

TWO QUARRIES ON THE BENNACHIE COLONY

Andrew Wainwright

INTRODUCTION

There are two quarries on Bennachie within the area of the Bennachie Colony, which sits on the south-east corner of the Bennachie Massif. They are both situated in the woods close to Shepherds Lodge. The lower quarry is seventy-five meters to the west and the upper quarry is about one hundred meters to the north-west (see Figure 1).

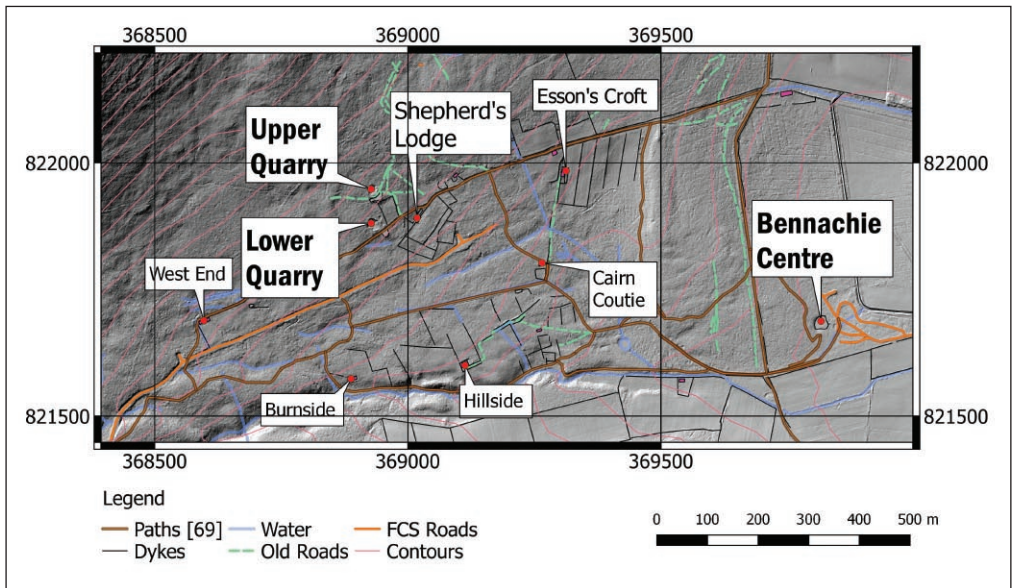


Figure 1. Map showing the location of the two quarries and colony houses superimposed on a LiDAR image.

The limits of the quarries are clear to see although they are somewhat overgrown. The lower one is right beside the path. The roads or tracks used to access the upper quarry and export the granite are also reasonably easy to find and they show up clearly on the LiDAR images.

The granite in both quarries is the normal Bennachie granite consisting of coarse-grained, pink feldspar and quartz. Biotite (a brown mica) is the main dark mineral although some of the quartz is also dark - similar to Cairngorm, but much too small to be of gem quality. The feldspar occurs also as isolated phenocrysts



Photo 1. Back wall of lower quarry. Note horizontal and vertical joints. Also, the block in the foreground with drill and feather marks. (Photo by the author)

(extra-large crystals) up to about 50mm long. Joints (natural fractures) can be seen running both roughly horizontally and vertically through the rock outcrops (see Photo 1) and these would have facilitated the extraction of the material.

No tool marks have been seen on the worked faces of the quarry and so it is reasonable to suggest that the granite would have been extracted initially by using large wedges and big

hammers. The wedges would have been forced into the natural joints until slabs broke off. The slabs would then have been moved to a work area where they could be cut into more marketable sizes. This may have been done with chisels and large hammers but, as a few blocks have been seen with signs of 'drill and feather' working, this method must also have been used for larger blocks (see Photos 1 and 2). The method involves drilling a row of slots about 2cms by 5cms and then hammering wedges in between two metal plates (the feathers). An experienced mason could tell just by the sound of the hammer on the wedges when the stone would split and he could also tell if the cut was going off the required line.

An earlier method of splitting blocks - also visible around Bennachie, was described by James Anderson (1794, 28-32) after visiting an Aberdeen quarry. He says they used a tool like a heavy hammer but with a blunt point on each end to cut slots a few inches long and much the same distance apart. Wedges were then banged into each slot, each one being hit in turn until the block split in half. He notes that it was possible to split blocks down to about 9 inches wide with this method and that the resulting blocks were quite suitable for general building work with no further finishing. For higher quality work the faces were dressed with a tool that sounds like a heavy adze and that then it would be difficult to get a knife blade in between two blocks. By the early 1800s the holes were drilled rather than cut with a pick (Anon., 1827) and blocks with signs that they were drilled can be seen in Photo 1. It appears that the difference may not be very useful for dating. The 'carved slot' method with rectangular or trapezoidal holes was clearly used before the end of the 18th century. Recent work in New England (Gage and Gage, n.d.)

report that the plug and feather method with drilled holes was used by farmers to split large field stones from 1823 but that the 'flat wedge' continued to be used alongside the drilled method.

THE UPPER AND LOWER QUARRIES

The lower quarry is shown on the first edition of the Ordnance Survey map of the area, which was surveyed between 1866 and 1867 and published in 1869 (see Figure 2). As the outline looks to be the same shape as it is today, the quarry was worked during the occupation of the Colony and not for long after the survey was made. Alexander Littlejohn lived at Shepherds Lodge during this period and we know from census records that he was a labourer in 1841, a stone dyker in 1851 and a mason after that (Fagen, 2011, 38). Therefore, it is possible that he extracted much of the granite from this quarry.

The upper quarry does not appear on the first edition map although the road up to it is shown to the east of the field lying east of the lower quarry. On the second edition, which was based on the same survey but revised in 1899, neither quarry nor the connecting roads are shown. Also, on this later map, all the land at Shepherds Lodge is shown as covered in trees and the house is indicated to be a ruin. The only croft in the Colony shown on this map as being occupied is Esson's.

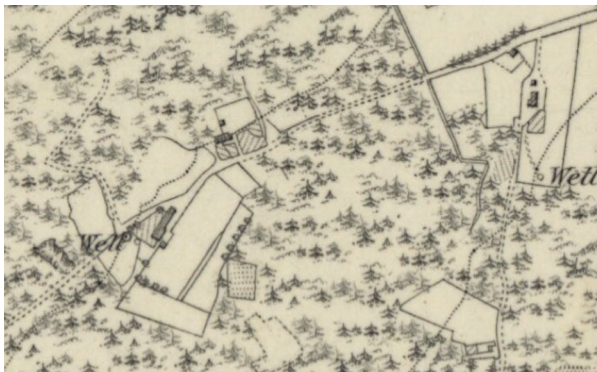


Figure 2. Extract from the First Edition Ordnance Survey, 1866-7.



Photo 2. Modern example of 'drill and feather' method. (Photo courtesy of Anna Frodesiak)

We have a copy of a tenancy agreement between the Tenantry of Balquhain (basically the laird) and James Esson dated 1870 (MS 2769/1/76/1). The lease refers

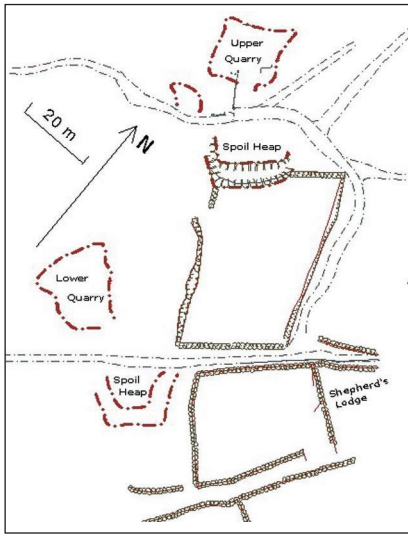


Figure 3. Sketch map of the two quarries and Shepherds Lodge.

to “the Quarry situated on the North side of Littlejohn’s Croft”. Two reasons make it probable that the quarry referred to here is the upper quarry. The spoil heap over-lies the top dyke of the Shepherds Lodge field to the east of the lower quarry and, of the two quarries, the upper one is the only one that could be described as north of the croft (though it is actually more NW). Since the quarry is not on the second edition map, work in it must have stopped before 1899 when the map was published. This quarry has not been surveyed in detail, but is a little bigger than the lower one. It may therefore have provided enough material for a similar number of dwellings.

No written record appears to survive to explain why the colonists opened these quarries.

It might have been to provide stone to build their houses. Oliver (Oliver *et al*, 2016, 357) contrasts the houses on the colony with those in other informal communities in Highland areas where turf remained a common building material. He implies that the houses in the colony were stone-built because of the presence of the nearby quarries but then goes on to note that they were built of undressed granite. However, a cursory look around the area outside the cleared fields of the crofts would indicate that there was no shortage of suitable stones which could be dressed to some degree and used for building rough croft houses. The stones in the houses are of several different lithologies and often have rounded corners indicating that they were not quarried but are in fact field stones - or ‘gatherings’ as they are sometimes called. Also, the effort of quarrying the stone and transporting it to the further crofts in the Colony would have taken much more effort than gathering the stones they had to collect anyway, simply to clear their fields.

It is more likely that the stone was a cash crop for the colonists, or at least for Alexander Littlejohn and James Esson. Bennachie granite can be seen in all the farms and cottages around Bennachie that appear on the first edition of the Ordnance Survey map and it is also found in the older houses in Inverurie. Well-cut blocks were used for the lintels over windows and doors and for the corner stones. It was also used for the ‘tabling’ (the flat stones on top of the gable ends) and for ‘spur’ stones (those stones placed at the top of the corners of the walls to keep the tabling in place). On the cottages all other stones are field stones but, on more prestigious houses, the front wall was often built of quarried stone. Farm buildings were

<u>Lower Quarry</u>			
Isopach (m)	Area (sq m)	Vol. (cu m)	Tonnes
0	288.00	247.98	
1	210.00	165.67	
2	125.00	72.08	
3	30.00	10.00	
Granite Extracted.		495.73	
<u>Lower Quarry Spoil Heap</u>			
0	176.30	121.86	
1	74.60	38.08	
2	11.00	3.67	
Total Heap		163.61	
Void space		33.33	54.53
Granite in Heap		109.08	
<u>Granite exported</u>		386.65	145.91

Figure 4. Volumetrics for lower quarry giving volume and weight of granite exported.

granite. This granite has a white feldspar, the quartz is never smoky and the mica is white - not brown as in Bennachie granite. The Kemnay quarry opened for commercial operations in 1858. Although James Esson is quoted as saying that he thought Bennachie should be a major source of granite (Fagen, 2011, Figure 18), the fact that Kemnay was connected by railway, even though this was narrow gauge, made it that much more viable. Almost all the later buildings in Inverurie and many of the farms close to Bennachie are of Kemnay granite.

similarly built with field stones but with quarried stone for the important pieces. However, if a building contained a mill the walls would have used quarried stone; the rotation of a heavy mill wheel would have set up vibrations that would have been very destructive for a wall made of rounded field stones.

Buildings seen on the second edition map, but not on the first, are more likely to have been built using Kemnay

QUARRY SURVEY

The lower quarry was surveyed using taped offset and a dumpy level and a standard volumetric analysis was carried out (see Figures 3 and 4). This involved drawing contours on the bottom of the quarry, then extrapolating the contours for the surrounding ground surface over the top. The former was then subtracted from the latter and isopachites (contours of equal thickness) drawn for the thickness of granite removed. From this data, the volume was calculated by making the assumption that the volume between two adjacent isopachites was represented by the product of the interval and average area. (Alternatively, the volume could be calculated from the area under the graph of area against height.) Since the granite was dressed at the quarry and the waste dumped in the spoil heap, in order to estimate the volume of rock actually exported, the amount in the spoil heap had to be subtracted from the volume dug out of the quarry. The rock fragments in the spoil heap were simply thrown in and so large voids existed and these had to be estimated. Without doing detailed experiments and measurements, it was considered

reasonable to use a figure of one third for this. Finally, the volume extracted was converted to weight by assuming the density of granite to have a specific gravity of between 2.6 and 2.7 (edumine.com).

In order to gain an idea of the use to which the quarried granite may have been put, two local houses were studied in some detail. Both may be considered typical of houses in the area as shown on the first

edition Ordnance Survey map. The first was Burnside of Braco: a small cottage originally consisting of two rooms downstairs and two small bedrooms above. The measurements of the principle stones were taken for a sample of the main features. Thus, lintels and sills were measured as were the corner stones down one side of the door and one window. The other sides were assumed to be the same. The same



Photo 4. Broadsea. This is a much larger house than Burnside of Braco. Note the blocks on the front are all well-dressed, quarried stones whilst those on the gable end are field stones. (Photo by the author)



Photo 3. Burnside of Braco. Small four roomed cottage. Note the stones on the gable end, all with rounded corners. These are field stones that have been dressed to some degree. (Photo by the author)

technique was used on other features. The faces of some stones could not be seen because of being covered by plaster or framing and these had to be estimated. Similarly, some features such as the chimneys, could not be examined close up and so, here again, the measurements were estimated. Using this method, it can be suggested that the total volume of quarried granite used to build this one cottage was approximately 4.9 cubic metres.

The second house considered was Broadsea. This is a farm house and would have been considered of much higher status. There are also farm buildings to the side of it. Befitting its status, the front face comprises standardised blocks of the same rock type and colour. They are all clearly from the same quarry. The same estimations were used as on Burnside of Braco and, where the stones could not be reached, sizes were estimated entirely by eye. Because of its larger size and the nature of the front face, the quantity of quarried granite was estimated to be about 24 cubic metres - five times as much as was used in the cottage. The amount of quarried granite in the farm buildings is difficult to assess as they have been modified over the years and it is hard to see what is original. However, the amount of quarried granite in the south-westerly wing, which is where the mill was located, amounts to at least 18 cubic metres. There is also a small cottage behind the farmhouse.

So, the total amount of quarried granite used in the Broadsea farm might be estimated as 24 cubic metres for the house, 5 cubic metres for the cottage, 18 cubic metres for the mill and an estimated further 5 cubic metres for other farm buildings; a total of 52 cubic metres. Our quarry could, therefore, have produced sufficient granite to build seven or eight similar farms.

CONCLUSION

These two houses are typical of the domestic buildings found in the area. Although smaller cottages without any upstairs rooms do exist, farmhouses significantly larger than Broadsea, have not been noted. Many of the farms had bothies and small houses nearby for farm servants and the farm buildings were variable in layout and size. The first edition of the Ordnance Survey shows about forty farms and cottages in the immediate vicinity of the colony quarries - within a radius of about four kilometers. Most of these have not been studied and so their size and the sizes of any associated buildings have not been counted. Also, in the area, there are two bridges in Burnhervie and a church in Chapel of Garioch, all of which are shown on the same first edition map but could have been built before the quarries opened. Many of the older houses in Inverurie are also built using Bennachie granite. As there are no quarries for this material closer than Bennachie, this may well have been the source for all of these buildings. From the figures given above, the quarries in the colony would have been too small to provide all the granite for all of these buildings. Other quarries do exist on Bennachie and Millstone Hill but details of size have not been recorded. Presumably they were sufficient to provide the shortfall.

ACKNOWLEDGEMENTS

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SOURCES

MS 2769/1/76/1, Bundle of expired leases, Special Collections, University of Aberdeen.

www.edumine.com/xtoolkit/tables/satables.htm

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