**Client :** **CASTLEMEAD GROUP LTD**

**Project Title :** **RESIDENTIAL DEVELOPMENT AT WOODLANDS FARM, DODDS LANE, GWERSYLLT, WREXHAM, LL11 4NS**

**Document Title:** **PHASE 4 - SITE REMEDIATION VERIFICATION REPORT**

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Plate 7 – Plot 4



Plate 8 – Plot 4 soil depth 450mm



Plate 9 – Plot 5



Plate 10 – Plot 5 soil depth 450mm



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## 1. INTRODUCTION.

### 1.1 Background and Terms of Reference

1.1.1 Castlemead Group Ltd has instructed e-geo Solutions Ltd to prepare a Site Remediation Validation Report for site remediation works carried out at a new residential development on land known as Woodlands Farm on Dodds Lane in Gwersyllt, Wrexham.

1.1.2 The site was previously agricultural land for the whole of its recorded history with farm buildings, and a former fishpond in the northeastern corner. The whole proposed development comprises 77 residential units with 23 constructed under the present phase on the west side of the site area.

1.1.3 To allow the safe development of the site remediation activities were carried out to address planning conditions and to ensure the site was 'fit for use'. The site remediation activities undertaken were detailed in a report titled:

*Remediation Strategy, Proposed Residential Development, Woodlands Farm, Dodds Lane, Gwersyllt, Wrexham. For Anwyl Partners. Report Reference: 14155/REM/002 dated 23rd May 202 by Robert E Fry & Associates Ltd.*

1.1.4 The Remediation Strategy Implementation Plan Report was based on the findings of previous studies at the site which included:

- *Geo-Environmental Investigation Report No. 14155 dated April 2015; by Robert E Fry & Associates Ltd.*

1.1.5 The objective of this Verification Report is to demonstrate and confirm that the site remediation works undertaken in garden areas has been implemented in accordance with the remediation proposals, and that the specific remediation objectives have been met.

1.1.6 This report presents details and evidence of the works carried out and details of placed materials used in the remediation works.

1.1.7 The report has been prepared by e-geo Solutions Ltd for the sole use of the Client, for the purposes described and no extended duty of care applies to other parties. The comments given, and opinions expressed are based on the information collated from site observations and the analysis of samples, however there may be outstanding information and data which becomes available at a later date which has an impact on the overall conclusions.

1.1.8 The copyright of this report and its contents prepared by e-geo Solutions Ltd is solely owned by e-geo Solutions Ltd. Neither this report nor contents prepared by e-geo Solutions Ltd may be reproduced, published or adapted without the express written approval of e-geo Solutions Ltd.

### 1.2 Site Location

1.2.1 The development site is located to the northeast of Dodds Lane and on the east side of Gwersyllt, near Wrexham. There is an existing housing estate to the west and agricultural land to the north and east and Dodds Lane to the south. The site location is shown on Figure 1 and development boundary on Figure 2 and is centred at Grid Reference SJ 32328 53192.





## 5. VERIFICATION.

### 5.1 Depth of Placed Clean Cover System Materials

5.1.1 Topsoil and subsoil materials have been imported to the site for use as a clean cover material and placed in the garden areas of properties. Observation pipes comprising 100mm diameter drainage pipe were placed in garden areas during soil placement to allow final depth measurement of placed soils.

5.1.2 A high visibility geotextile has been placed on the original ground surface and below the clean cover system in garden areas and was observed at the base of the observation pipe in each garden area.

5.1.3 The depths of soil materials as measured in the observation pipes is presented below:

| PLOT NR | Soil Depth (Subsoil + Topsoil) mm |
|---|---|
| Plot 1 | 650 |
| Plot 2 | 520 |
| Plot 3 | 520 |
| Plot 4 | 450 |
| Plot 5 | 450 |
| Plot 6 | 450 |
| Plot 7 | 480 |

5.1.4 Photographic evidence of soil material placement and the achieved depths is presented below:



Plate 1 – Plot 1



Plate 2 – Plot 1 soil depth 650mm

## 2. SITE CHARACHTERISTICS

### 2.1 Site Description and Topography

2.1.1 Prior to commencement of the residential development the site was agricultural land with derelict farm buildings around a farmyard. There was a pond in the northeast corner of the site but off the present development phase.

### 2.2 Ground and Groundwater Conditions

2.2.1 The site was the subject of a programme of extensive investigation works undertaken by Robert E Fry & Associates Ltd with the findings detailed in a report 'Geo-Environmental Investigation Report No. 14155 dated April 2015'. The investigations which covered the whole site area identified the presence of an upper layer of topsoil varying in thickness of 0.10m – 0.40m, overlying natural strata of glaciofluvial deposits.

2.2.2 A localised area of made ground was identified comprising of silts, sands and gravels with brick, concrete and mudstone, extending to a depth in excess of 3.45m, in the northeast corner of the site and associated with the location of the former fishpond. This was not within the current development phase.

### 2.3 Site Contamination

2.3.1 The results of sampling and analysis presented in the report *'Geo-Environmental Investigation Report No. 14155 dated April 2015 Robert E Fry & Associates Ltd'* recorded no elevated metals, PAH compounds, Inorganics, Petroleum Hydrocarbons or Organochlorine Pesticides within any of the topsoil or ground samples with the exception of one sample with elevated arsenic in made ground associated with the infilled pond. This is not within the current development phase.

2.3.2 Four gas wells were installed within windowless sample boreholes and monitored by Robert E Fry & Associates Ltd to determine the extent of any potential hazards relating to ground gas from the infilled pond. Low concentrations of methane and carbon dioxide were identified with methane reaching maximum concentration of 0.0% v /v and carbon dioxide reaching a maximum concentration of 6.9% v /v. The gas monitoring programme did not identify any flows of ground gases. Based upon the monitoring data the gsv's indicate characteristic situation 1 (NHBS Green) for the development area.

2.3.3 The desk study information has identified that the site is within a radon affected area where 10 – 30% of properties are subject to elevated radon emissions and therefore all properties will require full radon protective measures.

2.3.4 The farmyard area in the southwest corner of the site, which included an existing residential property and other dilapidated farm buildings, was not investigated and if any visual or olfactory evidence of contamination is noted during development then further investigations including sampling and testing will be required.

### 2.4 Proposed Development

2.4.1 The current phase of the development comprises 23 residential units with associated car parking and access roads. The layout is shown as Figure 2.



RESIDENTIAL DEVELOPMENT AT WOODLANDS FARM, DODDS LANE, GWERSYLLT, WREXHAM, LL11 4NS
PHASE 4 - SITE REMEDIATION VERIFICATION REPORT

## 3. REMEDIATION STRATEGY.

### 3.1 Site Conceptual Model and Risks

3.1.1 The results of the intrusive ground investigation and laboratory analyses did not identify any potential contamination risk from ground materials at the development site.

### 3.2 Site Remediation Proposals

3.2.1 The proposed remediation works at this whole site involve the following works:-

- Removal of existing buildings and hard standing within the farmyard area in the southeast corner.
- Provision of surface capping as required within the area of deep fill in the northeastern corner of the site. (outside present development phase)
- Removal of unsuitable surface materials of concrete, tarmac, brick from the soft landscaping areas surrounding the deep made ground deposits of the former fishpond in northeast corner (outside present development phase).

### 3.3 Site Remediation Approach

3.3.1 Details of the approach to remediation for external garden areas are detailed in a report *'Remediation Strategy, Proposed Residential Development, Woodlands Farm, Dodds Lane, Gwersyllt, Wrexham. For Anwyl Partners. Report Reference: 14155/REM/002 dated 23rd May 202 by Robert E Fry & Associates Ltd'*

3.3.2 For the present development phase of Plots 1 to 23 and specifically for Plots 1 to 7 the approach to remediation involved:

***Preparatory Works*** – *Removal of area* of concrete & tarmac hard standing prior to construction phase of work.

***Garden Areas*** – In residential front garden areas where levels are to be raised at least 450mm of suitable capping layer should be placed. Capping should comprise of clean inert material which should be confirmed by chemical analysis in accordance with the remediation strategy.