

Appendix 4

Coal Authority Report re 51000306015001
dated 4 June 2013

The COAL AUTHORITY

Issued by:

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MICHAEL CUNNINGHAM ARCHITECTS
VANILLA FACTORY
39 FLEET STREET
LIVERPOOL
L1 4AR

Our reference: **51000306015001**
Your reference: **Llay Home Farm Housing**
Date of your enquiry: **04 June 2013**
Date we received your enquiry: **04 June 2013**
Date of issue: **04 June 2013**

This report is for the property described in the address below and the attached plan.

Non-Residential Coal Authority Mining Report

HOME FARM, GRESFORD ROAD, LLAY, WREXHAM, CLWYD, LL12 0NW

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 5 seams of coal at 660m to 970m depth, and last worked in 1966.

Any ground movement from these coal workings should have stopped by now.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is in an area for which a notice of entitlement to withdraw support was published in 1944.

The property is not in an area for which a notice has been given under section 41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working facilities orders

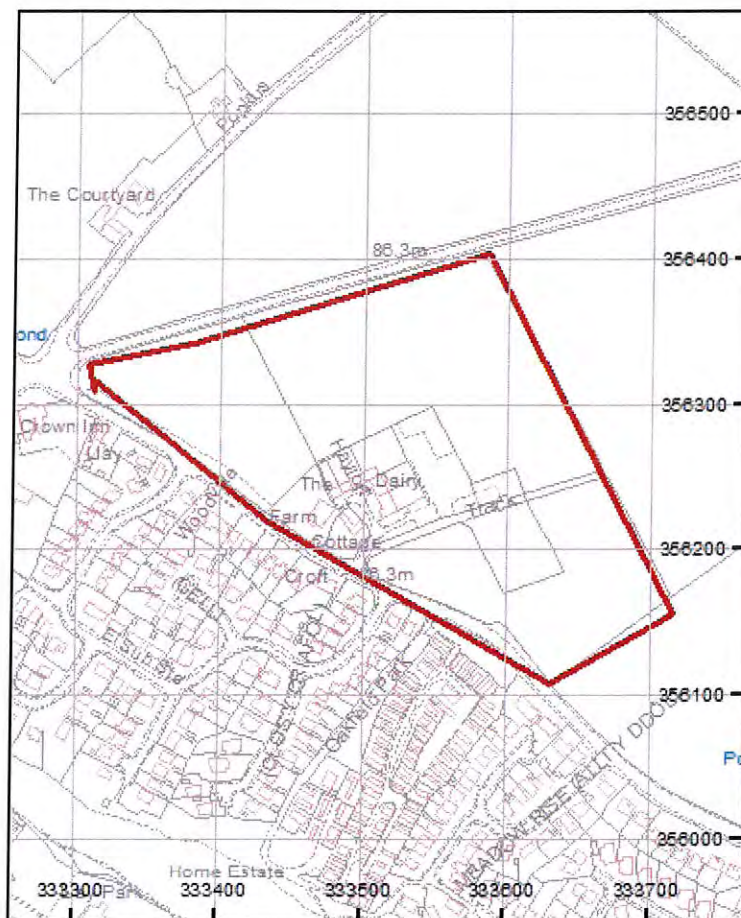
The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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Approximate position of enquiry
boundary shown



Appendix 5

Extract of Cuesta Consulting Limited Report

Michael Cunningham Architects

Home Farm, Llay

Initial Observations relating to Prior Mineral Extraction



Desk Study Report

(4th March 2014)

Cuesta Consulting Limited



1. Introduction

- 1.1 This report has been prepared for Michael Cunningham Architects (MCA) by Cuesta Consulting Limited, in response to MCA's emailed instruction, dated 5th February 2014, to provide independent advice relating to the notion of prior mineral extraction at a proposed housing development site at Home Farm, Llay, near Wrexham, in North Wales.
- 1.2 The requirement to consider the feasibility of prior extraction relates to Local Plan Policy MW9 which aims to safeguard sand and gravel deposits from non-mineral development that would result in the sterilisation of that mineral.
- 1.3 Comments received from mineral planning officers during pre-application discussions noted that *factors such as the timescale for the development are likely to limit the level of prior extraction that can reasonably be carried out on the site.* They also noted that *other factors such as the design needs of the development (including viability), landscape, ecology, flooding, drainage also need to be considered and that, it may be that very little prior extraction is feasible, in which case this should be explained so that the decision maker can weigh this up when making a determination.*
- 1.4 The minerals officer noted that investigations would be required to *demonstrate the quality of the sand and gravel deposits within the site, the thickness of the deposit, thickness of overburden and height of the water table to ensure that any extraction doesn't result in flooding on the site. The purpose of the investigation would be to demonstrate either that there is no mineral of economic importance that will be sterilised by the proposed development or if there is mineral of economic importance, to determine the level of prior extraction that can be undertaken without compromising the development.*
- 1.5 The report relates only to the initial desk study work. It reviews the geological evidence currently available and provides a preliminary assessment of the mineral resources within the site, and the scope for their commercial extraction. It provides justified recommendations for the scope of further ground investigations, laboratory testing and geological interpretation that would be needed to refine this assessment, if required by the planning authority, in order to confirm the feasibility and potential scope of such extraction being carried out as an integral part of the proposed development.

2. Initial Desk Study

Data Sources

- 2.1 All known existing borehole data within the vicinity of the site had previously been compiled by the Mineral Planning Authority and were inspected at their offices in Mold on 18th February 2014. Relevant aspects of the data are reported below.
- 2.2 Figure 2.1, below, shows the locations of the existing boreholes which lie closest to the site, together with the extent of the safeguarded mineral deposits. The latter corresponds with the outcrop of glacial sand & gravel as mapped by the British Geological Survey (BGS).

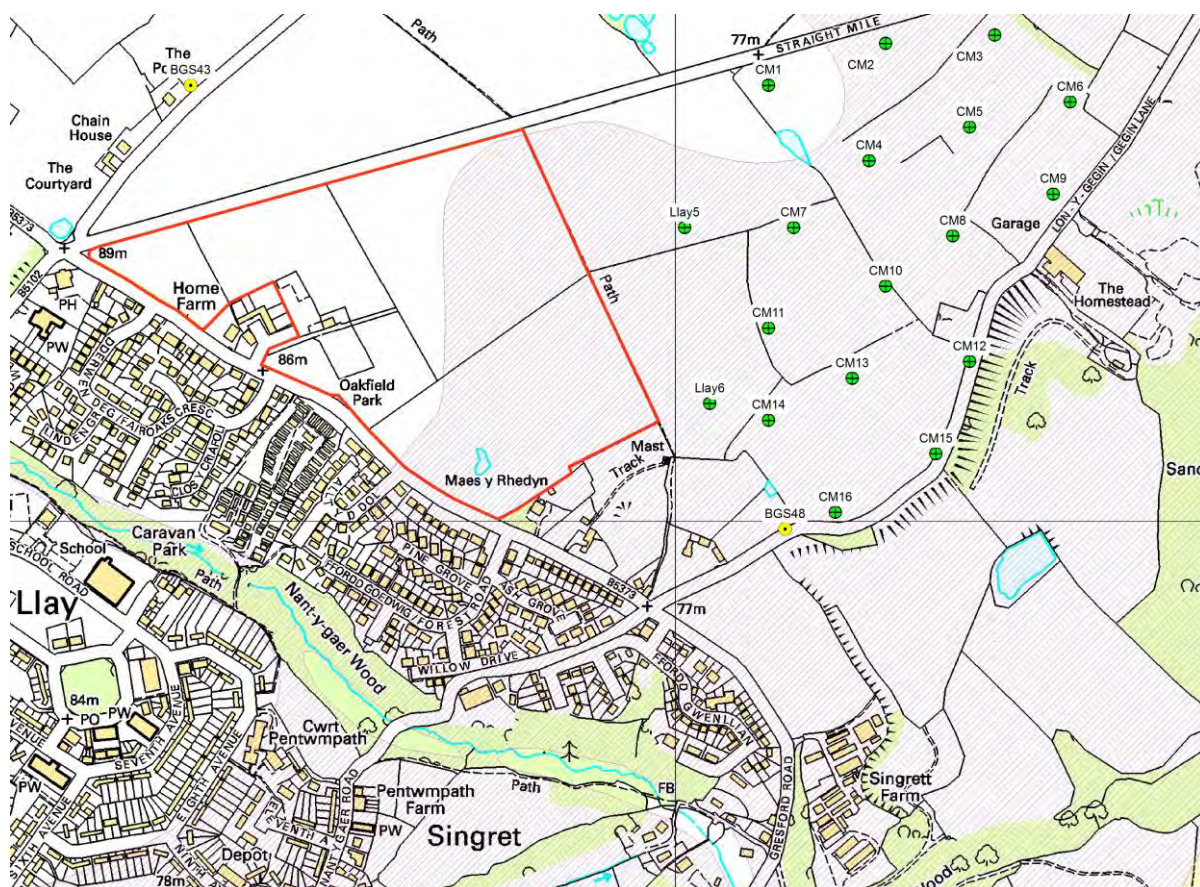


Figure 2.1: Location of Existing Boreholes and the Extent of Safeguarded Sand & Gravel (shaded)

BGS data

- 2.3 The site falls within a sand & gravel resource block previously identified by the Industrial Minerals Assessment Unit (IMAU) of the former Institute of Geological Sciences - now the BGS. The IMAU report (Dunkley 1981) provides details of numerous boreholes drilled specifically for the purposes of sand & gravel assessment, together with an overview of the geological deposits involved.

2.4 From that report, it is evident that:

- The deposits at Home Farm form part of the 'Wrexham delta-terrace': this is a 'coarsening upwards' sequence with glacial silts at the base, overlain by a thick unit of fine to medium-grained sands, which in turn is overlain by glacio-fluvial sands and gravels. The latter are generally interpreted as alluvial fan deposits, built up on top of the original delta. This is an important distinction in terms of the commercial viability of the deposits involved.
- These units are generally separated by gradational rather than sharp boundaries, although in some boreholes there are layers of clay in between the lower sands and the upper sands & gravels.
- Within the resource block as a whole, and taking the lower sands and the upper sands & gravels together, the deposits are massively dominated by sand, with gravel being encountered to any significant extent only within the uppermost unit.
- A cross section (Section B-B in Figure 5 of the IMAU report) passes through the site and suggests that the sands and gravels are exposed at the surface over much of the site (as indicated in Figure 2.1, above), but that these are concealed beneath an overburden of glacial till ('boulder clay') in the north west.
- The deposits have previously been worked at Bank Farm, to the north (now a completed landfill site) and at Singrett Farm to the south-east (restored to grazing and woodland). They continue to be worked at Ballswood Quarry, which adjoins the Singrett Farm site, to the east.

2.5 Two of the IMAU boreholes are located close to the Home Farm site: SJ35NW43 to the north of the site and SJ35NW48, located to the south. The positions of these boreholes (abbreviated as BGS 43 and BGS 48, respectively) are shown on Figure 2.1, above, and summary details are given, along with those for other nearby boreholes, in Table 2.1, below.

2.6 For the purposes of Table 2.1, the geological sequence has been simplified into three units: Overburden (glacial till or clay); Upper Sands & Gravels; and Lower Sands. The figures within this table are discussed later.

Cae Mawr Investigations

2.7 Directly to the east of the Home Farm site there are records of a series of exploratory boreholes associated with two previous planning applications for sand & gravel extraction.

2.8 The first of these applications, by the Bodfari Sand & Gravel company, is shown on the planning authority's reference map but no other information was available, other than two boreholes (shown as 'Llay 5' and 'Llay 6' on Figure 2.1), summary details of which were found on Plan 2860/4 relating to the adjoining 'Cae Mawr' site (see below).

2.9 The second application, by Western Aggregates (subsequently part of RMC and now CEMEX UK), related to the proposed working of the Cae Mawr site in conjunction with continued operations at the adjoining Ballswood Quarry (see below). A total of sixteen boreholes were sunk at this site (shown as CM1 to CM16 on Figure 2.1), and details of these were set out on plan No. 2860/4, submitted as

part of a Section 78 Appeal in March 1993. These again are summarised in Table 2.1 and the details are discussed later in this report.

Borehole Ref	Overburden thickness (m)	Upper Sand & Gravel thickness (m)	Depth to base of Sand & Gravel (m)	Lower Sand thickness (m)
BGS 43	8.80	4.00	12.80	12.20
BGS 48	2.80	6.30	9.10	14.80
CM1	1.10	3.10	4.20	5.90
CM2	0.20	7.70	7.90	13.50
CM3	0.20	8.40	8.60	6.80
CM4	0.20	3.10	3.30	14.70
CM5	0.20	2.80	3.00	15.00
CM6	0.20	8.80	9.00	12.00
CM7	1.20	1.40	2.60	16.60
CM8	0.10	7.40	7.50	13.50
CM9	0.20	12.80	13.00	6.10
CM10	0.20	2.80	3.00	8.60
CM11	6.00	0.00	6.00	10.00
CM12	0.10	14.30	14.40	0.00
CM13	0.20	5.40	5.60	6.50
CM14	1.60	7.40	9.00	10.80
CM15	0.10	14.10	14.20	4.50
CM16	1.50	7.15	8.65	0.00
Llay 5	4.40	4.60	9.00	0.00
Llay 6	5.20	11.00	16.20	0.00
Averages	1.73	6.63	8.35	8.58

Table 2.1: Summary of Overburden and Mineral Thicknesses from Existing Boreholes
(see Figure 2.1 for borehole locations)

- 2.10 It is worth noting that two sets of information are shown on this plan for each of the Cae Mawr boreholes. The figures for the CM boreholes shown in Table 2.1 relate to one set of information (which is also given on Plan 2860/4/A). The second set of information, which gives elevations as well as depths, is generally consistent with respect to the overburden and upper sand & gravel thicknesses, but records much reduced thicknesses, or no thickness at all, for the Lower Sands unit. An inference that may be drawn from this is that the Lower Sands unit was generally not regarded as a worthwhile mineral resource. This cannot be verified from the information held by the Minerals Planning Authority but is consistent with the IMAU descriptions of increasingly fine sand and increasing silt/clay content with depth (as discussed further below). It is also consistent with what appears to have been found in the adjoining Ballswood Quarry.

Ballswood Quarry

- 2.11 This quarry, located directly to the east of the Singreth Farm site, has exploited the north-eastern edge of 'Wrexham Delta-Terrace', working in from the steeply sloping edge of the feature above the Alyn Valley. The IMAU report, dated 1981, showed the site to be 'worked out', although in fact, extraction has continued

since then, albeit on a periodic basis. Various documents relating to this quarry, held by Flintshire County Council, reveal that it has tended to be worked on an intermittent basis over many years. A report by the Mineral Valuer for Wales, dated July 1997, noted that the deposits being worked here, at that time, were 'deficient in gravel'. For this reason, the former operator (Western Aggregates) considered the remaining deposits to be uneconomical, unless they could be worked in conjunction with the coarser sands and gravels available within the adjoining Cae Mawr site (1991 application and 1993 appeal). That appeal was unsuccessful, however, and following the refusal (in 2006) of a further application, the site was eventually mothballed.

- 2.12 More recently, the site has been acquired by new owners - D.P. Williams (Holdings) Ltd. - and has re-opened. It is understood that coarse aggregate from elsewhere, including recycled materials, is now being brought in to blend with the sand to produce higher quality products, including concrete blocks.

Preliminary Assessment of Resources within the Home Farm Site

- 2.13 No information is available relating to sand & gravel resources within the Home Farm site itself. General inferences can, however, be made from the data available from boreholes on adjoining land, as summarised in Table 2.1, above. In view of the complex stratigraphy associated with glacio-fluvial deposits, those data cannot provide reliable indications regarding the detailed distribution of sand, gravel and overburden within the site. They can, however, at least provide indications regarding the likely overall characteristics of the deposits and, in particular, the typical thicknesses of each of the main depositional units likely to be encountered. These indications are discussed below.

Overburden Thickness

- 2.14 Data from all of the existing boreholes closest to the Home Farm site, as presented in Table 2.1, above, show that the thickness of overburden varies between 0.2m and 8.8m across the area. The overburden can be expected to be thickest where the mineral is overlain by glacial till (i.e. beyond the northern edge of the outcrop), although significant depths of overburden (up to 6m) are also recorded in parts of the Cae Mawr site, within the supposed area of sand & gravel outcrop.
- 2.15 Figure 2.2, below, displays the individual values for each existing borehole. This reveals that the four highest figures are found in the boreholes which are closest to the Home Farm site, with much reduced thicknesses further east.
- 2.16 Thus, although the average overburden thickness across the whole of the area is 1.73m, it seems likely that greater thicknesses (perhaps in the order of 5 to 6m) could be encountered within the Home Farm site. If this were to be the case, it would significantly increase the cost and thereby reduce the economic viability of extracting the underlying mineral - especially in the context of prior extraction. This is discussed further in Section 3, below.

Upper Sand & Gravel unit

- Cuesta Consulting Limited**
OA Reference: C/MCA/002

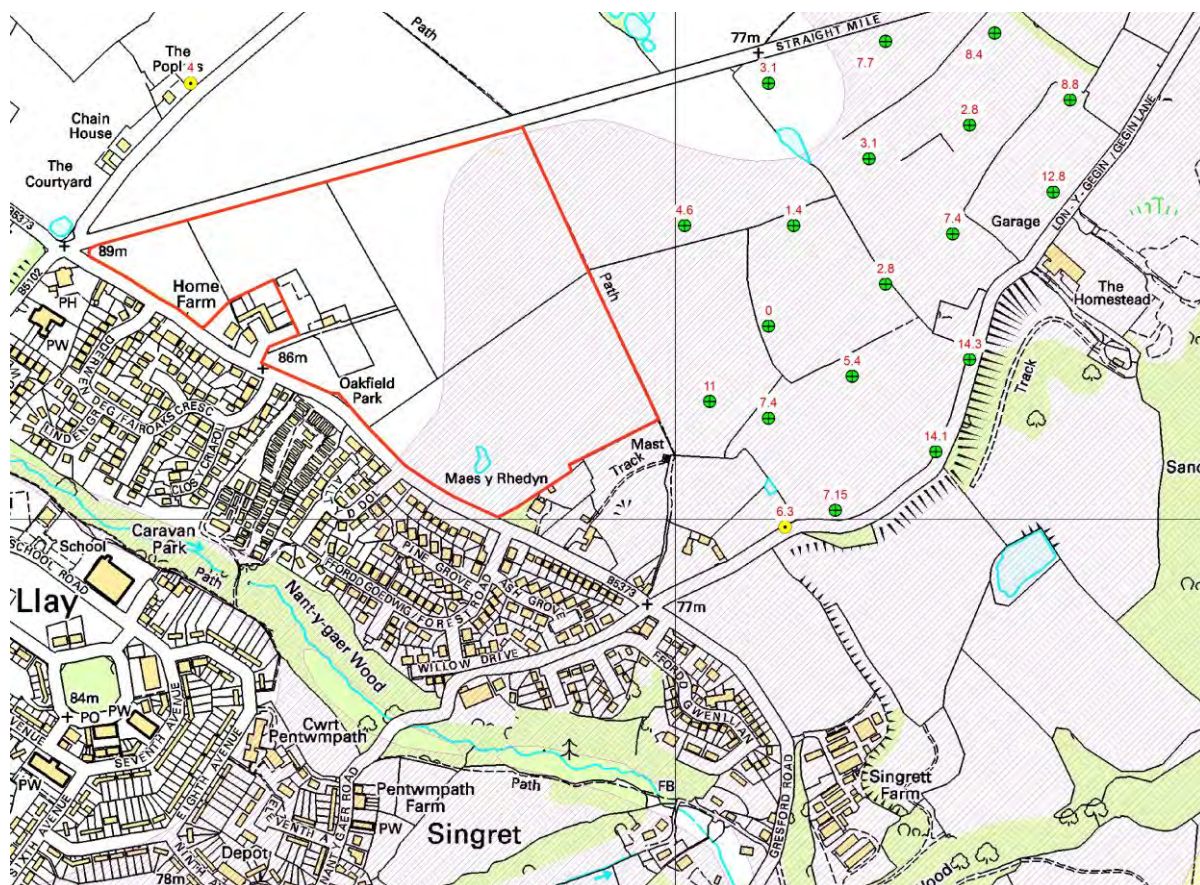


Figure 2.3: Thickness of the Upper Sand & Gravel unit (in metres) as recorded in Existing Boreholes surrounding the Home Farm site.

- 2.20 If anything, the average thickness of the Upper Sand & Gravel within the Home Farm site might be less than the average shown in Table 2.1 (because, as noted above, the general tendency seems to be for the thickness to increase towards the south and east)

Lower Sand unit:

- 2.21 The underlying Lower Sands appear to represent deposition of predominantly finer-grained material within a deltaic environment, in a glacial lake which existed between the Irish Sea ice sheet and the hills at the western margin of the Cheshire Plain. In that environment, gravels would tend to be less common and the deposits would be expected to contain increasing proportions of silt and clay.
- 2.22 This is borne out by the IMAU boreholes which provide details of the particle size distribution. Borehole BGS 43 (i.e. SJ35NW43) to the north of Home Farm reveals that 93% of the deposit is sand (mostly fine grained) with 7% fines (silt & clay). BGS 48 (SJ35NW48) to the south reveals 80% sand (again mostly fine grained) with 17% fines and 3% gravel. The predominance of fine sand, the high fines content and the lack of gravel all greatly reduce the economic viability of the Lower Sand unit compared with the Upper Sand & Gravel.