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**PROPOSED QUARRY**  
**MONIFIETH**  
**ANGUS**

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**Evaluation and Recording**

**HK Murray and JC Murray**

**1. Background**

1.1 As part of the Environmental Impact Assessment for the proposed quarry extension at Monifieth, Angus, an assessment was undertaken to consider the impact of the development on nearby cultural heritage, both directly and indirectly and in terms of the setting of any archaeological features.

1.2 The site comprised two existing quarries (Ethiebeaton and Ardownie), land to northwest and north of the existing Ethiebeaton Quarry and land between it and the existing Ardownie Quarry. An area of open ground directly west of the south end of the Ethiebeaton quarry is currently below dumped soil but we were advised by the quarry manager that parts of this area had not been topsoil stripped. A second area of open ground, currently grazed, lies southwest of the Ardownie Quarry.

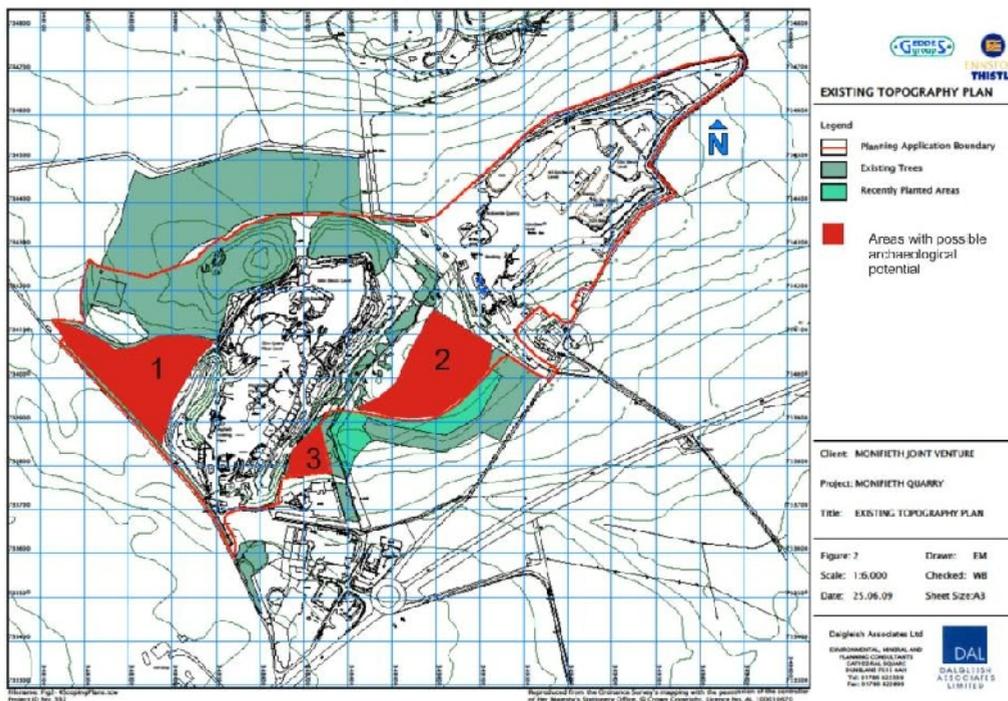
1.3 As a result of the Assessment, two mitigations were detailed:

- 7% evaluation trenches to be excavated in two areas (Illus 1: Areas 1 and 2)
- Railway and Ethiebeaton Estate features to be recorded

1.4 Murray Archaeological Services Ltd was commissioned by Dalgleish Associates Ltd on behalf of Breedon Aggregates Scotland Ltd and the Geddes Group to undertake the work, the first element of which took place on 18<sup>th</sup> and 19<sup>th</sup> May 2010. Area 2 evaluation was undertaken on 8<sup>th</sup>-9<sup>th</sup> November 2010.

## 2. The Evaluation

Three areas of archaeological potential were identified during the assessment (Illus 1: Areas 1-3). One of these, Area 3, is shown as part of the tree screening and will not be quarried. It was considered that this did not require further evaluation at this point. Area 1 was trenched in May 2010 and Area 2, which is in grazing land, was evaluated in autumn 2010 at the end of the grazing season.



**Illus 1 Plan of the proposed development (red outline) with areas of possible archaeological potential shown in red (Areas 1 -3)**

## Area 1

Area 1 is presently used for topsoil dumping and is shown on the proposed development as an area not to be quarried but a significant proportion of the area will be taken up by settlement ponds.

Four trenches were excavated by a machine with 1.8m wide straight edges ditching bucket. Part of this area had been trenched for run-off water drainage but areas of undisturbed topsoil remained and the trenches were placed in these areas.

No archaeological features were found.

### *Trench 1*

Orientation: NNW/SSE

NGR NNW end: NO 48345 34062 SSE end: NO 48364 34044

Length: 26m Width: 1.8m

Stratigraphy: Mid grey brown loam over clay natural with some broken stone through it. Soil depths above natural ranged between 600mm to the N and 750mm to the S.

### *Trench 2*

Orientation: NNW/SSE

NGR NNW end: NO 48330 34052 SSE end: NO 48344 34038

Length: 20m Width: 1.8m

Stratigraphy: Mid grey brown loam over clay natural with some broken stone through it. Soil depths above natural ranged between 600mm to the N and 500mm to the S.

### *Trench 3*

Orientation: WNW/ESE

NGR WNW end: NO 48309 34048 ESE end: NO 48333 34036

Length: 24m Width: 1.8m

Stratigraphy: Mid grey brown loam over clay natural with some broken stone through it. Soil depths above natural ranged between 600mm to the N and 750mm to the S.

### *Trench 4*

Orientation: NNW/SSE

NGR NNW end: NO 48295 34025 SSE end: NO 48317 34016

Length: 28m Width: 1.8m

Stratigraphy: Mid grey brown loam over clay natural with some broken stone through it. Soil depths above natural ranged between 600mm to the N and 750mm to the S. Clay drain at E end.

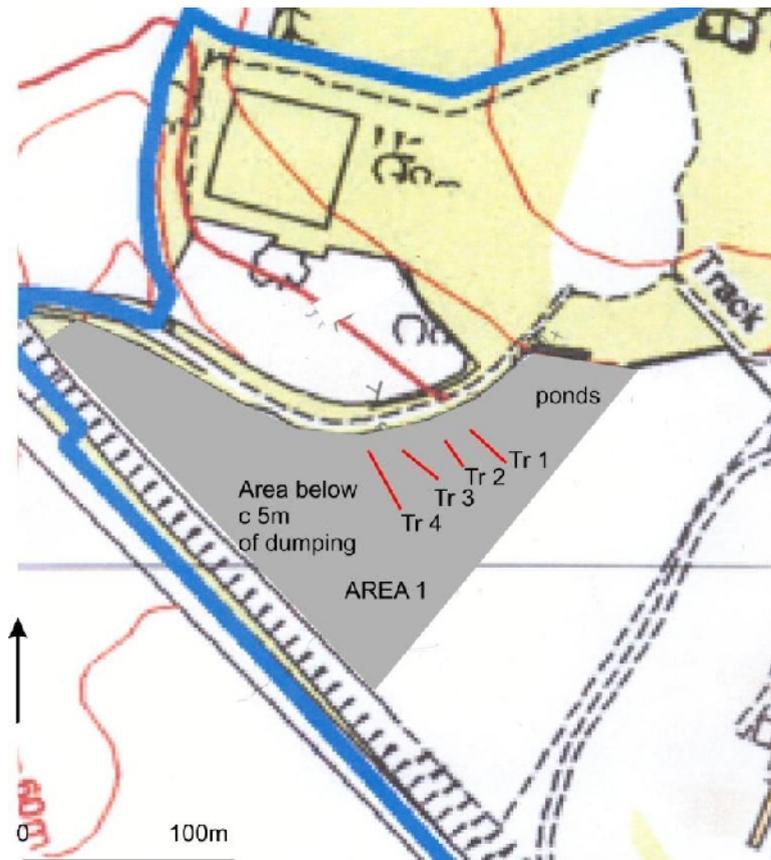
### Conclusion

No archaeological features were found.

### Mitigations

None

Although no archaeological features or finds were evident in the evaluation trenches, this does not preclude the possibility of chance finds or archaeological discoveries outwith the evaluation trenches. Should such chance finds occur during the quarrying operations, then the Archaeology Service, Aberdeenshire Council, or Murray Archaeological Services Ltd, must be informed immediately so that an appropriate archaeological response can be formulated and agreed by all parties concerned.



Illus 2 Plan of Area 1 trenches. Ordnance Survey © Crown copyright (2007) All rights reserved. Licence number (100049810)



**Illus 3** General view Area 1 trenches 1-4, looking W

## **Area 2**

Area 2 is within the area of proposed extraction and will be completely removed. This is currently in grass and archaeological features may survive cut into the natural below plough depth (c. 300mm). As the evaluation was undertaken in autumn 2010 at the end of the grazing season the report on Area 2 is in Appendix 2.

## **3 Recording of Ethiebeaton Estate and Railway features**

### **Ethiebeaton Estate.**

The mid 19<sup>th</sup> century Ethiebeaton House is shown on the 2<sup>nd</sup> edition OS map of 1894 (pub 1896) but not the 1<sup>st</sup> edition of 1858 (pub 1865) Now completely demolished, it lay on the northwest of the proposed development. The main features: the footprint of the house and outbuildings, the walled garden, the lodge and the memorial and some cast iron railway or estate posts appear to be within an area of retained woodland. A

large brick-built tank shown on the 1904/5 OS map on the southwest flank of Gallow Hill appears to be associated with the house and is within the area of the proposed quarry extraction.

Although only the features on Gallows Hill are under direct threat there is the probability that many of the remaining estate features will become totally overgrown. It was agreed therefore that there should be a basic photographic record with notes made of all these features.

A map of the Ethiebeaton Estate dated 1893 is on display in the Breedon Aggregates Scotland Ltd offices at Ethiebeaton and was made available to MAS Ltd. This shows the 19<sup>th</sup> century estate features in detail and has been used as a basis for much of the recording.



**Illus 4 Detail of 1893 Ethiebeaton Estate map (courtesy of Breedon Aggregates Scotland Ltd)**

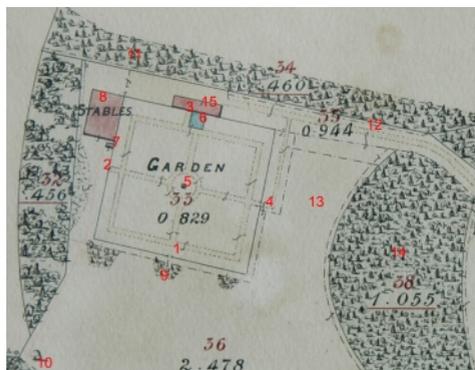
### 3.1 Mansion House

The mansion house has been completely demolished some years ago. No photographs taken. The mansion and its associated estate features are not shown on the 1<sup>st</sup> edition OS map surveyed 1857-59 but is shown on the 2<sup>nd</sup> edition of 1894/6. The 1893 estate map appears likely to have been drawn soon after the estate policies had been constructed and laid out.

### 3.2 Walled Garden

NGR: NO 48250 34197

The walled garden is overgrown but the main walls at present survive well.



**Illus 5 Detail of garden from 1893 Ethiebeaton Estate map (courtesy of Breedon Aggregates Scotland Ltd) with annotated numbers referred to in text.**

*Plan.* The garden was square plan with paths dividing the interior into 4 main rectangular beds around a central circular bed. A central feature is shown on the plan and is likely to be the surviving rose arch. Doorways 1, 2 and 4 were in the centre of the S, W and E walls respectively; the doorway (3) in the N wall was offset to allow the greenhouse (6) to be central. An additional doorway in the W wall (7) led to the stables.



**Illus 6 Garden wall from outside, NE corner. Note decorative coping tiles.**

*Walls.* The walls are of mortared stone, appearing to be whinstone with large ashlar blocks at the corners. It varies in height, the S wall being <3.1m whereas the N wall was <3.8m high and the E wall somewhat lower. Such variation is fairly common in

19<sup>th</sup> century walled gardens- giving greatest wind protection from the N, but allowing maximum sunlight from other directions. A quick examination of the wall inner faces showed some nails for plant support on the inside of the N wall, a cluster on the inside of the S wall to E of doorway and a few on the other two walls.

The top of the walls had a decorative coping of hollow glazed tiles 470mm long x 350mm wide x 180mm high with a hole 140mm wide x 90mm high. Although many are in their original position, many others have fallen and scattered.

*Doorways.* Doorways 1, 2 and 3 were all of the same design with a brick arch and flanked by ashlar squared columns (560mm wide and projecting 190mm) with an external stone lintel on the outer side. Doors 1 and 2 were brick blocked but had remains of iron door pivots. Door 3 retained a wooden pivot-hung door. Doorway 4, which appears to be the original main route between the mansion and the garden, was ruinous – it was approached from the garden by 6 stone steps up to the higher ground to the E.

A fifth doorway (7) beside the stables was framed with ashlar stonework. H: 2.3m. W: 1.18m.



**Illus 7 Garden door (3) and raggie of greenhouse roof and replacement roof on inside of N wall**  
*Rose arch* The central feature was a rose arch (5) with an iron framework, probably for climbing roses, topped by a wooden finial. Roses running wild around this may have been from the original planting.



**Illus 8 Frame of central rose arch**

*Greenhouse* The stone foundations of the greenhouse (6) shown on the estate map survive, abutting the inner face of the N wall. It had been gable end on to the wall and there are two different raggles of the roof line on the wall, suggesting it may have

been re-roofed at some point. A heating boiler may originally have been on the outer side of the wall (see feature 15 below) – cast iron water pipes for heating the greenhouse are still visible. This heating system may have fallen out of use when the roof was re-built as the wall below the lower roof line is plastered and the plaster covers what appears to be a brick blocking of the flue.

The greenhouse was a focal point in the centre of the N wall and in line with the central garden path and rose arch so it should probably be regarded as a semi-ornamental design feature rather than as a purely functional greenhouse.

There is a cold frame to the W of the greenhouse and another base of a possible frame to the E.



**Illus 9 Cast iron pipes of heating system in greenhouse, coming up from boiler in pit below floor**

*Other features*

- 8 Stables. Abutting outside of W wall - only part of the foundations survive.
- 9 Planting of mature copper beeches along the outside of S wall.
- 10 Red line shows present path to the gardens. The original paths on the 1893 plan comprise a carriageway from the mansion to the outside of the N wall and the stables and a footpath from the E doorway to the mansion. However, the present path from the main front drive is likely to be at latest early 20<sup>th</sup> century as there are two gates with L19<sup>th</sup>/E 20<sup>th</sup> century type of cast iron gate posts.

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- 11 Foundations to NW of walled garden. Low brick walls with traces of a sill beam- this may have been another, possibly more functional greenhouse although at the moment it has become overgrown with trees.
- 12 Main carriageway between garden/stables and the mansion. Flanked by mature elm, sycamore and beech. On the 1893 plan this ends at the mansion- it now continues around the base of the N side of Gallowhill where there are naturalised drifts of primrose, bluebell, anemone (including double white) and fritillaries.
- 13 Area of overgrown shrubbery alongside the path from the W doorway of the garden to the mansion. Includes small japonica.
- 14 Trees including beech and elm planted on knoll with drifts of daffodils, primroses and blue bells. Rhododendron and laurel on N and S sides beside approaches to mansion.
- 15 Foundations of building abutting the N side of N garden wall with a roof raggle on the wall at c 3m height. This is shown on the 1893 plan as a roofed building. Garden door 3 would appear to have opened into it. At the W end there had been a large door with ashlar framing surviving on the S side with iron hinges attached. This was 2.55m high and may have been a door into a coach house. The E end of this building has most recently been divided into three bays (4.2m, 2.3m and 3.2m wide from E to W). However the dividing walls may be secondary as they abutt the garden wall and behind one of the abutting walls part of the garden wall face has broken away revealing the lining of the chimney from the fire to heat the boiler with a brick chimney (some of the bricks almost vitrified with heat) up to the wall top. It is possible therefore that the original boiler house with fire and fuel store was against the outside of the wall in this building. The boiler itself appears to have been in a pit just visible below the floor of the greenhouse, the hot water circulating by gravity through the cast iron water pipes - a common arrangement in late Victorian greenhouses. The secondary use of this building may have been for livestock as in the wall of the W bay there is a tethering ring and a long staple of the type normally used for a cattle chain for a tied cow.

### *Plants*

Few original plants appear to survive in the garden although it was only seen in late spring much of the interior had been overrun with nettles and self-sown sycamore. Several fruit trees including an apple, a pear and a cherry survive beside the inner (S facing) side of the N wall. Cherries outside the N side of N wall may be partly self-

seeded but one looks older and may be original. Otherwise, within the garden, there were briar type roses around the central rose arch, giant periwinkle around the greenhouse and alpine strawberries growing from the mortar of the wall.

### 3.3 Estate water system

A water tank on the lower slopes of Gallows Hill (NGR: NO 48506 34235), above the Mansion House appears to have been a main collecting tank for water for the household. It does not appear on the 1893 map but is shown on Ordnance Survey maps from 1900. It is 8.8 x 5.1m externally and cut into the ground surface to > 2m (the base is filled with rubble). The walls, which are 750mm thick, are of brick lined with concrete and there is a small manhole for maintenance/inspection to the E. A cast iron water pipe exits from the N side of the tank and then is buried below ground. Halfway down the path to the Mansion a small circular iron tank with a slab of rock for a cover may be related to this water system.



**Illus 10 Water tank on Gallow Hill**

### 3.4 Cast iron fence/gate posts.

- Either side of drive on S side of railway bridge 3. Cast iron fence posts with ribbed shaft and 'bowler hat' finial.

- At the S end of existing path between main drive and garden. Cast iron strainer with ratchet, decorated finial. Cast iron gate post with ‘bowler hat’ finial and iron stay.
- At the N end of existing path between main drive and garden. Cast iron gatepost with plain shaft and ‘bowler hat’ finial. Cast iron strainer with ratchet. Ribbed shaft and ‘bowler hat’ finial. Maker’s name: HARPER’S PATENT ABERDEEN on shaft.



**Illus 11** Cast iron gate post

### 3.5 *Memorial*

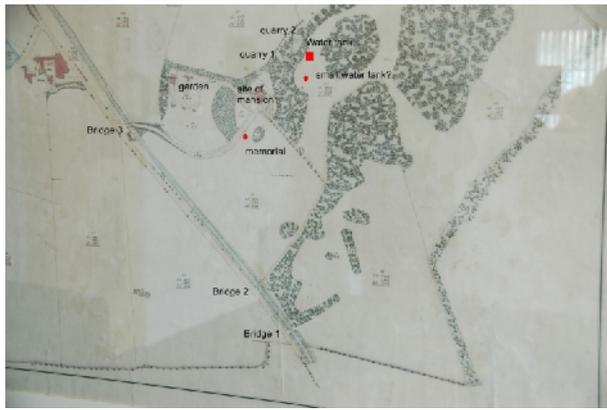
A memorial to members of the Fergusson, Lindsay, Frith and Carfrae families with inscriptions dating between 1916 and 1973 is situated beside the carriageway from the mansion to the Lodge (NGR: NO48410 34129). It was originally erected in memory of members of the family who died in the 1<sup>st</sup> World War.



**Illus 12 Memorial**

### 3.6 *Quarries*

Two small quarries on the side of Gallowhill, both on the 1893 map, were recorded. These do not appear on the 1<sup>st</sup> OS map of 1857-59 and therefore are likely to have been used to quarry stone for the house and associated buildings.



**Illus 13 Detail of 1893 estate map showing outlying features (courtesy of Breedon Aggregates Scotland Ltd)**

### **Railway features**

The track of the former Dundee to Forfar line (Caledonian Railway) ran along the W side of the proposed site, along the E side of the public road. Several viaducts survive. These would not be within the area of the quarry extraction but could potentially be affected by roadways within the quarry development area. In mitigation it had been suggested therefore that there should be a basic photographic record made of all these features. The line opened in 1870 and closed in 1955. When it opened the mansion had not been built and the various bridges give access between the farm at Ethiebeaton Mains to the W of the track and its land (later part of the mansion grounds) to the E of the track. The railway line is confusing as it is shown on the 1<sup>st</sup> edition 1”/mile OS map surveyed in 1857-58, but a footnote notes that the railway was inserted in 1888 before the map was printed.

*Bridge 1* (NGR: NO 48457 33755- between bridges 1 and 2). Arch carrying track over an access between fields. Rustic finish stone arch with 4 lines of brick around the arch itself. Sides of the bridge curve outwards, probably to facilitate driving cattle through the underpass.



**Illus 14 Bridge 1**

*Bridge 2* Similar to bridge 1 but arch not surviving. The sides are straight as this carried the track over a road from the S side of the estate which joined the main road W of the track.

*Bridge 3* (NGR: NO 48122 34120). At the lodge to the estate. This was a bridge over the railway track, shown on the 1<sup>st</sup> OS carrying a road from Ethiebeaton farm on the W side of the track across E towards Laws. This now carries the main driveway to the mansion. Consequently, although the construction was similar to bridges 1 and 2, it was rather more imposing. The main gate was of iron with cast iron gateposts at the access from the public road to the drive.

**Appendix 1: Catalogue of digital photographs supplied to NMRS and Angus SMR on CD)**

<b>Digital frame number</b>	<b>Site area</b>	<b>Content</b>
1-5	Evaluation Site 1	Trench 4
6-7	Evaluation Site 1	General view trenches 1-4
8-13	Evaluation Site 1	Trench 1
14-19	Ethiebeaton Estate	Cast iron posts at (10) S end of path from drive to garden
20-28	Ethiebeaton Estate	Cast iron posts at (10) N

		end of path from drive to garden
29-30	Ethiebeaton Estate	SW corner garden wall
31-36	Ethiebeaton Estate	Garden door 1 external
37-38	Ethiebeaton Estate	Garden door 2 external
39-40	Ethiebeaton Estate	Garden door 2 internal
41	Ethiebeaton Estate	Garden door 7 external
42-43	Ethiebeaton Estate	Garden door 7 internal
44-48	Ethiebeaton Estate	Central rose arch
49-50	Ethiebeaton Estate	Garden door 3 internal
51-53	Ethiebeaton Estate	Raggles of roof of greenhouse (6) on inside of N garden wall
54	Ethiebeaton Estate	Wall base of greenhouse (6)
55-56	Ethiebeaton Estate	Heating pipes in greenhouse (6)
57-58	Ethiebeaton Estate	Hinges and ashlar jamb of W end of building 15.Possible coach house
59-60	Ethiebeaton Estate	Garden door 3 external
61-63	Ethiebeaton Estate	E end building 15 Chimney in wall from boiler to heat greenhouse and wall
64-66	Ethiebeaton Estate	E end building 15 and tethering rings
67-68	Ethiebeaton Estate	Garden door 4 external
69-70	Ethiebeaton Estate	Garden door 4 internal
71-74	Ethiebeaton Estate	Detail of coping tiles fallen from wall top
75-76	Ethiebeaton Estate	Interior of garden looking towards S wall

77-78	Railway features	Bridge 1
79-80	Railway features	Bridge 1, details
81-84	Railway features	Bridge 2
85-86	Railway features	Bridge 3
87-88	Railway features	Detail of gate at bridge 3
89-90	Ethiebeaton Estate	Coping tiles in situ on wall of walled garden
91-92	Ethiebeaton Estate	Quarry 1
93-94	Ethiebeaton Estate	Quarry 2
95-97	Ethiebeaton Estate	Details of water tank on Gallowhill
98-99	Ethiebeaton Estate	Small tank on side of Gallow Hill between mansion and main tank
100-102	Ethiebeaton Estate	Specimen tree by mansion site
103-105	Ethiebeaton Estate	Memorial monument
Area 2 photographs		
1-11	Area 2	Trench 4, context 3. tags show find spots of agate
12-18	Area 2	Trench 4, context 3 section
19-26	Area 2	General views looking E
27-33	Area 2	General views looking N
34-35	Area 2	General views looking E
36-37	Area 2	General views looking S
38-41	Area 2	Evaluation trenches seen from E

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## Appendix 2

### Evaluation of Area 2

**HK Murray and JC Murray**  
**with lithics report by Torben Bjarke Ballin**

#### 2. The Evaluation

Area 2, which is in grazing land, was evaluated 8<sup>th</sup>-9<sup>th</sup> November 2010, at the end of the grazing season.

The site lies on a field that slopes steeply down from the W side, with a high point at the SW at c 75m OD and a lower terrace towards the SE at c 60m OD. It has wide views over lower ground to the E to the shoreline of the Firth of Tay c 2km away.

##### Area 2

Eleven trenches comprising c 7% of the total area were excavated by a machine with 2.2m wide straight edged ditching bucket.

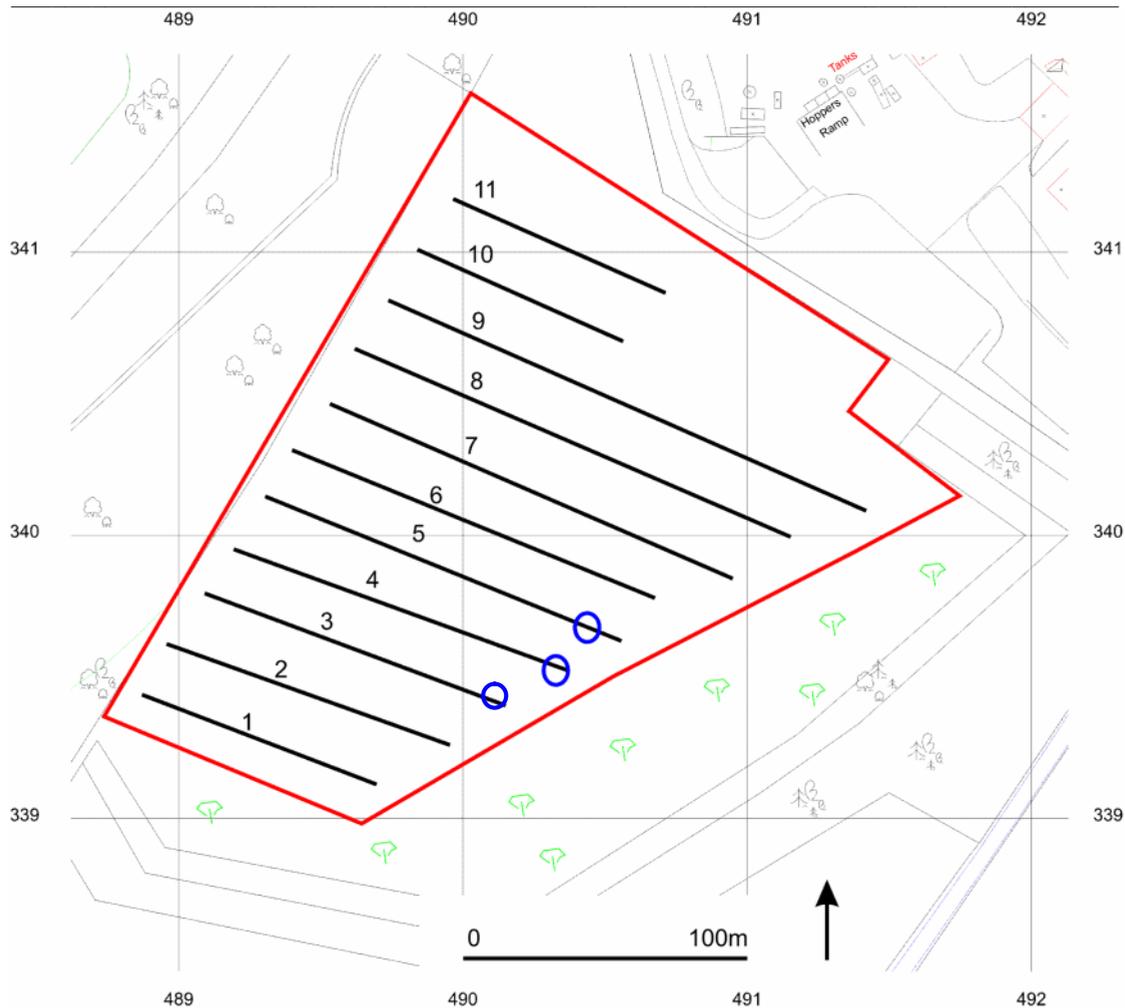
##### *Trench 1*

Orientation: WNW/ESE

NGR W end: 348887, 733946 E end: 348969, 733915

Length: 88.9m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was only c 250mm topsoil over bare rock, down slope to the E there was up to 900mm topsoil at a point c 40m from E end. At the E end the natural comprised sandy gravel over broken rock.



**Appendix 1: Illus 1 Plan of evaluation trenches in Area 2 (Ordnance Survey ©Crown Copyright 2010. Ref No 001150000). Blue areas on Trenches 3, 4 and 5 denote spread of finds.**

### *Trench 2*

Orientation: WNW/ESE

NGR W end: 348896, 733963 E end: 348996 733928

Length: 106.7m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 200-300mm topsoil over bare rock, down slope to the E there was up to 750mm topsoil at a point c25m from the W end and 900mm by c 85m from W end. At the E end the natural comprised sandy gravel over broken rock.

### *Trench 3*

Orientation: WNW/ESE

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NGR W end: 348908, 733982 E end: 349016 733942

Length: 114.2m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 250-300mm topsoil over bare rock, down slope to the E there was up to 750mm topsoil. At the E end the natural comprised sandy gravel over broken rock.

*Finds:* Pink agate fragments SF 17-18 were found among broken top fragments of bedrock.

#### *Trench 4*

Orientation: WNW/ESE

NGR W end: 348919, 733997 E end: 349038 733954

Length: 125.9m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 350-400mm of topsoil over bare rock, down slope to the E there was up to 1.05m topsoil and subsoil above natural. At the E end natural comprised sandy gravel over broken rock.

*Context 3:* A patchy area of grey sandy soil with some charcoal fragments extended in small pockets in the top of the natural over an area c 4m in extent E/W at the E end of the trench. Several of the patches were clearly animal burrows. They ranged between c 200mm across to c 1.20 x 0.8m. Most were 10-20mm maximum depth but there were two small pockets of 60mm and 130mm respectively, neither of which appeared to have been deliberately dug features. There was no evidence in the section of any consistent layer/features containing this grey soil. It was sealed by a thick accumulation of well mixed topsoil and subsoil (between 750mm and 1.10m in depth). This appears to be the accumulation of continual slippage from the upper W slope.

*Finds:* The spread of these patches coincided with a scatter of flakes and chunks of pink agate (SF 2-6, 9-16, 19.) some associated with the charcoal traces and others lying directly on the surface of the natural rock.

#### *Trench 5*

Orientation: WNW/ESE

NGR W end: 348930, 734015 E end: 349057 733964

Length: 135.4m Width: 2.2m

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Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 200mm topsoil over bare rock. The natural followed an abrupt slope c 20-30m from the W end, then a gentler slope until near E end. At E end there was up to 950mm topsoil and subsoil.

*Context 5:* Slight vestigial traces of grey sandy soil above natural were comparable to Trench 4, context 3. No charcoal was observed and there were no surviving features or consistent layers.

*Finds:* Pink agate fragments SF 7-8. SF 8 was in among broken top fragments of bedrock c300mm below the modern surface. SF 7 was in context 5.

#### *Trench 6*

Orientation: WNW/ESE

NGR W end: 348939, 734031 E end: 349069 733980

Length: 138.9m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 200- 250mm topsoil over bare rock to a point c 30m from the W end, from that point there was a more gradual slope down to the E end where there was 600-700mm topsoil above natural. At the E end the natural comprised sandy gravel over broken rock

#### *Trench 7*

Orientation: WNW/ESE

NGR W end: 348951 734048 E end: 349094, 733988

Length: 155.1 m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 280mm topsoil over bare rock, down slope to within c20-30m from the W end there was c600mm topsoil above natural, reducing to 400-500mm at the E end of the trench where the ground leveled out. At the E end the natural was sand over broken rock.

#### *Trench 8*

Orientation: WNW/ESE

NGR W end: 348961, 734068 E end: 349115, 734000

Length: 167.6m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was a depth of c 300mm of topsoil over bare rock, down slope to the E there was up

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to 800mm topsoil. From c30m from the E end the natural was sandier with a steep slope to the E.

#### *Trench 9*

Orientation: WNW/ESE

NGR W end: 348972 734084, E end: 349141, 734012

Length: 114.2m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At the upper W end of the trench there was c 300mm topsoil over bare rock, down slope to the E there was up to 600mm topsoil above natural. From c30m from the E end there was 400-500mm topsoil over natural. The natural was sandy with a steep slope to the E.

Two 20<sup>th</sup> century animal burials were noted midway down the trench.

#### *Trench 10*

Orientation: WNW/ESE

NGR W end: 348983, 734103 E end: 349056, 734070

Length: 80m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At this end of the site there was a far gentler slope with c 400mm topsoil over natural.

#### *Trench 11*

Orientation: WNW/ESE

NGR W end: 348995, 734120 E end: 349070, 734087

Length: 83m Width: 2.2m

Stratigraphy: Sandy mid-brown topsoil over natural. At this end of the site there was a far gentler slope with c 400mm topsoil over natural.

### **Conclusions**

A small scatter of pink agate fragments (Ballin, below) at the E end of trenches 3, 4 and 5 may have been related to charcoal fragments in patches of grey soil (contexts 3 and 5) which appeared to have been preserved in hollows in the natural bedrock and in animal burrows. Although this appears to be a remnant of anthropomorphic activity it is so vestigial that there are no coherent features or layers and there would appear to be nothing further to be gained by further excavation.

The early prehistoric activity which appears to be demonstrated by the small lithic assemblage and by the charcoal fragments in the grey soil (Trench 4, context 3) and by possible traces of a similar layer in Trench 5 (context 5) would have been on a terrace at c 60m OD with higher ground sheltering it to the N and with wide views to the S across lower ground to the (present) coastline of the Firth of Tay, c 2km away. It can perhaps be viewed in the context of the known Mesolithic sites at Broughty Ferry- (RCAHMS No: NO43SE 14, NGR: NO 472 311. Hutcheson, 1886) c 3km to the SW and at Morton, Fife, on the other side of the Firth of Tay. (RCAHMS No: NO42NE 9, NGR: NO 467 257. Coles, 1971)

### **Mitigations**

The lithic assemblage indicates some possible Mesolithic activity at the E edge of but the lack of more than a very vestigial and disturbed context makes further excavation unlikely to yield additional information.

No further work is recommended.

This does not preclude the possibility of chance finds or archaeological discoveries outwith the evaluation trenches. Should such chance finds occur during the quarrying operations, then the Archaeology Service, Aberdeenshire Council, or Murray Archaeological Services Ltd, must be informed immediately so that an appropriate archaeological response can be formulated and agreed by all parties concerned.

### **References**

- Coles, J.M. 1971 'The Early Settlement of Scotland: Excavations at Morton, Fife', *Proceedings of the Prehistoric Society* 36, 284-366.
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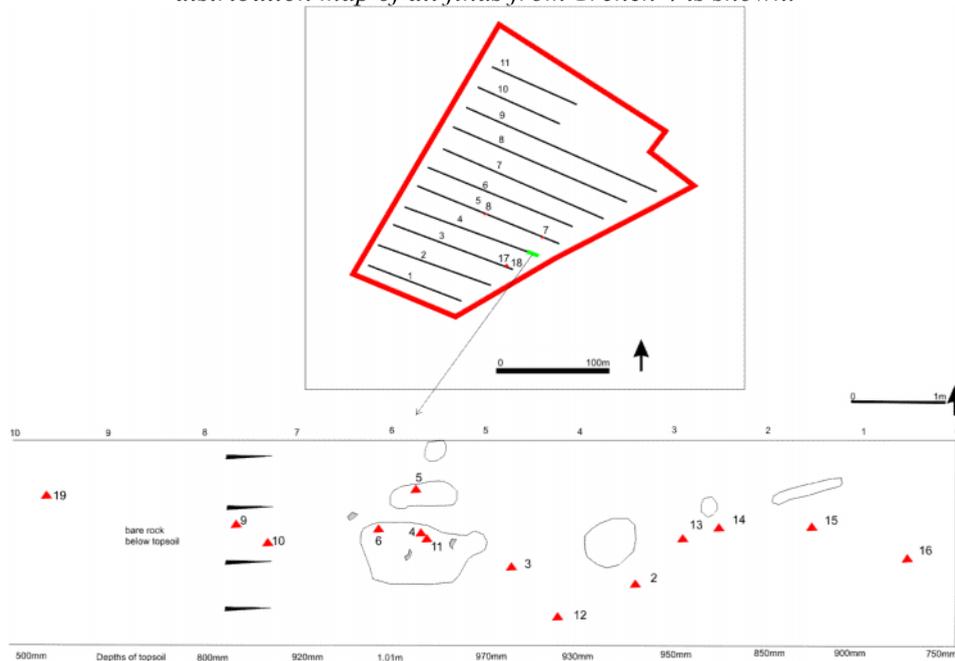
## Ardownie, Monifieth, Angus The agate assemblage

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### INTRODUCTION

In 2010, Murray Archaeological Services Ltd. carried out investigations of an area prior to the industrial extraction of whinstone near Ardownie, Monifieth, Angus. Eleven trial trenches were excavated (Fig. 1), and from Trenches 3-5 a small assemblage of worked agate was recovered. The finds were generally retrieved from the sandy topsoil, or from surviving pockets in the uneven bedrock, or from animal burrows.

Fig. 1. Distribution of all recovered pieces of agate. Underneath the general site plan, a detailed distribution map of all finds from Trench 4 is shown.



The purpose of the present report is to characterize this assemblage in detail, with special reference to raw-materials and typo-technological composition. From this characterization, it is sought to date and interpret the finds. The evaluation of the lithic material is based upon a detailed catalogue of the lithic finds from Ardownie (attached to the report as an appendix), and in the present report the artefacts are referred to by their number (CAT no.) in this catalogue.

### THE ASSEMBLAGE

From the excavations at Ardownie, 22 lithic artefacts were recovered. They are listed in Table 1. In total, 73% of the assemblage is debitage, whereas 18% is cores; two objects (9%) may be natural pieces. The definitions of the main lithic categories are as follows:

*Chips*: All flakes and indeterminate pieces the greatest dimension (GD) of which is  $\leq 10$  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).

Table 1. General artefact list.

<i>Debitage</i>	<i>Quantity</i>	<i>CAT nos</i>
Chips	8	5, 7, 10, 12-13, 15, 18-19
Flakes	3	1, 3, 21
Indeterminate pieces	5	2, 11, 14, 16, 22
<i>Total debitage</i>	<i>16</i>	
<i>Cores</i>		
Irregular cores	2	9, 20
Bipolar cores	1	8
Indeterminate cores	1	2
<i>Total cores</i>	<i>4</i>	
<i>Uncertain pieces</i>	<i>2</i>	<i>4, 17</i>
<b>TOTAL</b>	<b>22</b>	

### Raw materials – types, sources and condition

All pieces are in agate (a form of banded chalcedony –  $\text{SiO}_2$ ), with light and dark pink concentric rings around a core of crystalline quartz. Some of the smaller pieces (eg, CAT 11, as well as some of the chips) are fragments of individual rings or shells, frequently with a botryoidal surface structure. Several pieces have surviving soft cortex (eg, CAT 9, 20), identifying the parent pieces as small nodules prised out of the local igneous rock, or, more likely, found as small pebbles released from their parent rock by erosion.

The Devonian andesitic lavas of the Midland Valley, particularly in the area from Dundee to Stonehaven, are well-known for their high numbers of agate nodules, frequently of gemstone quality (Heddle 1901, 58). The agates generally formed by solidification of hydrothermal fluids in zeolitic cavities (Pellant 1992, 88).

### Debitage and cores

The 16 pieces of debitage include eight chips, three flakes, and five indeterminate pieces. Some of the chips are small flakes and some are small indeterminate pieces. The flakes CAT

3 (20 x 16 x 9mm) and CAT 21 (28 x 24 x 9mm) are both hard percussion flakes – the former has neat platform-edge trimming, whereas the latter is unprepared. CAT 1 is a chunky flake which split along its long axis (Accident Siret), and it has not been possible to define it more precisely.

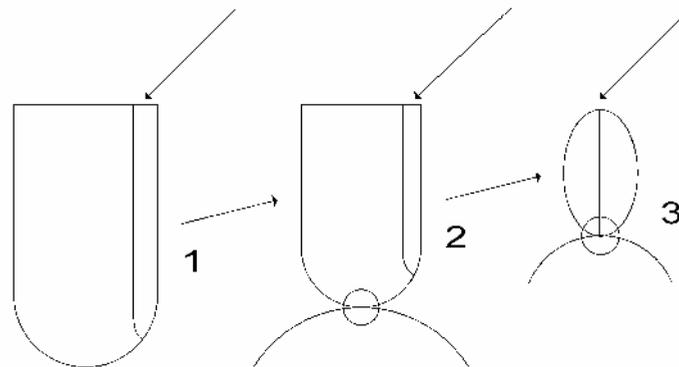
The site's four cores are two irregular cores (CAT 9, 20), one bipolar core (CAT 8), and one indeterminate core (CAT 6). The two irregular cores are of the same general size, with average dimensions of 35 x 30 x 20mm, and they were both flaked from at least three directions. CAT 8 is a small bipolar core (18 x 13 x 5mm), with one reduction axis (ie, one set of opposed terminals), and flakes were removed from both opposed faces. CAT 6 (17 x 14 x 12mm) does not fit any established core category. One face had minuscule flakes detached from various directions, and modification at one end may be wear from use as an expedient scraper.

CAT 20-22 (one flake, an indeterminate piece, and one irregular core) are conjoining parts of the same original piece. No modified tools were recovered.

## TECHNOLOGY

With the original nodules or pebbles having been as small as they were – probably rarely larger than GD 50mm – it would probably have been impossible to work these nodules without the use of an anvil. It is generally accepted that small pebbles are ill-suited for free-hand platform technique (eg, Finlayson 2000, 105; Callahan 1987, 63), as 1) they do not contain enough mass to allow the necessary decortication and preparation of platforms, flaking-fronts and platform-edges; 2) due to their small sizes and curved exterior, primary blows tend to glance off these pebbles; and 3) small pebbles have so little mass that a blow tends to move the hand and pebble, rather than detach a flake.

*Fig. 2. The three main percussion techniques: 1) Free-hand platform technique; 2) anvil-supported platform technique; and 3) bipolar technique (Based on Callahan 1987, Fig. 97).*



Two flakes are clearly platform flakes – CAT 21 with a pronounced bulb of percussion, and CAT 3 with neat platform-edge trimming – indicating the use of some form of platform technique, but CAT 8 is a typical small bipolar core (or hammer-and-anvil core). However, due to the size of the collected pebbles, it is most likely that the knappers at Ardownie applied anvil-supported platform technique, rather than free-hand platform technique. The differences between these various basic approaches are illustrated in Fig. 2.

As mentioned above, CAT 3 has dorsal trimming, and most likely the small nodules procured in the local area were partially decorticated and prepared before the first flakes were detached. No blades or microblades were recovered from the site, but it cannot be ruled out that small microblades were produced at the location and removed from the site.

## DATING

The assemblage includes no strictly diagnostic elements, but the use of small agate nodules was quite common during the Mesolithic period in this general area, such as at Morton in Fife (Coles 1971). The small agate pebbles of the Scottish east-coast lavas would be of little *systematic* value to other industries than a microlithic one, although they might find some *expedient* use during other prehistoric periods.

## SUMMARY

The present assemblage includes 22 pieces, 20 of which are almost certainly artefacts. All pieces are in pink agate, which was most likely procured locally in the form of small pebbles. Sixteen pieces are debitage, with four being cores; the collection includes no modified tools, although one or two pieces have use-wear suggestive of use as *ad hoc* tools.

The debitage embraces eight chips, three flakes and five indeterminate pieces, and the cores include two irregular cores, one bipolar core and one indeterminate core. It is thought that small nodules were generally reduced by the application of an anvil, either in the form of anvil-supported platform technique or bipolar technique. Some of the platform cores appear to have been carefully trimmed, whereas others may have been reduced in a more unsystematic manner.

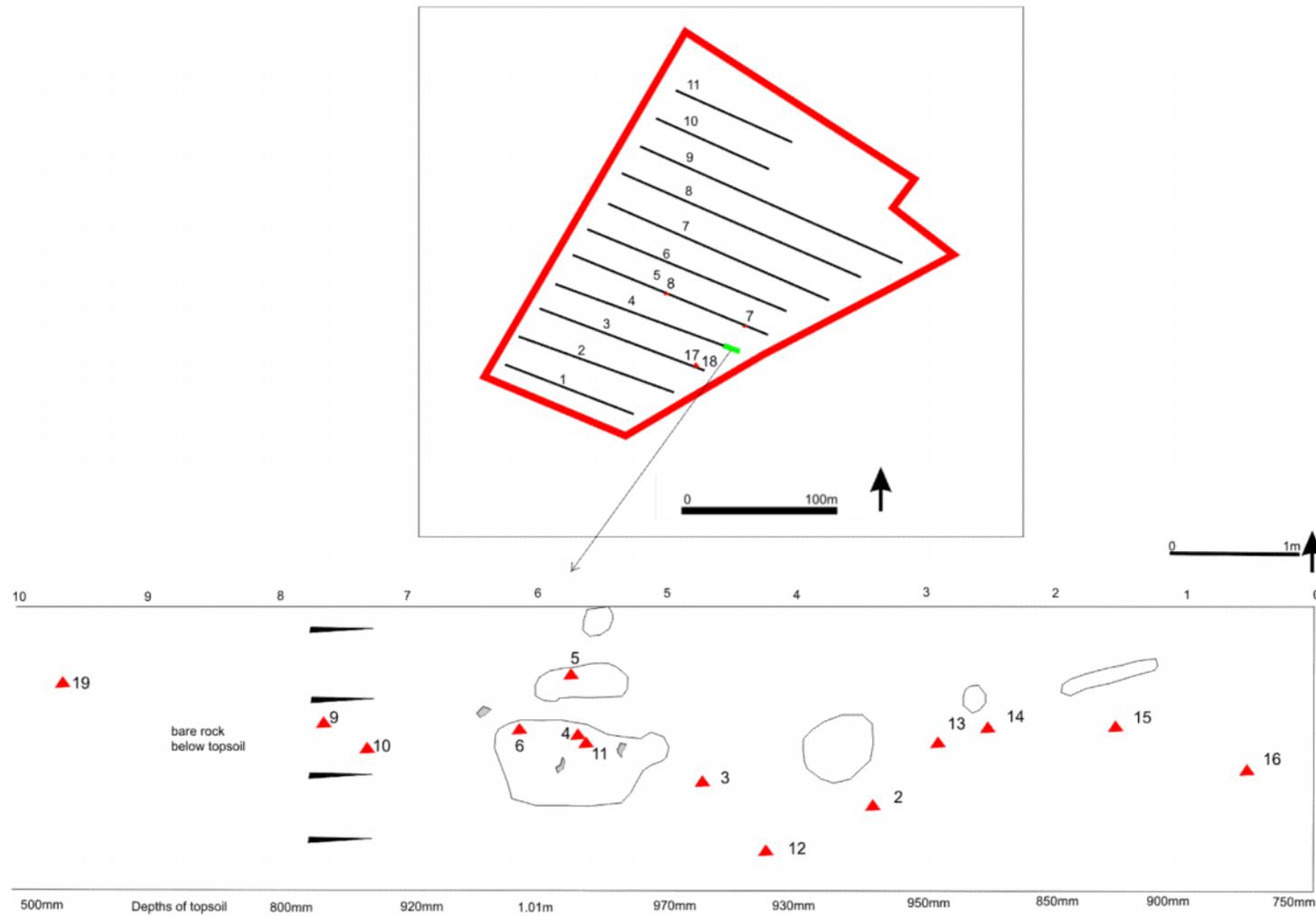
Although the lack of diagnostic elements does not allow precise dating of the assemblage, the microlithic nature of the cores and flakes suggests a Mesolithic date.

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CAT no.	Orig. SF no.	Trench	Context	Raw material	Artefact type	Length, mm	Width, mm	Thickness, mm	Description
1	2	4	3	Agate, pink	Flake fragment	18	22	21	Cortical chunky piece, split along the long axis. Although it looks like a chunk, one facet is definitely part of a ventral face. Probably split on an anvil.
2	3	4	3	Agate, pink	Indeterminate piece	13	11	7	Cortical. One edge shows the concavity left from a previous detachment.
3	4	4	3	Agate, pink	Flake	20	16	9	Cortical piece, probably detached by hard percussion. The dorsal face has a neatly trimmed platform-edge at one end.
4	5	4	3	Uncertain	Uncertain	17	15	6	Possibly a natural piece of sedimentary rock. However, some concavities could be negative flake scars.
5	5	4	3	Agate, pink	Chip	GD < 10mm			Cortical. Small indeterminate piece.
6	5	4	3	Agate, pink	Core, indeterminate	17	14	12	Cortical. One face shows numerous small negative flake scars. Probably anvil-struck. 'Rubbing' at one end may be use-wear (expedient scraper?).
7	6	4	3	Agate, pink	Chip	GD < 10mm			Inner piece. Small flake.
8	7	5		Agate, pink	Bipolar core	18	13	5	Inner piece. Both faces show negative flake scars. Only flaked along one axis. Small chips detached along various edges may be retouch or use-wear.
9	8	5		Agate, pink	Irregular core	31	29	20	Cortical piece, flaked from at least three directions.
10	9	4		Agate, pink	Chip	GD < 10mm			Cortical. Small indeterminate piece.
11	10	4		Agate, pink	Indeterminate piece	13	8	3	Inner piece. Either face is a natural plane of weakness. Split along the concentric planes characteristic of agate.
12	11	4		Agate, pink	Chip	GD < 10mm			Inner piece. Small indeterminate piece. Either face is a natural plane of weakness. Split along the concentric planes characteristic of agate. The central part of the original agate geode.
13	12	4		Agate, pink	Chip	GD < 10mm			Inner piece. Small flake.
14	13	4		Agate, pink	Indeterminate piece	14	9	8	Inner piece. Unusually coarse-grained agate.
15	14	4		Agate, pink	Chip	GD < 10mm			Inner piece. Probably small flake.
16	15	4		Agate, pink	Indeterminate piece	13	8	6	Inner piece. One face is a partial dorsal face. Possibly a core fragment.

17	16	4		Agate, pink	Uncertain	18	17	3	Inner indeterminate piece/possibly natural. Either face is a natural plane of weakness. Split along the concentric planes characteristic of agate. Heavily weathered.
18	17	3		Agate, pink	Chip	GD < 10mm			Inner piece. Small indeterminate piece.
19	18	3		Agate, pink	Chip	GD < 10mm			Cortical. Small indeterminate piece.
20	19	4		Agate, pink	Irregular core	39	31	21	Cortical piece, flaked from at least three directions. Uncertain whether fine modification along one edge is trimming, use-wear or retouch. CAT 20-22 are conjoining pieces.
21	19	4		Agate, pink	Flake	28	24	9	Inner hard percussion flake. Crushing along one arris may represent an attempt to adjust the shape of the parent core. CAT 20-22 are conjoining pieces.
22	19	4		Agate, pink	Indeterminate piece	12	8	4	Inner piece.



Appendix 1. Illus 2 Distribution of finds. Inset shows detail of trench 4 E end.



