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7th June 2021

Re. Reports G21073 (Phase 1) and G21103 (Phase 2) – Proposed Development Land at Dearne Grange Farm, Cumberworth HD8 8YA

We have received some comments from a planning officer regarding the above project/reports. The comments we have received are reproduced in blue and red text below and subsequently answered paragraph by paragraph.

"Notably, in Table 5 of the report, a very low risk is assigned to hazardous gases associated with mine workings and nearby made ground, but it is recommended that gas monitoring is undertaken. In Table 6 of the report, the recommendation for 6 gas monitoring visits over 3 months is given but it is also noted that gas monitoring is '*considered highly unlikely to be required'*.

In summary, we generally agree with the report findings and recommend Condition 3 is discharged. However, we would expect that in a site of high sensitivity end-use that is within 250m of a landfill that gas monitoring should be undertaken in line with CIRIA 665 guidance.

No ground gas monitoring has been undertaken as it was deemed unnecessary by the attending geo-environmental engineer who identified made ground in only one of the five boreholes. Made ground generally extended to 0.6m depth. Soil organic matter (SOM) was 2.94% and total organic carbon (TOC) was 1.72%. The report then proposed that hardstanding should be incorporated to break the significant pollutant pathways confirmed. An alternative approach is proposed to remove the near-surface soils and replacing with a clean cover system utilising 600mm of uncontaminated material.

We require further clarification as to why no ground gas monitoring was undertaken. We acknowledge that the made ground had a maximum depth of less than 3m and the TOC was less than 4%. However, this relates to made ground at the site and not gas associated with the landfill within 250m of the site. As such, further justification in relation to gas migration and the risk to site-users is required if an empirical approach to ground gas characterisation is to be adopted using the total organic carbon content. Alternatively, a ground gas monitoring regime of a minimum of 6 occasions over 3 months should be completed in accordance with CIRIA 665 guidance where Table 5.5a and Table 5.5b identifies this idealised period and frequency for a highly sensitive development (residential with gardens). Should evidence become apparent from the initial monitoring stages that gas monitoring can be curtailed then this should be submitted for consultation.

Until further information is received in relation to the ground gas risks onsite then this condition must remain.

Response / Additional information:

Paragraph 1:

> "Notably, in Table 5 of the report, a very low risk is assigned to hazardous gases associated with mine workings and nearby made ground, but it is recommended that gas monitoring is undertaken. In Table 6 of the report, the recommendation for 6 gas monitoring visits over 3 months is given but it is also noted that gas monitoring is '*considered highly unlikely to be required*'.

The reference to gas monitoring in Table 5 of the Phase 1 Desk Study report is as "*potentially* useful action". It is included as an indication of action that is available to assess the possible risk, it is not a recommendation.

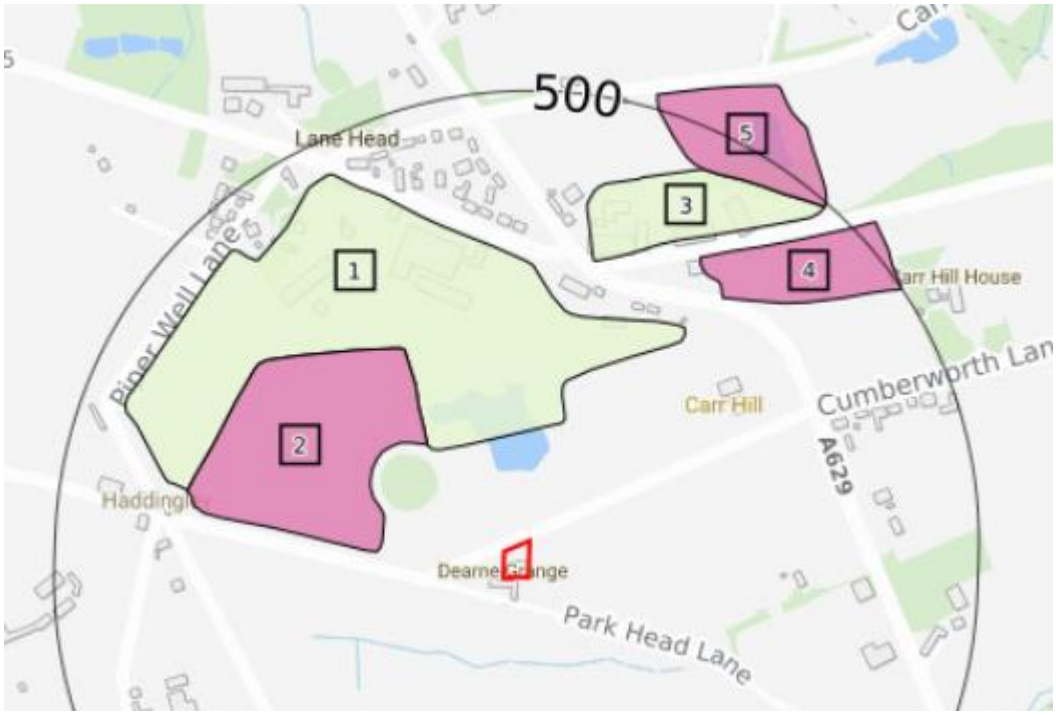
Paragraph 2:

> In summary, we generally agree with the report findings and recommend Condition 3 is discharged. However, we would expect that in a site of high sensitivity end-use that is within 250m of a landfill that gas monitoring should be undertaken in line with CIRIA 665 guidance.

The site is not within 250m of a landfill.

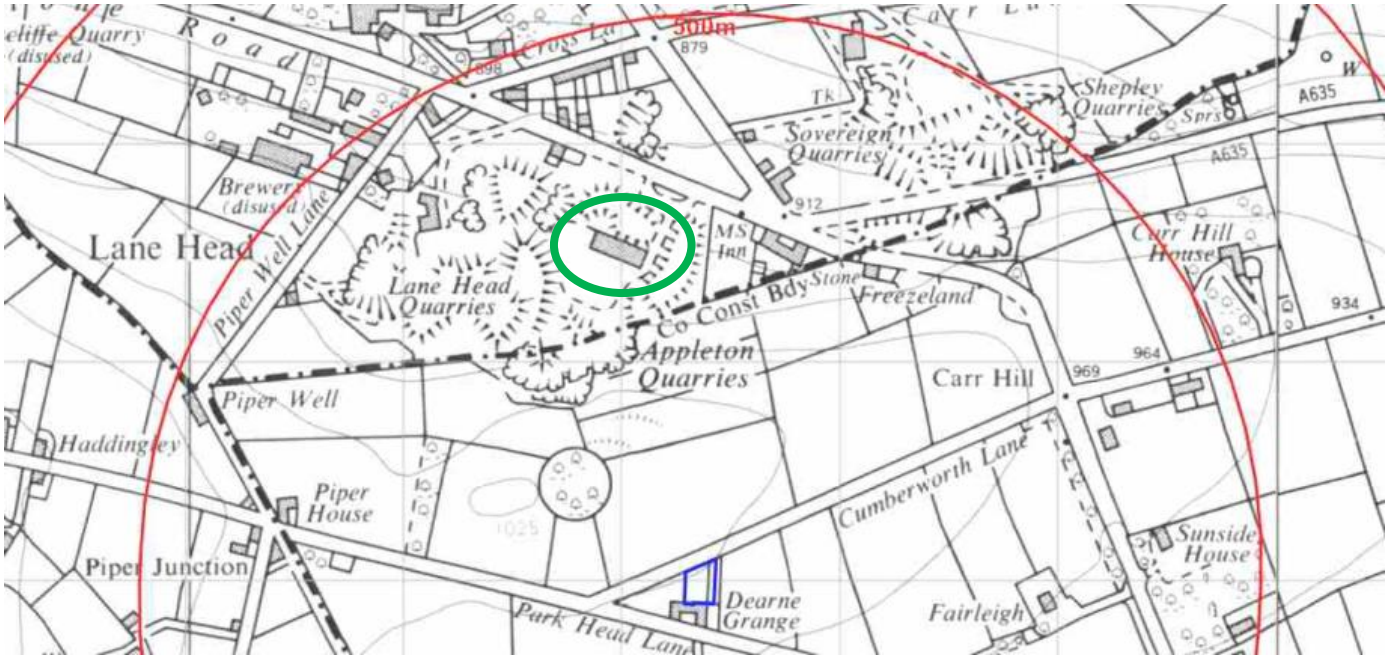
Note that materials acquired to compile the Phase 1 Desk Study report reviewed historical landfill records and found limited records approximately 330m-380m to the northeast, but none within 250m.

I assume the reviewing officer is referring to the BGS 1:50,000 mapping which shows an area of infilled ground to the north, shown below as a green area numbered [1] (the pink areas denote worked ground):

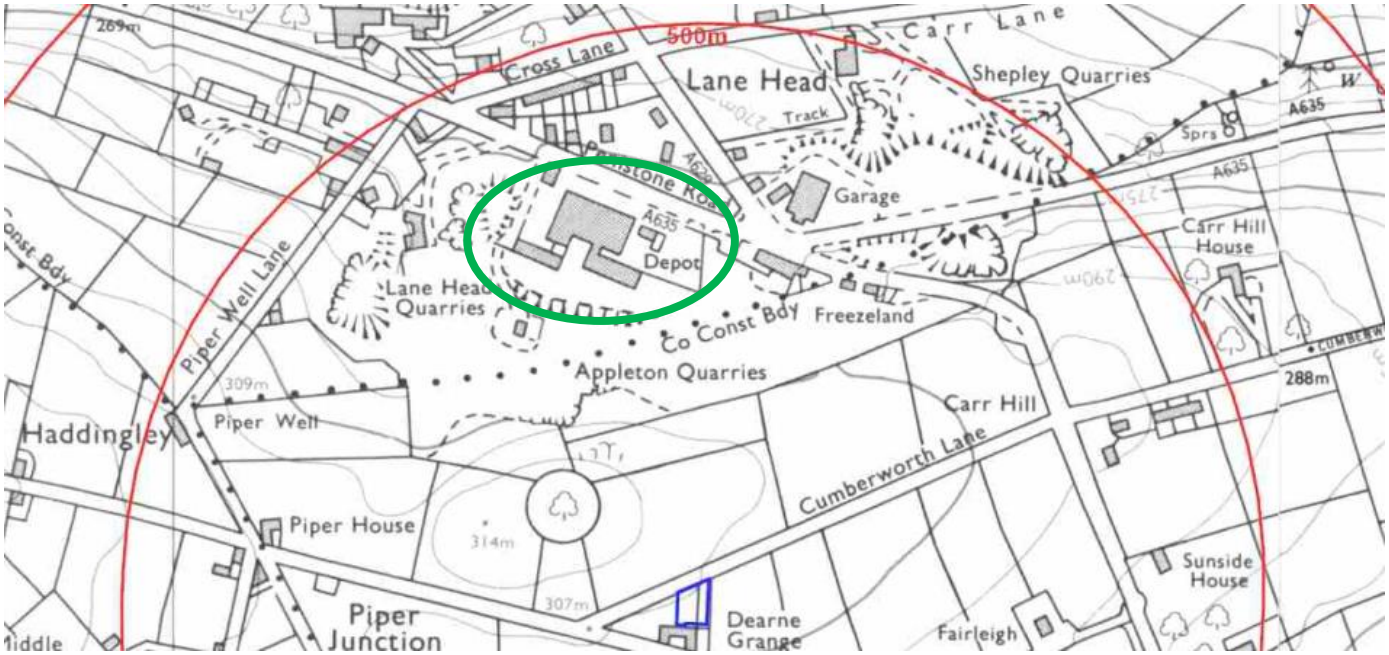


Please note that the majority of this area is currently an open quarry and is not infilled ground. However, the historical map record does perhaps suggest that there may be some artificial ground below the commercial structures to the east of the number [1] on the image above, see extracts on the following page.

1967-1970 map:



1980-83 map:



Buildings have been present in the location circled on the 1967-70 map above since the 1903-04 map and so the extent of quarrying at that location is likely to be limited. It is feasible, however, that the area below the buildings circled on the 1980-83 map was infilled prior to their construction given the differences between the two maps; however, these structures are >250m from the study area and, despite the appearance of the maps, the platform on which they are located appears in reality to be the edge of a quarry rather than an artificially constructed platform (see next page).

Further to the above, and most importantly, it is clear that any infilled ground at this location could not pose any feasible risk to the study site when the current topography is considered.

The area between the study site and the aforementioned buildings / potentially infilled land to the north has been quarried to significant depth and it is very obvious that no potential migration pathway between the site to the north and the study site would be possible.

An extract from the Google 3D imagery is reproduced below to highlight this fact:

Potential infilled ground Study Site

As can be seen in the above image, the quarry separating the two locations extends to substantially below the ground level of the site to the north and probably beyond the full depth of any infilled ground that might be present at that location.

For ground gas generated by this area of potentially infilled ground (which regardless is >250m away) to pose any feasible risk to the study site, it would need to migrate down-over and then laterally >250m before rising to surface at the study site to pose a potential risk. Clearly this is impossible, and it is much more likely that it would rise to surface close to source, or at worst, migrate laterally into fresh air in the quarry and disperse to the atmosphere.

This could be a genuine mistake by the reviewing officer if the current configuration of the surrounding area has not been observed/considered, but nonetheless, there is no infilled ground within 250m of the site, and there is no plausible gas source within the site itself, and therefore the findings of the two site investigation reports are correct.

Paragraph 3:

No ground gas monitoring has been undertaken as it was deemed unnecessary by the attending geo-environmental engineer who identified made ground in only one of the five boreholes. Made ground generally extended to 0.6m depth. Soil organic matter (SOM) was 2.94% and total organic carbon (TOC) was 1.72%. The report then proposed that hardstanding should be incorporated to break the significant pollutant pathways confirmed. An alternative approach is proposed to remove the near-surface soils and replacing with a clean cover system utilising 600mm of uncontaminated material.

The report proposed that the implicated area be covered by hardstanding to break the potential pollutant linkages. This recommendation was made based on the implicated soils merely comprising a thin surface horizon of road planings, and the fact that the risk to ground and surface waters through leaching had been shown to be negligible.

If a capping layer solution was adopted, the thickness was proposed to be just 200mm to reflect the lack of contamination in the deeper soils (making this not so much a capping layer, and more a dig and dump approach). The possibility of a capping layer was discussed as a contingency option in case the reviewing officer(s) were not happy with the proposal to break the pollutant linkage via the installation of hardstanding.

The 600mm benchmark thickness was given simply as a reference to what is normally required for a capping layer but given that underlying made ground at a depth of 0.50m in the same location had been shown to be uncontaminated, and that the road planings only extended to 0.05m, clearly only a lesser thickness of material would need to be replaced. This could perhaps have been clearer in the report.

Apologies for a further lack of clarity but, despite my name being on the report, this report was actually written and subsequently revised by other members of our staff. The front page would normally have been altered but was apparently missed in this instance.

Nonetheless I agree that the installation of hardstanding will be the most sensible and least wasteful means of breaking the identified pollutant linkages, and it seems that the reviewing officer is happy with that proposal.

Paragraph 4:

We require further clarification as to why no ground gas monitoring was undertaken. We acknowledge that the made ground had a maximum depth of less than 3m and the TOC was less than 4%. However, this relates to made ground at the site and not gas associated with the landfill within 250m of the site. As such, further justification in relation to gas migration and the risk to site-users is required if an empirical approach to ground gas characterisation is to be adopted using the total organic carbon content. Alternatively, a ground gas monitoring regime of a minimum of 6 occasions over 3 months should be completed in accordance with CIRIA 665 guidance where Table 5.5a and Table 5.5b identifies this idealised period and frequency for a highly sensitive development (residential with gardens). Should evidence become apparent from the initial monitoring stages that gas monitoring can be curtailed then this should be submitted for consultation.

The site has been categorised as falling into the CL:AIRE RB17 classification of **"natural soils with low organic content and less than 1m of made ground that comprises general infill"**. No risk assessment based on the analysed organic carbon content of the made ground (as per Table 1 of RB17) has been proposed as this only becomes relevant when the thickness of the artificial deposits exceeds 1m (and provided the made ground is not made up of obviously degradable / high organic content materials).

For the purposes of the above classification, The RB17 guidance stipulates that neither ground gas monitoring of gas protection measures will be required for a site matching this description provided the neither the made ground or the natural soil are of high organic content (which is the case for this site), nor would assessment using the measured TOC of the made ground.

The scenario the officer is describing above relates to sites with between 1m and 5m of made ground which is not the case for this site – see Table A1 below, reproduced from RB17 (bottom of table removed for conciseness because the additional entries are not relevant). This site matches the third row of Table A1, not the fifth row as might be inferred from the officer's comments.

Table A1: Application of approach to common scenarios

Scenario and source of ground gas	Gas monitoring?	Gas protection?
Natural soils with no Made Ground. E.g. London Clay, Mercia Mudstone, Lias Clay, Chalk, Gault Clay, Glacial Till	X	X
Natural soils with No Made Ground - in an area where radon protection is required.	X	✓ Gas/radon protection required
Natural soils with low organic content - less than 1m of Made Ground that comprises general infill and car park construction materials. E.g. Made Ground over London Clay, Mercia Mudstone, Lias Clay, Chalk, Gault Clay, Glacial Till	X	X
Natural soils with high organic content and less than 1m of Made Ground that comprises general infill and car park construction. E.g. Alluvium, Peat over natural soils such as London Clay, Mercia Mudstone, Lias Clay, Chalk, Gault Clay or Glacial Till	X	✓ CS3 gas protection provided
Natural soils with low organic content and 1m to 5m of Made Ground (average <3m) that comprises general infill and car park construction materials TOC less than 6%. E.g. Made Ground over London Clay, Mercia Mudstone, Lias Clay, Chalk, Gault Clay, Glacial Till	X	? Determine gas protection using TOC content of Made Ground and Table 2

Though not especially relevant to this discussion, our experience has shown that adoption of the TOC-based method is only advisable where >1m of made ground is present and gas monitoring is not at all possible (perhaps due to access reasons) because it is very often over-cautious and would result in more gas protection being installed in new structures than is truly required.

Further to the above, I reiterate that the site is not within 250m of a landfill and therefore the means of assessing the gas risk at the site have been entirely appropriate, and no feasible potential gas risk exists at the study site.

I trust this additional information is sufficient to allow the discharge of the relevant planning condition(s).

Kind regards,

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