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Geoarchaeological evaluation at Delhi, Blagdon Hall, Northumberland

by

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Summary

Geoarchaeological investigations were carried out in order to interpret the significance of deposits in a proposed opencast extraction site.

The investigation showed that many deposits consisted of typical restored opencast soils whilst others included typical stagnogley soils with seasonal waterlogging.

Features of one trench (Trench 9) were interpreted as the result of soil restoration after mining, whilst observation of a section through an ancient mound (the 'Prospect Mound') suggested the hypothesis of possible soil ploughing before the mound was put into place.

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Introduction and aims

Trial trenching for an archaeological evaluation of a proposed opencast extraction site were carried out by Northern Archaeological Associates at Blagdon Hall, Northumberland.

A site visit and geoarchaeological investigation were carried out by the present writer in order to interpret the significance of deposits within three trenches (Trench 5, 6 and 9) of the nineteen excavated, and to understand some of the mechanisms of site formation.

Methods

Soil profiles in the excavated trenches and the distribution and type of local natural soils and geomorphology were observed and described during the site visit. Existing information on the nature of local soils was consulted, and advice from the Soil Survey and Land Research Centre (R. Palmer) on the site's history was obtained.

Results

The parent, basal material underlying local soils is derived from formations of the Carboniferous Coal Measures, with four main coal seams: the Middle Coal Group of the Coal Measures, the Plessey Coal, the Low Main Coal and the Five Quarter Coal.

Local soils consist of two main units: the Dunkeswick series and restored opencast

soils. The approximate position of the boundaries of the two units (R. Palmer, pers. comm.) are indicated in Figure 1, obtained from Figure 2 of the project design (Northern Archaeological Associates, 2001).

The Dunkeswick series is distributed in a large part of the excavated area (hatched zones in Figure 1). Soils of the Dunkeswick series are typical surface stagnogley soils characterized by seasonal surface waterlogging, an organic-mineral topsoil (Ap horizon) to an average depth of 20 cm, overlying clay loam horizons down to 45-50 cm, in turn overlying clay-rich horizons (Btg horizon) down to approx 60 cm, overlying parent materials derived from Coal Measures

Restored opencast soils are distributed in the remaining area (plain in Figure 1). Such soils were created after open cast mining: during mining, soils were stripped out and piled up in the immediate vicinity of the stripped area; after mining, the soil cover (often of approximately 1 metre thickness) was put back on the overburden (Jarvis *et al.*, 1984). Thus, the nature of the restored soil reflects the nature of the natural soils stripped out before mining.

Typical restored opencast soils have been described as comprising a leamy topsoil of variable thickness over a slowly permeable compact clay loam, silty clay loam or clay subsoil, passing at depth to dark grey rock waste, chiefly of the Coal Measures mudstone (Jarvis *et al.* 1984).

Restored soils typically are characterized by

NW-facing section of trench:

Approximately 0-17 cm: modern plough soil;
Approximately 17-44 cm: redeposited disturbed heterogenous structureless layers of various textures;
Approximately 44-50+ cm: Reddish brown silty clay, mottled, with abundant coal fragments.

In the central part of the trench, a feature excavated into the subsoil was interpreted as a pit.

Trench 6 (in the prospect mound; Figure 3)

The trench was excavated within a feature named *the prospect mound*, interpreted by the excavator as a probably 18th-early 19th century mound. The *prospect mound* average profile consisted of the following units (Figures 3 and 4):

- 1] 0-97 cm: Disturbed heterogenous soils, of various textures and colours, interpreted by the excavators as artificially deposited above a possibly pre-existing lower mound;
- 2] 97-160 cm: Disturbed heterogenous soils, of various textures and colours, including lenses of both over- and underlying horizons mixed together;
- 3] 160cm: Buried OGS? or truncated surface of the underlying buried soil horizon. Possible date suggested by the excavator: 18th century;
- 4] 160-195 cm: A horizon of buried paleosols, massive, homogenous, greyish with red mottles and abundant coal. Sharp clear lower boundary with irregular, often angular pockets, in places gradual;
- 5] 195- 199+ cm: Grey stony clay with grey

and yellowish mottles and massive structure, abundant coal.

Trench 5 (Figure 5)

Profile on W-facing section:

0-20 cm: Organic topsoil (O horizon);
20-25 cm: Modern plough soil horizon (Ap horizon);
225 cm: Modern plough marks;
25-30 cm: Reddish brown silty clay, mottled, with no coal fragments, similar to the subsoil of profile 9 and to horizon 5] of Trench 6.

Oblique features pre-dating the modern Ap horizon were interpreted by the excavator as traces of probable ridge and furrow.

Discussion and conclusions

Trench 9

All components observed in this trench above the subsoil consisted of restored soil, its features corresponding entirely to those described for opencast mining restored soils in the area (Soil Survey and Land Research Centre and Jarvis, 1985). Typically, brick, burnt stone, ironstone, slag and charcoal are found in restored soils in this area.

The subsoil in this trench includes the Btg and BC horizons of the Dunkeswick sol series, characterized by grey stony clay with grey and yellowish mottles and massive structure.

All evidence supports the interpretation that the artefacts represented in this trench represent the result of soil restoration after opencast mining, and later re-development of soil-forming processes.

Trench 6

The excavators interpretation was that the upper part of the mound (1] to 2]) was possibly deliberately deposited during the 18th or early 19th century on top of a previously existing feature/mound.

Units 4] and 5], therefore, could have been buried under units 1] and 2] for a period of up to 200 years and, therefore 1] and 2] may represent the local soils existing before burial in the 18th century. Local natural soils in this area belong to the Dunkeswick series, typically characterized by a well expressed ped patterns in the subsoil (subangular blocky in the B horizon, and prismatic stricture in the C horizon) .

No peds, however, were observed in the horizons represented by units 4] and 5]. The structure of such horizons, however, may well have been compressed and obliterated by the weight of units 1] and 2] during the 200 years burial. In this case, units 4] and 5] would represent horizons of local natural soils comparable to those of the Dunkeswick series, but lacking in peds as a result of compression.

Alternatively, it is possible that the lack of pedality and the homogenous appearance of the horizon is the result of pre 18th-early 9th century ploughing before burial. This seems a more likely interpretation, supported by the evidence of sharpness and in places angular shape of the pocket of this horizon's lower boundary with the subsoil of unit 5], such pockets possibly representing traces of ploughing. The red triangle in Figure 4 indicates the stratigraphic position of such boundary.

Thus, the following hypothesis is suggested:

A soil consisting of horizons 5] , 4] and their

topsoil was ploughed during an indefinite time and later truncated (layer 3]) and buried during the 18th or early 19th century by materials of units 4] and 5]. Archaeological interpretation of the shape of the boundary between horizons 4] and 5] (at the level of the red triangle of Figure 4 will allow confirmation of such hypothesis.

Trench 5

Profile 1 results from ploughing the natural soils of the Dunkeswick series. Plough marks at 25 cm are very similar to the shape of the lower boundary of 4] in Trench 6. This supports the hypothesis of ploughing at the base of the *prospect mound* (Trench 6).

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References

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lack of peds, though in the oldest restored soils, structure may have started to develop, making profiles similar to those of natural local soils. Typical content of restored soils

includes: angular sandstones, fragments of coal, ironstones, and often also bricks, slag, cinders and, rarely, fragments of discarded mining equipment (*ibidem*).



Figure 1. Approximate location of the Dunkeswick Series (hatched area) and restored opencast soils (plain).

Trench 9

Trench 9 was located on the “Disturbed Soils” association, mainly made of restored opencast soils. Here, the topsoil of restored opencast soils lay over a slowly permeable compact clay subsoil, passing at depth to dark gray rock waste.

Profiles in Trench 9 were characterized as

follows:

Central part of trench (area corresponding to a geophysical anomaly):

Top: Slightly stony dark grey top-soil;
Middle of section: Black horizon, rich in coal, with some charcoal, brick, ironstone and slag;
Subsoil: Reddish brown silty clay, mottled, with abundant coal fragments.



Figure 2. Trench 9



Figure 3. Trench 6 within the prospect mound.

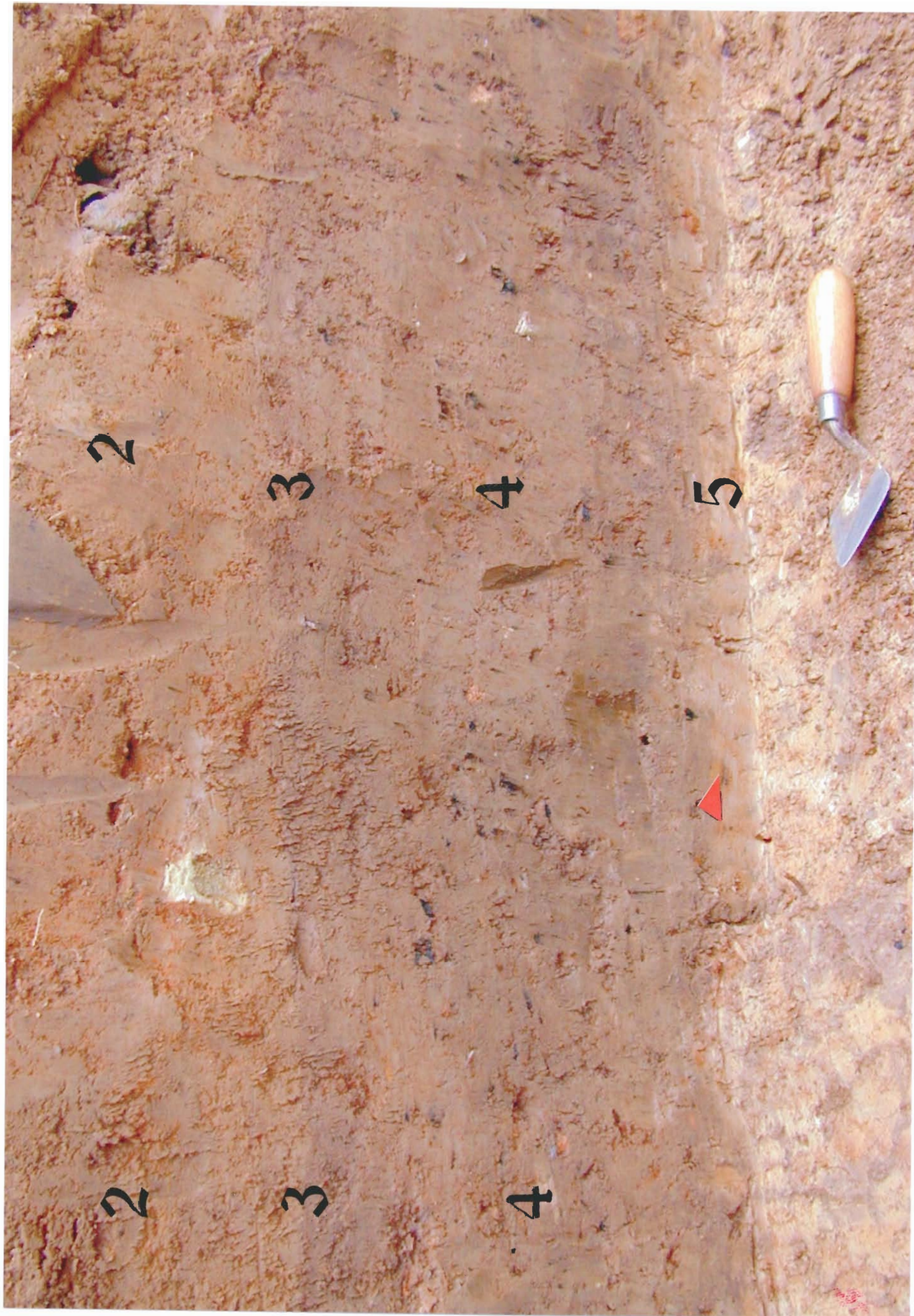


Figure 4. East-facing section of Trench 6: the red triangle indicates the position of the boundary between the possible plough soil and the truncated paleosol.



Figure 5. Trench 5: the red triangle indicates the position of the boundary between modern plough soil (upper greyish material) and the buried truncated in situ soil (yellowish brown material)