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Dear Max

Green Hays, Bunny Lane, Keyworth, Nottinghamshire, NG12 5LP
Soil Deposition / Engineering

Thank you for sight of the letter from RBC to your colleague Mr. McCarthy regarding soil deposits/ engineering to the north of the approved residential development.

I understand you wish to receive some professional opinion on the implications for archaeology, related to the deposition of soil.

With respect to the archaeology of the site, a desk-based assessment (Nexus Heritage Sept. 2018) and a geophysical survey (Stratascan June 2013) identified an expanse of ridge and furrow earthworks and an infilled pond in the northern part of the site.

The intent is to spread surplus subsoil and topsoil over this area as shown in Bloor Homes' drawings MI127-EN-130B and MI127-EN-132B. The depth of the spread is to be 0.65m.

In one respect this deposition of soil would seal the site of the historic pond and the ridge and furrow earthworks, effectively preserving them *in situ*. This would be a beneficial outcome.

However, the soil deposition operation would mask the ridge and furrow earthworks and as a landscape feature of historic origin they would be buried and lost to view – effectively removing a

face of the historic landscape. In weighing applications that affect non-designated heritage assets, a balanced judgement will be required from the LPA having regard to the scale of any harm or loss and the significance of the heritage asset. In our opinion the impact to the ridge and furrow, is insufficient to sustain an objection to a planning application for the soil deposition – the visible morphology of the ridge and furrow earthworks would be lost to view, but they would be preserved in situ.

The option for mitigation is available to the LPA and, by means of a condition the archaeological /heritage interest of the ridge and furrow could be secured by means of recording and advancing an understanding of their significance prior to the impact upon them in a manner proportionate to their importance and the impact, and making this evidence (and any archive generated) publicly accessible. The recording could take the form of an earthwork survey to map the earthworks. Such surveys are commonly undertaken on ridge and furrow earthworks and they represent an orthodox and proven mechanism for mitigation. The methodological approach for such a survey could take the form of terrestrial or airborne laser scanning to produce a surface model of the terrain tied into the Ordnance Survey national grid.

Consideration also needs to be given to two other factors:

- intermixing of materials
- compaction of the ground due to the imposed load.

With respect to the first, I would recommend that a water-permeable geotextile is laid down on the area prior the import and laying of soils. The geotextile should avoid physical mixing of introduced materials into underlying ground.

With respect to the second, loading and the potential for sediment deformation and damage to any artefacts is a possibility. Some research on loading impacts on archaeological remains was carried out early in the century (Sidell *et al*¹ 2004; Hyde 2004²). There has also been some more recent research (Mejia 2014³).

I would estimate that whilst the volume of soil to be redeposited is large, it would be accommodated over a large area in a relatively thin layer. The unit load imposition would therefore be low and I

¹ Sidell, E. J., Higuchi, T., Allison, R. J. and Long, A. J., 2004 'The response of archaeological sediments and artefacts to imposed stress regimes as a consequence of past, present and future anthropogenic activity.' In Nixon, T (ed.) *Preserving Archaeological remains in situ? Proceedings of the 2nd Conference 12-14 September 2007*. London: Museum of London Archaeology Service. P. 32-39.

² Hyde, A. F. L., 2004 'Damage to inclusions in sand subjected to one-dimensional compression.' In Nixon, T (ed.) *Preserving archaeological remains in situ? Proceedings of the 2nd conference, 12-14 September 2007*. London: Museum of London Archaeology Service. 98-104.

³ Mejia, A. A. P., 2014, *An Engineering Approach for the Design of Archaeological Reburial Systems*. (Doctoral dissertation).



would not anticipate any adverse consequences for the archaeology of the relict pond or the ridge and furrow earthworks as the stresses applied at the surface would dissipate with depth. I would, nevertheless, recommend that your engineers review the bearing capacity of site and calculate the amount of deposit consolidation that they would expect to occur within the different soil horizons within the existing stratigraphic profile. Whilst there is no universally accepted "safe stress" value for loads to archaeological layers, the aim would be to ensure that the imposed load would be spread over a sufficiently broad area such that failure of the underlying soils does not occur and settlement/compression due to compression of the soil dissipates towards a negligible value at shallow levels.

Yours sincerely,

A. Martin
Director
for Nexus Heritage