resembling the compact, free-threshing bread wheat (*T. aestivo-compactum*, hereafter termed *T. aestivum* L.). Also recovered from one sample was a single indeterminate straw node.

Dominant among the wild plants were the fruits, leaves and stems of ling or heather (*Calluna vulgaris* (L.) Vi11.). These were concentrated in two deposits, F 119 and F 121, from a single pit feature believed to be of modern origin. This species is found today on acid grassland, heath and in woodland. The other wild plants represented are dock (*Rumex* spp.), sedge (*Carex* sp.) and cinquefoil (*Potentilla* sp.). These are all common in archaeological crop assemblages, though they also may have grown around the site itself. Two hazel (*Corylus avellana* L.) nutshell fragments (F 134) may have derived from more general debris (floor sweepings, midden material) or from casual discard.

Discussion

The cereal remains are low in number and poorly preserved. There is no clear evidence that any of the material identified is associated with the use of a mill. It is possible that grain drying was taking place in the site environs, the debris from which became incorporated in backfilled deposits at a later date, but these backfills may contain plant remains from a range of activities and dates unrelated to cereal processing.

As regards the modern pit feature (F 119/121) which produced the majority of the plant remains, heather remains are markedly dominant. These are unlikely to have been introduced to the site by the same means as the remains of economic plants, and may have arrived on the site with material collected as fuel, or for thatching, bedding or furnishing purposes. The cereal remains may also have derived from thatching, though the single straw node (F 119) does not make this a weighty hypothesis. In summary, the ephemeral nature of both the plant material and the archaeological deposits means that firm conclusions cannot be drawn, either regarding the use of the economic crops present or the interpretation of the archaeological features.

PALYNOLOGICAL ASSESSMENT

Richard Tipping

Five contexts were assessed for their pollen contents, and in particular the relative abundance of pollen of Cerealia. The contexts examined were: F 143, 150–1, 154 and 156. Sub-samples of c 0.6 cc were removed from Kubiena tins, and processed according to standard techniques, including 10 µm sieving and exhaustive hot hydrofluoric acid treatment to remove silica in the highly minerogenic sediments. The resultant slides were scanned over several traverses, and assessment of pollen types and states of preservation made. One

context (F 156) proved non-polleniferous. The remaining samples appeared closely similar in the range of pollen types and relative proportions of taxa. One context (F 143) was rapidly counted, to a total of 100 land pollen, giving an indication of the taxa present, and their relative abundances:

Alnus (1% total land pollen), *Betula* (1), *Pinus* (1), *Ulmus* (1), *Corylus/Myrica* (34), Ericaceae (1), *Calluna* (30), Gramineae < 8 µm anl-D (30), Gramineae > 8 µm anl-D (1), Cyperaceae (1), Filicales (4.2% t.l.p. plus spores), *Pteridium* (0.8), *Polypodium vulgare* (0.8), *Sphagnum* (0.8).

Very few land pollen grains were well preserved (6% t.l.p.), and corrosion was both prominent and extremely severe (53%); some *Corylus/Myrica* grains may be of *Betula*, corrosion being so intense as to render identification impossible. Microscopic charcoal was not systematically recorded, but all slides had abundant charcoal fragments.

Only one grain of cereal type (Gramineae > 8 µm anl-D) was recorded. Some contexts did not contain such grains at all. The principal conclusion of the assessment has thus proved negative, in that there is no enhancement of cereal pollen due to milling activities. However, this result should not be taken as a dismissal of the archaeological hypothesis for the existence of a mill. It is considered unlikely that the four polleniferous contexts examined are contemporary with the use of the artificial pool. Context F 156, lying closest to the base of the sedimentary fill, was probably closest in time to the phase of activity at the site, but this proved non-polleniferous.

DISCUSSION

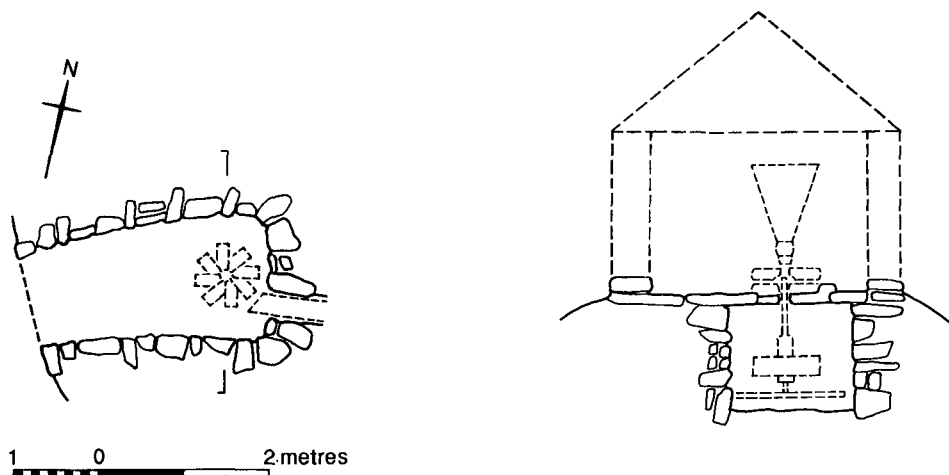
ASSESSMENT: A POSSIBLE MILL SITE?

The recorded archaeological data provide a meagre basis from which to interpret the structure and function of the site. None the less, the unusual stream-bed location of these features invites the attempt to interpret the pool-basin and its associated post-pits as the site of a water-mill, and in particular as an example of the predominant pre-industrial type in the Scottish Highlands and Islands: the horizontal mill.

The location of the site is certainly suitable. The ability to generate an effective head of water, operating on a mill-wheel with the assistance of gravity, is one of the most important considerations taken into account when choosing a mill site (Rynne 1988, 26). The present volume of water is not large, but the passage of the stream between the outcrops of Cnoc nan Carnan to the south and the inland cliff-head to the north, carries it through a gradual increase in gradient in its course, achieving at Area 7 a fall of 1-in-12 over a stretch of some 80 m. This relatively energetic flow may have been harnessed by impounding the stream above the site. Its steep, narrow banks would allow even a temporary dam to be constructed with ease. Furthermore, if a mill-lade had been led into the site, its location within the bend of the stream would allow the water to be diverted over the most economical route.

Having established the suitability of the site, it remains to assess whether any of the features of Area 7 corresponds to possible remnants of a mill-house or its workings. The architecture and engineering of the horizontal mill are well documented by Baillie (1975), Cruden (1948), Goudie (1886), Shaw (1984) and Rynne (1988), amongst others. None the less, it will be useful to preface this discussion by repeating a description of the main features.

The horizontal mill is not a sophisticated apparatus. Baillie (1975, 25) described it as 'the simplest possible mechanical adaptation of the hand-operated rotary quern'. The upper compartment is a room which accommodates the mill-stones, and a grain-hopper, suspended from the roof. The under-house, or undercroft, houses a horizontal water-wheel with up to a dozen flat



ILLUS 5 Plan and section of a horizontal water mill at Balmavicar, Kintyre, with reconstructed mill house (after RCAHMS 1971)

or spoon-shaped awes or feathers. The water-wheel pivots on a horizontal wooden member, the sole tree, and moves the upper millstone by the rotation of a perpendicular, central drive-shaft, normally about 1.2 m long. A jet of water is directed against the feathers of the mill-wheel by an inclined wooden chute or flume. The lightning tree, a vertical board rising from one end of the sole tree, has at its upper end a transverse member, or sword. By inserting wedges beneath the sword, the sole tree is raised or lowered, and the degree of contact, or friction, between the millstones is adjusted.

At Sruth a' Mhuilinn, none of these elements is present. However, this need not prevent the pool-basin from being considered as the site of a mill. In the archaeological record of early Irish mills, and the ethnological record of more recent Scottish ones, the corpus of known sites is dominated by those mills which featured enduring construction materials. Thus the early Irish examples are known only from their undercrofts: they are characteristically identified by the discovery in water-logged conditions of the massive oak timbers which constitute the frame, floor and even side-walls of the lower compartment. Timbers from Cloontycarthy, County Cork (Rynne 1988, 22) or from Drumard, County Derry (Baillie 1975, 27), have afforded good reconstructions of these elements. Scottish horizontal mills do not generally feature the same massive timbers in the construction of the undercroft as Irish mills, and stone is used throughout in the construction of the most completely recorded examples. The mill at Dounby, on the mainland of Orkney, is recognized as an archetype (Cruden 1948). However, examples like Dounby are favoured in their preservation, and therefore in their prominence, by a local architecture that relies heavily on stone. It should not be assumed that they represent the range of design in the construction of mill-houses and undercrofts throughout Scotland.

In contrast to the enduring materials of these examples, the fabric of a mill at Sruth a' Mhuilinn might have been such as to preserve very little material evidence of its construction. Large undercroft timbers would be characteristic only of an early Irish mill of the Columban period. In any case, even if such timbers had been present on the site, and allowed to remain in place after the mill became defunct, the semi-aerated conditions of Area 7 would not favour their

preservation beyond the normal span. With regard to the upper compartment, its construction is likely to have reflected the current idioms in local secular architecture. It is in this direction that one should look for a likely image of the mill-house on Sruth a' Mhuilinn. Aside from the obvious example of the ecclesiastical buildings, Iona does not boast a tradition of good stone buildings. Reliable information exists only for modern times. In 1794 the Duke of Argyll directed that 'a plain house of common drystone walls, pointed and harled with lime and covered with a thatched roof, should be built at Icolmkill for the accommodation of the schoolmaster' (MacArthur 1990, 177). This, however, will have been considered to be a habitation of some modest prestige. The description of a French traveller, Bernard Ducos, in c 1820, is probably more representative of the turf-and-wattle constructions that were prevalent in much of the Highlands and Islands until the early 19th century:

It is just a single room between four walls of mud, straw, branches and clumps of dried turf. There is no window or paving. Daylight comes in by the door. In the centre, set against two stones, clods of peat burn without flame. The smoke goes out through the roof, made of heather roots and reeds, bound with sea grasses and held down with pebbles. (MacArthur 1990, 57)

In all likelihood then, a mill-house on Sruth a' Mhuilinn, from almost any historical period on Iona, may have consisted of some slight arrangement of timber, turf and stone.

The slightness of these building materials would accord with the general report by Gauldie (1981, 117) that Highland mills in the modern period were sometimes washed away entirely by streams in winter spate. According to Gauldie's account, the slightness of the built features may extend beyond the mill itself to characterize its ancillary features: a sluice gate might be improvised by sods of turf, or even a whin bush jammed in the breach, and no sluice gate at all was required where there was no mill-dam. Reynolds (1970, 61) notes the practice of using the natural, unchannelled stream to drive the mill-wheel, and describes the mill-pond as 'a refinement uncommon in Scotland and the Western Isles'. This opportunistic, sometimes seasonal operation of the mill is the source of the denomination 'winter mill', a name used to describe those mills which, without benefit of pond or dam, were rendered inoperable by the low-water level of the mill stream in summer.

From these background details it should be clear that a defunct mill, even a recent example, need not be vestigially represented by major structural features along the course of Sruth a' Mhuilinn, or by conspicuous modifications to the course of the stream itself.

One feature in the construction of a horizontal mill cannot perish, however, or be removed from the site, and can be disguised only by being infilled. This feature is the pit in the stream bed which houses the mill undercroft. The large, flat-bottomed, sub-rectangular pit which comprises the pool-basin in the course of Sruth a' Mhuilinn is more than adequate in width and depth to have accommodated an undercroft, recorded examples being generally less than 20 sq m internally, and only a few being as deep as 2 m. But while this feature certainly resembles an undercroft pit in shape and size, its orientation with regard to the stream course is problematic. An undercroft housed by this feature should be more or less bisected by the stream; here, however, the pool-basin lies diagonally across the stream, and is intersected by it only at its southern angle (illus 3). The difficulty is resolved if it is assumed that either the stream once flowed directly through the pool-basin, or more likely, that a sluice or mill lade had once diverted water from the stream through the basin. Had a mill lade been led into the site, the gully which drains the overflow from the pool at the north-east (F 102, illus 3) would have carried water away from the undercroft, returning it to the stream. The position of the second gully, at the north angle of the basin (F 100), is harder to explain. It may have served as a bed for the flume or water-chute which was fed by the lade, but

this feature would more characteristically be positioned higher up in relation to the water-wheel, and located off-centre in the rear wall of the undercroft and not in an angle of its walls. It is noted again, however, that this second gully was not well defined, and may not have been a structural feature of the mill.

In considering the possible existence of a mill-lade, the sections recorded upstream in Areas 2–6 yielded no evidence of a modified stream course, and the surface features adjacent to Area 7 and to the west of Burnside Cottage give no hint of an infilled lade. However, the environs of the Cottage *have been the scene of intensive use and re-use since at least the early 19th century*, as the Royal Commission was prompted to complain in the course of efforts to trace the earthworks there:

Between this clearance heap and the stream, the course of the vallum has been obliterated by cultivation and by enclosures associated with Burnside Cottage, a small dwelling which replaced a building of early 19th century date. (RCAHMS 1982, 36-7)

Some phase of this activity may well have involved reorganization of the site to the extent that even a small mill-lade might have disappeared.

There is no self-evident interpretation for the five large post-pits recorded at the east side of the pool-basin. As supports for the floor of the upper compartment, or mill-house, one would expect a more formal arrangement of posts, on all sides of the pool-basin. The possibility remains that these pits have no association with the pool at all, and relate to an earlier structure which has been partly truncated by the basin and the north-east gully. Given the close proximity of these features to the stream, an earlier, truncated structure, if it existed, may itself have been a mill.

ASSESSMENT: SOME ALTERNATIVES

Interpretation of the sub-rectangular pool-basin as an undercroft pit constitutes the only primary evidence that Area 7 is the site of a horizontal mill site. It is worth giving brief consideration to a few other possibilities, though it must be said that the evidence for any of these interpretations is slight.

Linen and wool were both produced on Iona in the 18th century (Boswell 1901, 329) and, to some extent, weaving formed part of the islanders' economy throughout the modern period (MacArthur 1990, 161). It is possible that a large pool may have been cut into the stream bed to facilitate the 'waulking' of textiles to remove fulling agents, as this work was commonly performed in the Highlands in fresh, running streams (MacKay 1976, 135).

Alternatively, the pool may simply have been a place from which to draw fresh water. Nineteenth-century Burnside Cottage had a swee, or crane, fixed to the gable so that laundry-water from the stream could be boiled in a pot suspended over an open fire. 'The women would spread the washing out on the grass to dry, while the children herded the cattle out of curiosity's reach' (MacArthur 1990, 151). The Ordnance Survey of 1878 records a well on the south bank of the stream precisely opposite the point where the pool is recorded (OS 1:2500 – sheet CIV.12). There is certainly no other evidence for a well at that point and it is possible that this record refers to a place in the stream from which water was drawn.

However, none of the functions suggested here would seem to justify the labour of quarrying a large basin from the stream bed, and none of them offers a more convincing interpretation of the basin and the associated post-pits than the proposal that they represent the site of a horizontal mill.

CHRONOLOGICAL CONTEXTS

The excavated remains at Sruth a' Mhuilinn offer no direct or unequivocal evidence for the date of the structure they represent, and it is likely that a mill could have been in use on Iona at almost any time between the early medieval period and the end of the 18th century.

The medieval period

The evidence, from a variety of sources, indicates that milling was a feature of the early monastic economy on Iona. Adomnan's seventh-century *Life of Saint Columba* makes no direct reference to a mill, but recounts scenes involving both a kiln and granary, and refers to the erection of a cross upon a millstone base (Skene 1876, 332). The Royal Commission (RCAHMS 1982, 8) records several re-used millstone fragments from the Benedictine Abbey and its environs and, indeed, the earliest of these occurs as an element in the complex base of the eighth-century St John's Cross.

No primary evidence exists for the operation of a mill on Iona during the Benedictine and Augustinian years (13th–16th century). However, the excavated remains of a medieval corn-drying kiln (Barber 1981, 308), and of the building interpreted as the brewery or bakehouse of Iona Abbey (Reece 1981, 37) are consistent with the scale of food-resource management one would expect to characterize large religious houses of this period. It is very likely that the Benedictine community would have maintained a mill also during their long tenure on the island.

It should be noted, however, that the remains of earlier mills may not lie on the present stream course. Reece suggests that this course is the result of a Benedictine organization of the landscape, including provisions for drainage of the Lochan Mor, and that other, unrecognized, diversions of the stream may have existed (1981, 28).

THE MODERN PERIOD

After Adomnan, there are no further references to milling until the accounts of the visits paid by Dr John Walker in 1764 and Thomas Pennant in 1772. Both men saw the island with empiricists' eyes, and their observations are probably reliable. Pennant's broad view north and west from the Abbey towards the Lochan Mor takes in a good deal that is useful:

Beyond the mount are the ruins of a kiln, and a granary: and near it, was the mill. The lake or pool that served it lay behind; is now drained, and is the turbary, the fuel of the natives: it appears to have been once divided, for along the middle runs a raised way, pointing to the hills. They neglect at present the conveniency of a mill, and only use querns. (1776, 295)

Pennant does not define the location of these mill ruins in any detail, except to say that they lie between the 'Abbot's Mount' (Tor an Aba) and the drained Lochan Mor. Note that he does not specifically associate the mill ruins with the Iomaire Tochair, which has variously been interpreted as a mill dam and causeway. Compare Walker's more detailed account:

In a plain adjoining the garden of the Abbey and surrounded by small hills, there are vestiges of a large piece of artificial water, which has consisted of several acres, and been both contrived for pleasure and utility. Its banks have been formed by art into walks, and though now a bog, you may perceive the remains of a broad green terrace passing through the middle of it, which has been raised considerably above the water. At the place where it had been dammed up, and where there are still the marks of a sluice, the ruins of a mill are to be seen, which served the inhabitants of the monastery for grinding their corn. Pleasure grounds of this kind, and a means of dressing grain still unpractised in these remote islands must no doubt have been considered in such early times as matters of very high improvement. (MacKay 1980, 137)

The two descriptions are basically corroborative, though Walker's less plain language at first appears to paint an intriguingly unfamiliar scene. The Iomaire Tochair is easily recognizable as a 'broad green terrace', but no other early visitor to Iona has sketched into this scene 'banks...formed by art into walks'. It can only be assumed that here Walker is describing the prominent banks and broad level ditch of the earthworks at the eastern margin of the Lochan Mor. If this is the case, then 'the place where it had been dammed up' is not at the foot of the Iomaire Tochair, but at or near the point where Walker interpreted the Lochan Mor to have had elaborate formal 'banks'. This seems even more likely as Walker, like Pennant, implicitly distinguishes the site of the mill from the Iomaire Tochair. It is quite likely then that the mill ruins seen by these two witnesses were located on that stretch of the stream beside Burnside Cottage and Area 7 of the present excavation. In this scenario, the 'sluice' may, after all, describe a mill-lade which was led into the pool-basin via the gully (F 100, illus 3) at its northern angle, and which was latterly erased by rebuilding and reorganization on the site of Burnside Cottage.

Walker ascribes the mill ruins to 'the inhabitants of the monastery'; Pennant is non-committal as to their date. It has already been argued that the fabric of a mill-house on Iona would not long outlive the abandonment of the mill. The ruins may conceivably have been medieval, but it is much more likely that the ruined mill seen by Pennant and Walker was one which had only recently become defunct.

Between 1730 and 1830, thousands of small, crudely built local mills in Scotland were replaced by a much smaller number of mills which were superior in technology and construction. Shaw (1984, 114–18) argues that archaic technology and crude construction were only two factors in a constellation of forces which converged to drive the small horizontal mill into obsolescence. Cash crops were taking precedence over subsistence crops. Crop rotation introduced a greater variety of cultivation and increased the proportion of root crops in production. The traditional subsistence crops (bere barley, oats, peas and beans) were rapidly giving way to the potato. In addition, there was the increasing incidence of drainage by land improvers. Gauldie (1981, 104–5) cites numerous instances in which small local mills of this period were eliminated by being deprived of adequate water supply. In tandem with the centralization of milling at fewer but larger and technologically superior mills, the hand quern (once suppressed in favour of estate mills) began to reappear in use throughout the Highlands and Islands. This unusual instance of technological bifurcation is explained by the crofter's persisting domestic need to process his own subsistence foods, long after the local horizontal mill began its advance to extinction.

Against this background, Pennant's description of the abandoned mill, the drained lochan and the reversion by the islanders to quern stones may be seen as a miniature of the decline of horizontal mills in Scotland throughout the later 18th century. By the mid-19th century, grain was routinely being ferried from Iona to the mill at Bunessan on the Isle of Mull. This practice may have become established as early as the previous century. Drainage of the Lochan Mor had been accomplished in the 1750s by an energetic tacksman on the island, John Maclean (MacArthur 1990, 20). It is not clear whether this was the coup which rendered the mill inoperable, or whether it had ceased to operate some time before the loch was drained. In any case, the reclamation of Iona's only substantial source of peat was clearly regarded as a higher priority than maintaining the natural reservoir of water which fed its only mill stream.

POSTSCRIPTS TO PENNANT AND WALKER: OTHER MODERN WITNESSES

In the 200 years since Walker and Pennant made their visits to Iona, tourists' and antiquarians' descriptions of the island have proliferated. References to the site of the mill, kiln and granary often feature in these descriptions but in truth have added little that is original or informative.

Indeed as far as identification of a mill site is concerned, the waters have been made muddier rather than clearer by some later contributions.

Two early 19th-century travellers to Iona, MacCulloch (1824, 160) and Garnett (1811, 265) walked the stream bank and scanned the Lochan Mor with the avowed intention of making a faithful first-hand description, but recorded neither mill nor mill ruins. It may be assumed that they had already been erased at this time by the natural elements or by reorganization of the site. In view of this, it is surprising to read later, purportedly contemporary, descriptions of the mill ruins by the Revd Dugal Campbell in *The New Statistical Account of Scotland* (1845, 317) and later by Wilson's *Imperial Gazetteer of Scotland* (1868, 140). There is no mystery here. These later descriptions are unacknowledged borrowings from Walker's account of 1764 and are replete with his style and language. The artificial expanse of water, artful walks and broad green terrace all appear, together with the ruined mill, dam and sluice which in reality had disappeared long since.

Subsequent authors invoke the mill site in attempted reconstructions of the early monastic landscape of Iona. Skene (1876), most notably, but latterly Smith (1877, 105–6) and Donaldson (1923, 352) assume that the 18th-century descriptions of the ruined mill and kiln are reliable guides to equivalent features in the Columban scene. Skene's formula is representative of the general assumption: 'the existence of a small lake and mill stream, the only place suitable for the purpose, fixes the existence of these features for all time' (1876, 332). It has already been suggested by the present discussion that this is not the case, and that pre-modern mill remains may be discovered elsewhere than on the current course of Sruth a' Mhuilinn.

Given these unhelpful literary accretions, it is not altogether surprising that even the Ordnance Survey found themselves disoriented at Lochan Mor, partly beguiled by the Columban tradition and partly misdirected by unreliable sources. The following entry from the Ordnance Survey Name Book of 1872 is revealing. The Name Book identifies the source being quoted as the *Imperial Gazetteer of Scotland* (Wilson 1868), which has already been found wanting (above) in first-hand information:

(Site of) Corn Mill – No remains of this are now in existence but a mill once stood about here where the monks of Iona ground their corn. 'At one side of it (the broad green terrace) are traces of a sluice and ruins of a Corn Mill'.

Thus, Walker's account of 1764 had passed via Wilson's *Gazetteer* into the compilation of the Ordnance Survey edition of 1878. It is by now a third-hand and heavily abbreviated version of his original description, and consequently gives rise to a serious misunderstanding of his observations of the scene, and consequently a mis-identification of the mill site on the Ordnance Survey's 1:2500 map of 1878 and subsequent editions. The maps locate the mill site at the foot of the Iomaire Tochair (NGR NM 2851 2465), assuming that this is the dam referred to by Walker. However, as has been already argued, both Walker and Pennant distinguish between the Iomaire Tochair and the point at which the mill and sluice occur, and Walker's dam is much more likely to refer to some point on the stream's passage through the earthworks.

The error of the Ordnance Survey in identifying the 'broad green terrace' of these accounts is understandable. The Iomaire Tochair is an enigmatic feature whose identification as either a mill dam or a causeway has divided all opinion concerning it. The end of this embankment lies approximately 80 m upstream from Burnside Cottage and the features excavated in Area 7. It is unlikely to have had an influence on the operation of any mill on that site.

SUMMARY OF THE DATING EVIDENCE

The background outlined by the foregoing discussion makes it possible to envisage a mill in use on Iona at any time from the Columban period to the 18th century. A precise date cannot be established for the construction of the proposed mill on Area 7. On the other hand, the date of its abandonment is a less open-ended issue, as the draining of the Lochan Mor in the 1750s establishes a firm *terminus ante quem* for the operation of the last mill on the island. A body of opinion attributes an early, or Columban, mill site to the point of issue of Sruth a' Mhuilinn from the Lochan Mor. There is no real evidence that this was the case, and in fact much of this opinion derives from an uncritical conflation of descriptions of the 18th century landscape with impressionistic accounts of the Columban scene. The available evidence points to the greater likelihood that Area 7 is the site of a modern mill. The site location corresponds roughly to the descriptions of the ruined mill, granary and kiln given by Pennant (1776, 295) and Walker (MacKay 1980, 137). It is improbable that they would have seen mill ruins which had endured since the medieval or Early Christian period. More likely, the structure they described had recently been abandoned, shortly to disappear, and was a mill established in the late 17th or early 18th century.

Unfortunately, of the excavated features in Area 7, none produced suitable material for radiocarbon dating. However, there is one element of concrete evidence that reliably fixes the formation of the recorded features in the modern period: the incidence of particles of coal in the back-fills of the pool-basin and in the post-pits at its east end. The introduction of coal to Iona as the regular domestic fuel is recounted by MacArthur (1990, 120). Since the exhaustion of the peat supply from the Lochan Mor, peat had been harvested by the islanders on the Ross of Mull. Heavy seas over several successive winters in the 1870s had denied the islanders access to this source of fuel. In 1882 the Argyll Estate ended the chronic hardship and difficulty of retrieving peat from Mull by withdrawing the peat rights in Ross and instituting a regular supply of coal to the island.

It need not be assumed from the presence of coal particles in the post-pit fills that coal was present when the site was first established. Instead, coal may have been introduced to the site at about the time these features had almost achieved their final state. If the remains of upstanding timbers were pulled from these post-pits when the site was deliberately back-filled, small particles of coal which were present in the dumped upper fills of the pool-basin might easily have intruded into the post-sockets. An equally likely variation of this interpretation is that coal particles infiltrated more gradually into post-pipes which were decaying *in situ*, after they had already been sealed by back-filling. As has already been asserted, such timbers cannot have survived in the semi-aerated conditions of Area 7 for any extended period, and thus the post-pits are much more likely to be remnants of a modern mill than of any older structure.

CONCLUSIONS

Ultimately, the primary burden of this report remains the archaeological interpretation of a group of excavated features. The shape, dimensions and stream-bed location of the large, sub-rectangular pool-basin are very likely to represent the undercroft of a horizontal water-mill, but this cannot be demonstrated on purely archaeological grounds, and in those terms, the case must be seen to remain unresolved.

The archaeological evidence is augmented by an extensive but diffuse body of secondary information which suggests that of all the possibilities, Area 7 is indeed very likely to have been the site of a mill. The very name, Sruth a' Mhuilinn, points to this being a mill stream, and as such it may have been used continually from the Columban period to the mid-18th century. The location

appears to correspond to that of a modern mill which was described as ruinous by late 18th-century accounts. This ruined state is consistent with the abandonment of horizontal mills throughout Scotland in this period. The present state of the site is attributed to its intensive re-use in the construction of successive 19th-century houses and associated enclosures. These phases clearly involved extensive reorganization of the environs of Burnside Cottage. The site was back-filled, and it is argued that systematic dismantling of the vestigial remains of the mill may be indicated by the presence of coal particles in the fills of post-pits. If the mill was serviced by a lade, it too would have been back-filled at this time.

The identification of a mill site with the south-east end of the Iomaire Tochair by the 1878 edition of the Ordnance Survey map is almost certainly in error, although only excavation can prove the case. The confusion arises from a misreading in a secondary source of Walker's description of the scene in 1764, compounded by the widespread but unsubstantiated belief that the Iomaire Tochair is a mill dam.

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