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Our Ref: 7471
Your Ref:
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Proposed Housing Development, Brookhouse Way Cheadle, Staffs.

Overview of Site Investigations and Foundations.

This review is of a set of site investigations which span 20 years, all relevant to the proposed housing development of 36 units as shown on the Planning Layout drawing A843/001 by Geoff Perry Associates Ltd.

Reports 1&2 relate to a larger area which incorporates a phase 1 area built out by Wimpey in the early 2000's
Reports 3&4 cover the proposed phase 2 area but draw on elements of report 1 the desk study. Report 4 undertakes the contamination testing and ground gas monitoring again, risk assessing them against current day standards.

Existing Reports.

The following reports are available relating to the subject site.

1. Desk Study (Phase 1) by Shepherd Gilmour Environment Ltd, Sept 1999
2. Ground Investigation (Phase 2) by Shepherd Gilmour Env' Ltd, March 2000
3. Phase 1 Risk Assessment by Shepherd Gilmour Environment Ltd, June 2014
4. Phase 2 Site Investigation by GeoCon Site Investigations Ltd, Feb 2019

1. The Desk Study report dated Sept 1999 Ref:- ME148/GAM/CH/F563 highlights the site had previously been used for opencast coal mining at varying depths up to 20m. It was also considered a possibility that unrecorded coal workings could exist below the opencast pit and beyond the headwalls that define the extent of the mining area. The historical maps and record plans of the opencast site have been used to inform the later reports.

2. The Site Investigation report dated March 2000 Ref:- ME148/GAM/CH/G241 was substantial covering the phase 1 & 2 site areas. This comprised 34 trial pits; 11 trial trenches; 11 boreholes and 13 rotary boreholes. The purpose of the investigation was to find the extremities of the opencast pits which had been in-filled some years earlier with "Engineered Fill" to promote the reuse of the site for development, light industrial sheds or housing.

3. The Phase 1 Risk Assessment report dated June 2014 Ref:- E0158IW(GS10328) undertook an updating of the Desk Study from 15 years earlier utilizing up to date risk assessment methods to highlight what updating would be needed to the intrusive Phase 2 site investigation. This used the Historic data from the original 1999 desk study which is not repeated in the updated report hence the need to reference. This indicated the need to update the chemical testing regime to check for any contaminants as defined by present day standards. The ground gas monitoring would also need repeating to ensure conditions had not changed and the results were assessed to current day standards. These standards for contamination and ground gas have become more onerous over the years since the first assessment.

4. The Phase 2 Site Investigation report dated Feb 2019 Ref:- E0158JL (GS10985) V5 involved 3 days of window sampling and 3 days of trial trenching to help verify ground conditions and the location of opencast head walls. Installation of 7

gas and groundwater monitoring wells monitored on 6 occasions over 3 months. A suite of chemical and geotechnical laboratory analysis. The conclusion of this testing addresses Planning Condition 25. Recommendations with regard to foundations, ground floor slabs and treatment of potential underground coal mining are all included in this report.

Risk Assessments.

Risk to Human Health:- The chemical determinants were found to be below the relevant screening criteria for residential units (8.3.1). It is considered that chemical contamination does not appear to be present beneath the site (8.3.2) In addition no asbestos fibres were detected (8.3.3) The risk to human end users is considered to be very low (8.3.5)

Risk to Controlled Waters:- The risk assessment indicates that the risks to groundwaters are considered to be *very low*.(8.4.7)
Risk to Surface Waters :- The risk assessment indicates the risks to surface water is considered to be *very low (8.4.13)*

The Ground Gas risk assessment indicated elevated carbon dioxide and methane levels categorising the site as Characteristic Situation (CS)2-low risk. (8.5.21) It is likely the site would be classed as Amber 1 under the NHBC traffic light system requiring low-level gas protection in the form of a membrane and ventilated sub-floor. (8.5.24)

Foundations, Slab & Coal Workings.

Given the depth of made ground, traditional foundations are considered not suitable and that piling be used to transfer the loads. (6.3.2)

Potential underground coal mining below the base of the opencast pit were encountered in the year 2000 SI (6.3.3) It is recommended that individual plots be rotary drilled to check for broken ground and grouted if found to ensure stability for a piled foundation solution. (6.3.4)

Suspended floor slabs and a ground beam system spanning between piles will be required. A ventilated under floor void will be required along with a gas membrane located on top of the suspended slab below a screed.

The predominantly clay colliery spoil used to infill the opencast pits is bound to have a variability. The geotechnical testing undertaken classifies the clay as low to high plasticity which under the NHBC classification results in the site having a low to high volume change potential. (6.2.3 & 6.2.4) Trees have been allowed to grow to semi mature height which even through some have been cut down, tree root influence will affect most plots requiring anti heave measures.

Report Prepared by:- Giles Burton, Consultant – Shepherd Gilmour (Leeds) Ltd.