SANDRINGHAM ROAD
CHEADLE HULME
STOCKPORT

GEO-ENVIRONMENTAL INVESTIGATION AND ASSESSMENT
FOR
STOCKPORT HOMES

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1.0 INTRODUCTION

Appointment

1.1 WML Consulting was commissioned by Stockport Homes to undertake a Geo-environmental Investigation and Assessment of a site at Sandringham Road, Cheadle Hulme, Stockport.

Proposed Development

1.2 It is understood that current development proposals comprise the demolition of existing residential garages and removal of trees to construct new two storey houses with associated gardens, access road and paved areas. A proposed development plan (Pozzoni Architects P2799-SK04, October 2011) is provided in Appendix 01.

Objective

1.3 The objective of the Ground Investigation and Assessment was to provide geotechnical recommendations for construction design purposes together with a geoenvironmental risk assessment in terms of possible ground contamination.

1.4 To achieve the objective, the following tasks were undertaken:

- Establish, through undertaking a Phase 1 Desk Study, the geological, hydrogeological and environmental setting of the site so as to identify any potential ground constraints to development through a site specific conceptual model and to design an appropriate Phase 2 Ground Investigation in accordance with the Environment Agency (2004) Model Procedures for the Management of Land Contamination, CLR11.
- Characterise the ground conditions both in terms of soil geotechnical parameters and ground contamination from information provided by an appropriate Ground Investigation
- Provide recommendations regarding suitable foundations, floor slabs and new pavement construction, together with any other geotechnical considerations that could affect possible future development.
- Determine a ground conceptual model for the site so as to undertake an appropriate Phase 2 Generic Quantitative Risk Assessment (GQRA).

Scope

1.5 The Phase 1 Desk Study has been undertaken and is presented in the following WML Consulting report:

- Phase 1 Desk Study and Preliminary Geoenvironmental Assessment (Reference 5062/G/01, dated 9th January 2012).

1.6 This report includes the findings of an appropriate Phase 2 Ground Investigation designed on conclusions and recommendations provided in the Phase 1 Report. For ease of reference, the findings of the Phase 1 Desk Study are summarised in the following sections. The two reports however are not exclusive and should be read in conjunction.

2.0 SITE LOCATION AND DESCRIPTION

Site Location

2.1 The site is located at the end of Sandringham Road which is a cul-de-sac within a housing estate in Cheadle Hulme, Stockport, Cheshire. The site is centred on approximate Ordnance Survey National Grid Reference 387422, 387490 and has an area of around 0.16 hectares. Abutting the northern site boundary is an area of open land running down to Micker Brook, some 30m to the north-west at its nearest point.

2.2 A recreational playing field is located adjacent to the eastern boundary. The western site boundary is formed by fencing to existing domestic houses while Sandringham Road forms the southern boundary. A topographical survey plan of the site is presented in Appendix 01.

Site Description

2.3 The site is currently occupied by domestic garages which take up the central area and are lined in a roughly east to west direction. The garages appear to be formed at least in part by asbestos cement sheeting although the westernmost structure is of brick construction. A fence line with several mature trees delineates the garage area from open parkland to the north. It is understood that the proposed development will take up part of the parkland which is currently covered in rough grass. The parkland is accessed through the eastern area of the site.

2.4 The area to the south of the garages is covered in the main by hardcore with further mature trees within a grassed 'island' on the southern boundary. Sandringham Road terminates at the south of the site.

2.5 Two sewers are known to cross the site in a roughly north-south alignment. These flow northwards with one discharging into Micker Brook and the other connecting with a main sewer network to the north of the site.

2.6 A small area of trees and overgrown hedges separate the east of the site from the playing fields and existing footpaths running east and north-west of the site.

3.0 SUMMARY OF ENVIRONMENTAL AND HISTORICAL SETTING

3.1 The following paragraphs summarise the most relevant findings of the Phase 1 Desk Study report.

3.2 The site is indicated to be immediately underlain by Alluvium with Glacial Till occurring beneath this. These strata are underlain by gravelly sandstone of the Chester Pebble Beds Formation. The underlying geology is such that the site is not at risk from shallow coal workings.

3.3 There are no proven or conjectured geological faults recorded beneath or within influencing distance of the site.

3.4 The property is not in a Radon Affected Area as defined by the Health Protection Agency. Therefore no radon protection measures are necessary.

3.5 The alluvial deposits beneath the site have been classified by the Environment Agency as a Secondary A Aquifer (formerly Minor Aquifer). The underlying Glacial Till is however recorded as unproductive, being of low permeability and negligible significance for water supply.

3.6 The solid geology beneath the site is recorded as a Primary Aquifer (formerly Major Aquifer). However, the site is not shown to be within an Environment Agency groundwater Source Protection Zone.

3.7 The nearest recorded Surface and Potable Water Abstraction licenses together with the nearest recorded Groundwater Abstraction licence are all considered sufficiently remote as not to be affected by the site.

3.8 The nearest Detailed River Network entry is Micker Brook which is located approximately 30m to the north-east of the site and is a Primary River. As such it may be considered by the Agency as a sensitive receptor.

3.9 The nearest recorded operational landfill is considered sufficiently remote from the site as not to provide an influence.

3.10 The nearest historic landfill is located some 215m to the north of the site. The license was operational from 1979 to 1985 for the disposal of Inert, Industrial, Commercial, Household, Special waste and Liquid Sludge. The distance from the site, together with the intervening geology and topography are factors that probably determine that the landfill poses negligible risk to the development.

3.11 There are no operational or non-operational waste treatment, transfer or disposal facilities recorded within 500m of the site.

3.12 There are 3 no. recorded industrial sites within 250m of the subject site. The nearest two locations are associated with the sale of building products and services and are therefore not deemed to be of influence. An electricity sub-station is located around 140m to the south-west of the site although this is sufficiently distant as not to be considered of potential influence.

3.13 There are no Petrol Fuel Sites recorded within 500m of the subject site.

3.14 There are no dangerous or hazardous processes requiring permits and/or authorisations within influencing distance of the site.

3.15 There are no recorded potentially harmful Discharge Consents to public sewer or to Controlled Water within 500m of the site. The nearest Licensed Discharge Consent is recorded around 235m to the north-west for Storm Overflow into Micker Brook. However, it is known that sewers discharge into the Brook at greater proximity to the site.

3.16 There are no Environment Agency recorded pollution incidents within 500m of the site.

3.17 No records exist of sites which have been determined as Contaminated Land under Section 78R of the Environmental Protection Act 1990 within 500m of the study site.

3.18 There are no designated environmentally sensitive sites within 500m of the focus area.

3.19 It should be noted that an ecological assessment of the site falls outside the brief of this report and that an ecological specialist should be consulted in this regard.

3.20 The site is located approximately 20m to the south-west of Micker Brook which is located within an Environment Agency designated Zone 2 and 3 floodplain.

3.21 A site specific Flood Risk Assessment may therefore be required in planning.

3.22 Historically, no significant development has occurred on site with the exception of several small domestic garages. Surrounding agricultural land has been subject to residential development but with no notable industrial usage. The likelihood of significant contamination occurring at the site due to its past use is therefore considered low, although it cannot be discounted that possible localised fuel and/or oil spillages relating to the domestic garage activities may have occurred.

4.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

4.1 Based on the above findings, the Phase 1 Desk Study report provided the following Preliminary Conceptual Model and Risk Assessment for development of the site for domestic housing with associated gardens, access road and pavements.

Source	Pathway	Receptor	Linkage	Comment
The site has not been subject to extensive past development although its use in part as domestic garages may have resulted in localised spillages of hydrocarbons. Localised areas of possible Asbestos Containing Materials (ACM), cannot also be discounted at this stage.	Direct contact, ingestion of soil, dermal contact, dust exposure pathways.	Current Site Users	Unlikely	No significant contamination is anticipated. The site is currently covered partially by hardstanding with the remainder being grassed or covered by fairly dense undergrowth. As site use and hence exposure is periodic, the risk to current site users is considered LOW.
		Site End Users	Possible	Although no significant contamination is anticipated, localised areas of ground contamination cannot be discounted at this stage. A LOW to MEDIUM preliminary risk is therefore assessed until such time as further ground investigation information is available.
		Construction Workers	Unlikely	Construction workers will be exposed to sub-soils at the site during earthworks and foundation construction. Any perceived contamination risks will however be mitigated by adopting good site working practices including appropriate Health and Safety measures during the works, thus providing a VERY LOW preliminary risk.
		Adjacent land users	Unlikely	Contact via wind-blown dust/ debris, particularly during the development phase is possible. The current risk is considered VERY LOW although this would increase during construction works. Appropriate dust control measures will therefore be required as part of good site working practices during construction.
	Uptake of possible contaminants in garden area.	Plants	Possible	Although no significant contamination is anticipated, localised areas of ground contamination cannot be discounted at this stage. However, a LOW preliminary risk is assessed for plant growth this will need to be confirmed by ground investigation.
The likelihood of significant soluble and/or liquid and therefore mobile contaminants occurring at the site due to its past use is considered low, although localised spillages resulting from the	Direct downward migration through leaching and/or mobile liquids.	Groundwater	Unlikely	No significant source of mobile contamination is envisaged at the site. Therefore the perceived risk to groundwater is considered LOW. However a precautionary approach is considered appropriate until such time as the low risk is confirmed by ground investigation.

Source	Pathway	Receptor	Linkage	Comment
domestic garage use cannot be discounted.	Off-site migration in groundwater or surface water flow.	Surface water	Possible	Whilst no significant source of mobile contamination is envisaged at the site, Micker Brook, which is a Primary River, is located within 30m of the site. As existing sewers running through the site discharge into the river, a precautionary approach is taken at this time until further ground investigation is undertaken. The perceived risk to surface water is therefore considered LOW to MEDIUM.
		Groundwater/surface water abstractions	Unlikely	The site is not within an Environment Agency Source Protection Zone and the nearest groundwater abstraction is more than 1km from the site. Also there is no recorded surface water abstraction within 750m or potable abstraction within 1km of the site. The risk to groundwater/surface water abstractions is therefore considered VERY LOW.
		Adjacent Properties	Unlikely	No significant contamination source is envisaged at the site. Any possible sources of hydrocarbon contamination will likely be localised with low probability of migrating to adjoining properties. Therefore the preliminary risk to adjacent domestic properties is considered LOW.
		Ecology	Unlikely	There are no ecologically sensitive sites within influencing distance of the subject site. The risk to ecology is therefore considered VERY LOW.
The likelihood of significant volatile contaminants occurring at the site due to its past use is considered low.	Inhalation of harmful vapours (indoor and outdoor airspaces)	Current Site Users	Unlikely	No significant contamination source is envisaged with a significant external inhalation pathway not envisaged. Therefore the current risk from inhalation of indoor/outdoor air is considered VERY LOW.
		Site End Users	Possible	Although significant contamination sources are not anticipated they cannot be wholly discounted at this stage until ground investigation information is available. The preliminary risk from inhalation of indoor vapours in the proposed buildings is therefore assessed as LOW to MEDIUM.
		Construction Workers	Unlikely	In the unlikely event of construction workers coming into contact with possible volatile compounds, the exposure time will be relatively short. The risk to construction workers, assuming that appropriate health and safety measures will be adopted, is therefore considered VERY LOW.
		Adjacent Properties	Unlikely	Significant concentrations of volatile contaminants are not envisaged. In addition, a plausible pollution linkage through relatively impermeable Glacial Till is unlikely. The potential risk to adjoining site users is therefore considered LOW.

Source	Pathway	Receptor	Linkage	Comment
The site is not within influencing distance of any recorded landfill. No significant thickness of degradable Made Ground is envisaged.	Emissions from the ground collecting in confined spaces and excavations	Construction/ services maintenance workers	Unlikely	A significant thickness of potentially degradable material on site is considered unlikely therefore the potential to generate significant volumes of toxic and/or flammable/explosive gas is low. Assuming that appropriate health and safety measures will be adopted during construction, the preliminary risk is therefore considered VERY LOW.
	Migration of gases on/off site and collecting in confined spaces on/off site.	Adjoining site users	Unlikely	A significant thickness of potentially degradable material on site is considered unlikely therefore the potential to generate significant volumes of toxic and/or flammable/explosive gas on site is low. The potential risk to adjoining site users is therefore considered LOW although this will need to be confirmed by appropriate ground investigation.
		Current/future site users	Unlikely	The potential to generate significant quantities of toxic and/or flammable/explosive gas on site is low. In addition, as there are no landfills within influencing distance of the site, the perceived risk to site end users is therefore considered LOW. This will need to be confirmed by appropriate ground investigation
The site is not in an area which is affected by naturally occurring radon gas.	Natural emissions from the ground collecting in confined spaces within buildings	Site end users	Unlikely	The site is not located in an area where radon protection measures are required. No further action is necessary regarding radon protection as the risk is VERY LOW.
Chemicals which could prove aggressive to construction materials may be present on site.	Direct contact	Construction concrete, plastic water pipes.	Unlikely	Any risks to construction materials identified after site investigation and assessment will be mitigated as part of the structural design. The perceived risk is therefore considered LOW.

4.2 Under the proposed development scenario, most of the potential pollution linkages have been considered unlikely with associated preliminary risks generally being assessed as low.

4.3 However, as the localised presence of ground contamination resulting from the site's partial use as domestic garages cannot be wholly discounted, ground investigations were considered necessary not only to provide parameters for geotechnical design but also to verify uncertainties in the conceptual model.

5.0 SITE INVESTIGATION

Rationale

5.1 Intrusive investigations were undertaken primarily to provide geotechnical parameters for structural design purposes but also to verify uncertainties in the preliminary site conceptual model.

5.2 Window sample probeholes were undertaken to provide geotechnical information on near surface deposits and to provide samples for chemical analysis. A general coverage of the site was considered appropriate with due consideration of the presence of services which crossed the site. In addition, no investigations were possible within the footprints of the current residential garages although this is not considered critical in light of the site's historical setting.

5.3 Standpipes were installed in selected probeholes for the measurement of standing groundwater levels. The standpipes were also utilised for the measurement of ground gas so as to confirm the anticipated low associated environmental risk.

5.4 In view of no specific historical contaminative use at the site, chemical analysis of a general suite of contaminants of concern was undertaken on selected samples of soil so as to provide a Generic Quantitative Risk Assessment and to establish the chemical suitability of soils for re-use within the development.

Intrusive Works

5.5 Ground Investigation work was undertaken by Geo-Ventures Limited on 12th December 2012. This comprised the formation of 5no window sample probeholes to a depth of 4.45m.

5.6 The window sample logs are presented in Appendix 02 of this report.

Monitoring Standpipe

5.7 Monitoring wells for groundwater and ground gas measurements were installed in 3no probeholes as indicated on the logs presented in Appendix 02 of this report.

Geotechnical and Chemical Testing

5.8 In-situ geotechnical testing was undertaken at regular intervals during the formation of the probeholes in the form of Standard Penetration Tests (SPTs). The results for this testing are presented on the descriptive logs in Appendix 02.

5.9 Geotechnical classification testing was undertaken on selected samples for the following:

- Natural Moisture Content;
- Liquid and Plastic Limit;

5.10 The results of the geotechnical testing are presented in Appendix 03 of this report.

5.11 Chemical analysis was undertaken on selected samples for the following contaminants of concern:

- Total Arsenic, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Chromium VI.
- Total Cyanide, Phenols, Suphur.
- 2:1 water/soil suphate extract, pH.
- Speciated USEPA Polyaromatic Hydrocarbons (PAH).
- Asbestos identification.

5.12 The results of the chemical analysis are presented in Appendix 04.

Gas and Groundwater Monitoring

5.13 Gas and groundwater monitoring has been carried out on three occasions between 3rd and 24th January 2012. The monitoring results are presented in Appendix 05.

6.0 GROUND CONDITIONS

Stratigraphy

6.1 Ground conditions encountered during the intrusive investigation generally confirm those identified in the published literature and in summary comprise thin made ground or topsoil overlying cohesive and granular natural deposits of Alluvium and/or Glacial Till.

Topsoil and Made Ground

6.2 Topsoil was encountered in the grassed area to a depth of 0.20m below ground level (bgl). In other areas made ground was encountered to a maximum depth of 0.45mbgl, being generally described as tarmac, stone fill and ash with broken brick.

Natural Deposits

6.3 The topsoil/made ground was immediately underlain by brown sandy clay with occasional thin bands of sand and is considered to be alluvial in nature. This stratum extended to depths of between 2.00 and 2.70mbgl where it was underlain generally by greyish brown and orange brown sand of varying constituents including gravel.

6.4 A deeper clay band was encountered locally beneath the sand layer at depths of 2.80 and 3.90mbgl in WS1 and WS3 respectively which probably represent the Glacial Till horizon. The sand layer extended to at least 4.45mbgl in all other window sample holes.

6.5 SPT 'N' values for the upper alluvial clay horizon ranged from 3 to 11 with an average of 6 indicating a soft consistency. However, as the clay was described in the window sample logs as being generally stiff, this may indicate that a degree of desiccation of the upper layers has occurred.

6.6 SPT 'N' values for the lower Glacial clay horizon ranged from 10 to 14 with an average of 12 indicating a firm consistency.

6.7 Laboratory Test results for the upper and lower clay strata indicate natural moisture contents of between 15 and 32% and generally decreasing with depth. Liquid limits of 32 to 49% with corresponding Plasticity Indices of 15 to 26% indicate the clay to be of low to intermediate plasticity and volume change potential.

6.8 SPT 'N' values measured in the granular horizons range from 7 to 15 with an average of 11, indicating a generally medium density.

Visual/Olfactory Evidence of Contamination

6.9 No visual and/or olfactory evidence of ground contamination was identified during the investigation.

Groundwater

6.10 No groundwater entries were recorded during the formation of the window sample probes.

6.11 Subsequent monitoring of standing water levels within standpipes indicated groundwater generally at approximate depths of between 0.75 and 1.25mbgl.

6.12 It should be appreciated that the groundwater monitoring described above was undertaken during a very short period of time. Significant variations in the long term groundwater regime may occur at other times, particularly with prolonged, extreme weather conditions, and that no account can be taken of such in this report.

General

6.13 It should also be appreciated that ground conditions may vary between and away from the exploratory hole positions, and that no account can be taken in this report of such variations.

7.0 GEOTECHNICAL APPRAISAL

Site Preparation and Earthworks

7.1 Current development proposals comprise the construction of two storey residential dwellings with associated gardens, car parking and road access.

7.2 Site preparation will include the removal of residential garages which appear in part to be constructed of asbestos cement sheeting. No removal of these structures should proceed until advice has been sought from an asbestos specialist on how the material should be safely removed from site.

7.3 All services should be exposed and, where required, diverted to facilitate construction of new foundations. Redundant service runs and drains should be removed.

7.4 Following removal of any foundations and services, excavations should be backfilled with well compacted suitable granular fill.

7.5 The site is relatively flat and generally level with surrounding land. No significant earthworks are therefore anticipated.

7.6 Site preparation will include the removal of several mature and immature trees and bushes. It is recommended that the advice of an ecological specialist and arboriculturalist should be sought prior to removal of any vegetation and structures from the site.

Foundations and Floor Slabs

7.7 As the proposed development is to comprise low rise dwellings, structural loads will be relatively light. Notwithstanding this, made ground should be considered unsuitable for the direct support of structural loads as it may be loose / soft and variable in nature, resulting in unacceptable total and differential settlements.

7.8 The underlying upper alluvial clay has been described as generally stiff although this is contradicted to a degree by the low SPT 'N' values recorded in this stratum. Variable moisture contents may suggest that a degree of desiccation is occurring at shallow depth and it is considered that the effects of clay shrinkage/heave from tree root action or tree/hedgerow removal will be the influencing factor on the depth of foundations to the proposed development. This will need to be addressed on receipt of an appropriate tree survey report.

7.9 Identification of the nearby tree species will determine their water demand as provided in Appendix 4.2-A of NHBC Standards 2010, Foundations, Chapter 4.2, *Building Near Trees*. Assessment as to the clay shrinkage/swelling potential resulting from tree root action should be undertaken in consideration of a medium volume change potential for the clay.

7.10 It cannot be discounted at this stage that foundations may need to be taken down beyond the upper alluvial clay stratum and into the underlying granular deposits at depths generally of between 2.00 and 3.00mbgl to compensate for the possible effects of clay shrinkage/heave together with possible soft clay zones. Excavations to this depth will likely encounter groundwater at shallow depth and will thus need to be adequately dewatered and supported. This may therefore render the adoption of a mass concrete trench fill foundation option impractical and uneconomical.

7.11 Foundation construction will also need to take account of any remaining services and, where they are in close proximity, may need to be taken down to beneath the lowest level of the service trench so that their structural integrity is maintained.

7.12 In view of the above, it cannot be discounted that piled foundations may need to be adopted as the preferred solution. This will need to be considered in light of the proximity of the existing dwellings and the need to keep noise and vibration effects to a minimum. A bored pile solution is therefore likely to be preferred in this respect.

7.13 In light of likely near surface heave effects from tree removal, floor slabs should be constructed as suspended.

Pavements

7.14 Pavement formations will need to be thoroughly inspected after the removal of vegetation, topsoil and hardcover with any unsuitable materials being removed. Pavements constructed on natural cohesive soils should be designed to a California Bearing Ratio (CBR) of no more than 2.5%. This should be confirmed by in-situ testing at formation prior to final design and construction.

7.15 Notwithstanding this, the formation at any level should be proof-rolled prior to pavement construction with any soft zones thus revealed being excavated and replaced with appropriately graded and engineered granular fill.

Excavations and Groundwater

7.16 The groundwater table is currently standing at depths of 0.75 to 1.25mbgl. As such, the presence of groundwater inflow into shallow excavations may be anticipated and conventional 'sump and pump' dewatering measures will be required to keep excavations dry. Also excavations will need to be adequately supported to maintain their stability.

Concrete Design

7.17 Design/mix of buried concrete should be undertaken in accordance with the "Aggressive Chemical Environment for Concrete" (ACEC) classification, of BRE Special Digest 1:2005 (Concrete in Aggressive Ground). With reference to the site history, it is deemed necessary to classify the site as "Brownfield", with respect to BRE Special Digest.

7.18 Results of 2:1 water/soil extract for sulphate do not exceed 0.1g/l. Values of pH range from 7.9 to 9.0. On the basis of these results, the typical design sulphate (DS) class and "Aggressive Chemical Environment for Concrete" (ACEC) class for the site are DS-1 and AC-1 respectively.

8.0 GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)

General

8.1 The Desk Study report has concluded that, due to the absence of historic contaminative land use, the potential for a significant pollution linkage to be present at the site is low.

8.2 Further to this, no visual or olfactory evidence of significant ground contamination was recorded during the ground investigation.

8.3 Notwithstanding this, chemical analysis was undertaken on selected samples of soil to confirm the anticipated low environmental risk and to assess the suitability of existing soils, and specifically topsoil, for re-use in proposed garden areas.

Human Health

8.4 Selected samples of made ground, topsoil and underlying natural deposits have been analysed for a general suite of contaminants of concern and compared against Generic Assessment Criteria (GAC) for human health to determine the significance of the measured concentrations in relation to the site conceptual model. Thus a Generic Quantitative Risk Assessment has been undertaken in line with guidelines provided in CLR11, Model Procedures for the Management of Land Contamination, 2004.GQRA).

8.5 The GAC used in the assessment primarily comprise published Soil Guideline Values (SGV) and values that have been derived using the Contaminated Land Exposure Assessment (CLEA) guidance as provided by DEFRA and the EA. In the latter case, values derived by Land Quality Management Limited (LQM) on behalf of the Chartered Institute of Environmental Health (CIEH) and presented in their publication 'Generic Assessment Criteria for Human Health Risk Assessment', 2009, have been used. Where contaminants are not covered by the above guidelines, GAC have been sourced from previously withdrawn SGV's.

8.6 The proposed end-use comprises new domestic houses with associated gardens which relates to the "Residential" land-use scenarios considered in the CLEA guidance.

Controlled Waters

8.7 GAC for the assessment of leachable contaminants have been derived from the following:

- UK Drinking Water Standards as defined by The Water Supply (Water Quality) Regulations 2000;
- UK Environmental Quality Standards (EQS).

Results

8.8 A table of GAC protective of human health is provided in Appendix 06. Comparison of results against these criteria indicates that of the four samples analysed, two contain concentrations of contaminants which exceed their relevant GAC's. These relate to exceedences of arsenic (260mg/kg), vanadium (85mg/kg) and several PAH compounds including Benzo(a)pyrene at 24mg/kg.

8.9 The two samples containing the elevated levels of contaminants were taken from a layer of ash-type made ground at shallow depth in the area of hardstanding in the west of the site.

8.10 No asbestos was identified in the samples analysed.

8.11 Comparison of the leachate test results against the drinking water standards indicates that PAH is slightly elevated above the standard required at the consumer's taps.

Discussion

8.12 The level of contamination in the ash-type material renders it unsuitable for re-use in garden areas although it may be considered for re-use as capping material beneath roadways and hardstandings subject to it being suitable in engineering terms. Consideration of this material for re-use would involve careful segregation and storage to prevent cross-contamination of suitable, uncontaminated materials. In light of the restricted nature of the site this may not prove practical and in view of the anticipated volume, it may therefore be considered preferable to remove it from site.

8.13 Topsoil and underlying natural soils arising from the construction works will, however, be suitable for re-use in garden areas.

9.0 GROUND GAS RISK ASSESSMENT

Methodology

9.1 Current guidance for the assessment of risk associated with the presence of hazardous ground gases (principally methane and carbon dioxide) is provided in two key documents, namely:

- Code of practice for the Characterisation and Remediation from Ground Gas in Affected Developments. British Standard Institution (BS 8485: 2007); and
- Assessing Risks posed by Hazardous Ground Gases to Buildings CIRIA (C665, 2007).

9.2 The assessment presented herein is primarily based on the BS 8485 document.

9.3 Hazardous ground gas qualitative risk assessment is based on a conceptual model similar to that used for soil and groundwater contamination sources (i.e., source-pathway-receptor pollutant linkages). A semi-quantitative estimate of risk can be assessed based on knowledge of the conceptual model and a measure of hazardous gas concentration and gas flow at the site within monitoring standpipes.

9.4 Based on the measured flow rates and hazardous gas concentrations, individual "hazardous gas flow rates" (Q_{hg}) can be derived for each monitoring point, from which the "site characteristic hazardous gas flow rate" (Q_{hgs}), and then the "Characteristic Situation" can be determined.

9.5 BS8485 provides guidance on the level of gas protection requirements based upon the characteristic situation and the type of development (e.g. non-managed property such as private housing, or managed properties such as public buildings, commercial buildings or industrial buildings).

Ground Gas Conceptual Model

9.6 The site is not in an area recoded as being affected by naturally occurring radon gas.

9.7 The Desk Study report indicates that there are no recorded operational or closed landfills within influencing distance of the site.

9.8 No degradable material with the potential to generate significant concentrations of ground gas has been identified in the ground investigations.

9.9 The underlying geology does not include Coal Measures strata which could have the potential to release hazardous ground gas.

9.10 In consideration of the above, the preliminary risk to the development from ground gas has been assessed as low. However, it has been considered prudent to confirm this by undertaking limited ground gas monitoring, primarily for methane and carbon dioxide, with associated flow rates, on three occasions between 3rd and 24th January 2012.

9.11 The results confirm the anticipated ground gas conditions with no detectable levels of methane and a maximum carbon dioxide concentration of 0.1% by volume in air (v/v) being recorded on one occasion. No gas flows or pressures were recorded in the standpipes. The Hazardous Gas

Flow Rate, calculated from peak concentrations and flow is therefore 0.0001l/hr. On this basis and in consideration of the gas concentrations, the site would fall into Characteristic Gas Situation 1 (Very Low Hazard Potential) as indicated in BS8485, confirming the preliminary low gas risk assessment.

9.12 Therefore, no further action is considered necessary with respect to ground gas.

10.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS

Waste Soils Characterisation

10.1 Excavation works undertaken during the development are likely to produce waste soils for which appropriate waste management will be required. Any waste soils should be considered for re-use where possible by incorporation into the development.

10.2 In this respect, chemical analysis has determined that topsoil and sub-soil at the site is not contaminated and thus suitable for re-use within the proposed development. Where topsoil is to be re-used it should be stockpiled separately from other construction materials and covered to prevent mixing with other soils and leaching of nutrients by rainwater infiltration. Any topsoil requiring disposal will be classified as non-hazardous due to its inherently organic content.

10.3 The level of contamination within the ash-type made ground renders this material unsuitable for use in garden areas. Where it cannot be re-used effectively beneath hardstanding areas and thus becomes surplus to requirements, it is likely to be classified as non-hazardous waste for disposal.

10.4 Any off-site disposal of soil will require careful management and due consideration of appropriate legislation, guidance and Duty of Care responsibilities.

Imported Fill

10.5 Imported fill will be subject to specific quality requirements, particularly where utilised as clean topsoil and sub-soil in proposed landscaped areas. Allowance should be made for testing imported fill materials prior to emplacement to ensure suitability.

Construction Activities

10.6 In view of the proximity of domestic housing to the site, due consideration should be given to the suppression of noise, dust and vibration emissions during construction.

11.0 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

11.1 The site is covered by thin made ground and topsoil overlying cohesive and granular, possibly alluvial soils. These deposits are underlain by Glacial Till. Standing groundwater occurs at a depth of between 0.75 and 1.25mbgl.

11.2 The site has not been subject to significant industrial development during its history and is currently used for domestic garages. Site preparation will include the removal of the garages which appear in part to be constructed of asbestos cement sheeting. No removal of these structures should proceed until an appropriate asbestos survey of the site has been undertaken and any Asbestos Containing Materials (ACM) removed by a suitably licensed contractor. No asbestos was identified in the soil samples analysed.

11.3 No significant pollution linkages have been assessed in the conceptual model and the overall risk from soil contamination and ground gas is considered low. However, chemical analysis has indicated ash-type made ground at the site to be contaminated and thus unsuitable for re-use within garden areas. Where it cannot be re-used effectively beneath hardstanding areas and thus becomes surplus to requirements, it is likely to be classified as non-hazardous waste for disposal.

11.4 Topsoil and underlying natural soils are suitable for re-use in garden areas.

11.5 Ground gas monitoring has confirmed a low environmental risk with no further actions required in this respect.

11.6 Foundation construction will need to take account of potential ground shrinkage/heave resulting from existing/removed trees. Foundation construction will also need to consider any remaining services and, where they are in close proximity, may need to be taken down to beneath the lowest level of the service trench so that their structural integrity is maintained.

11.7 The ground conditions are such that mass concrete trench fill type foundations may not be practical and/or economical thus possibly requiring a piled foundation to be adopted.

11.8 Floor slabs may need to be suspended due to potential heave effects. The potential for ground shrinkage/heave should be assessed on completion of a tree species survey and in view of a moderate volume change for the underlying cohesive soil.

11.9 Results of 2:1 water/soil extract for sulphate do not exceed 0.1g/l. Values of pH range from 7.9 to 9.0. On the basis of these results, the typical design sulphate (DS) class and “Aggressive Chemical Environment for Concrete” (ACEC) class for the site are DS-1 and AC-1 respectively.

11.10 Pavements constructed on cohesive deposits should be designed to a preliminary California Bearing Ratio (CBR) of 2.5%. This should be confirmed by in-situ testing at formation prior to final design and construction.

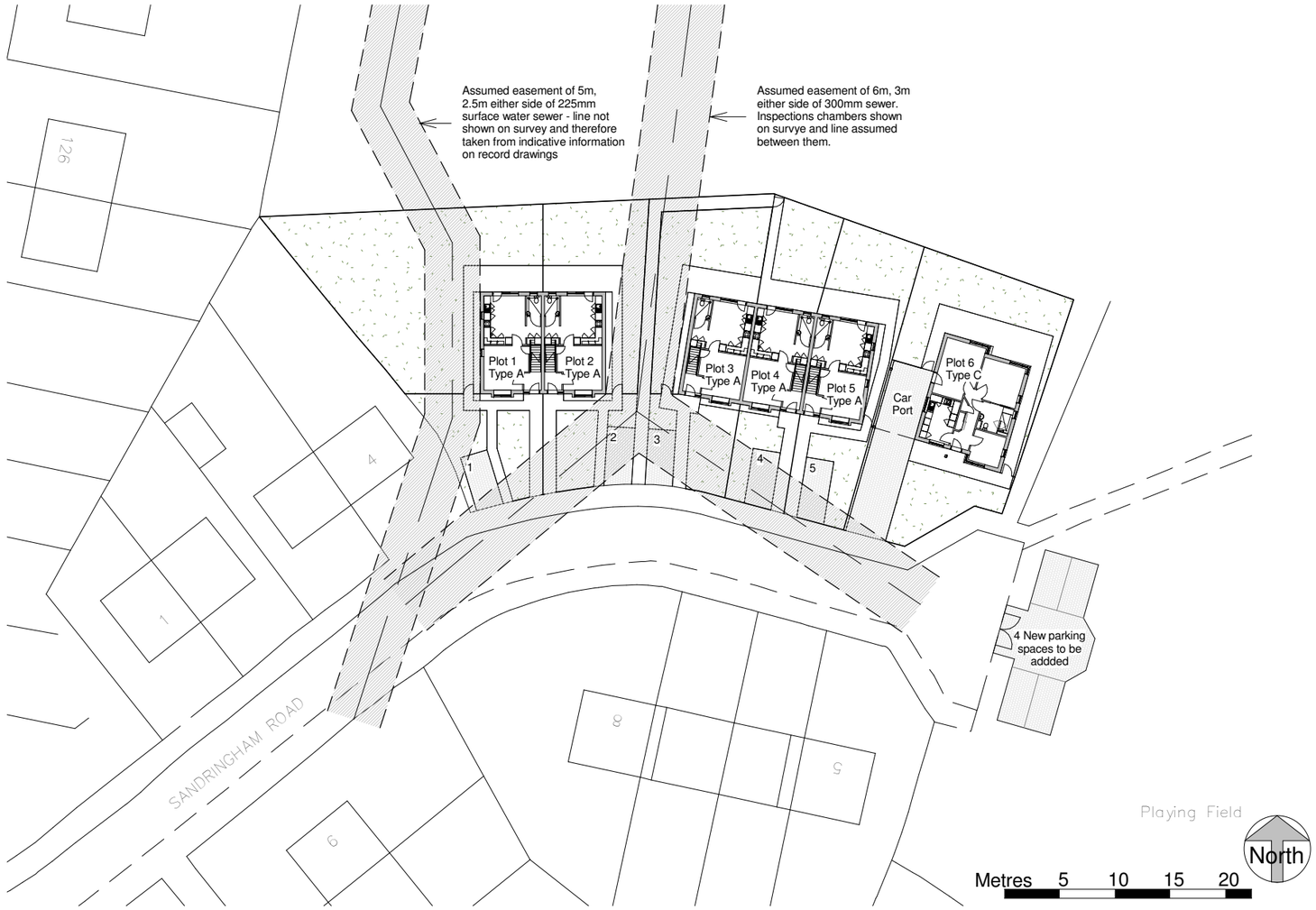
11.11 All formations should be inspected and proof-rolled prior to construction, with any soft zones thus revealed being excavated and replaced with appropriately graded and engineered granular fill.

APPENDIX 01

DRAWINGS

Updated Site Layout Plan

October 2011



Site Layout Plan

1:500

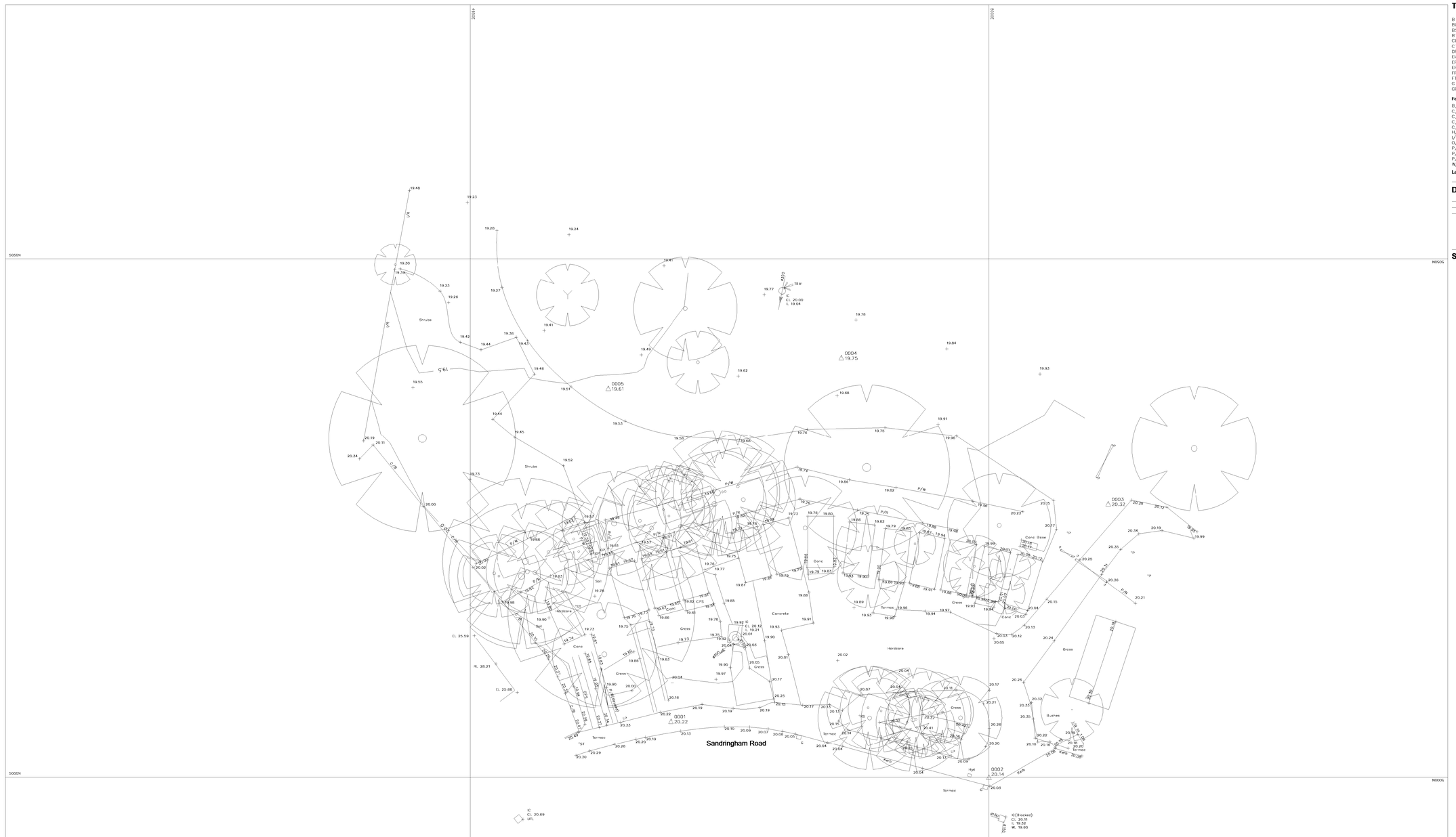
Schedule of Accommodation:

Type	Description	Area	Count
Type A	3 Bedroom 5 Person House	90m²	5
Type B	2 Bedroom 3 Person Wheelchair Bungalow	70m²	1
		Total	**6**

Parking provision 100% plus 4 spaces unrelated to the development (planning gain item)

Notes:

All existing trees to be removed and replacements planted elsewhere as agreed with the Local Authority



Topographical Survey Legend

B	Bollard	GV	Gas valve	rwp	Rain water pipe
Bin	Litter bin	Hyd	Hydrant	SP	Soil pipe
BS	Bus stop	IC	Inspection cover	ST	Stop tap
BT	British telecom ic	JB	Junction box	Stay	Cable stay
CPS	Concrete paving slabs	KO	Kerb outlet	SV	Stop valve
CTV	Cable television cover	LB	Letter box	TCB	Telephone call box
DR	Drain	LP	Lamp post	TL	Traffic light
Elec	Electrical ic	Mkr	Utility marker	TP	Telegraph pole
EP	Elec. pole	MP	Mile post	TPS	Tactile paving slabs
ER	Earth rod	NP	Name plate	VP	Vent pipe
FP	Flagpole	P	Post	WM	Water meter
FT	Floodlight	PM	Parking meter	WO	Water outlet
G	Gully	RE	Rodding eye	U/IL	Unable to lift
GP	Gate post	RS	Road sign		

Level prefix descriptions

AL	Arch level
BL	Bed level
CL	Cover level
EL	Eaves level
FL	Floor level
IL	Invert level
PL	Parapet level
RL	Roof/ridge level
SL	Soffit level
Spr	Arch springing level
ToW	Top of wall level
Thr	Threshold level
WL	Water level

Fence annotation

B/W	Barbed wire
C/B	Closed boarded
C/I	Corrugated iron
C/L	Chain link
C/P	Concrete panel
H/R	Hand rail
I/R	Iron railings
O/B	Open boarded
P/C	Post & chain
P/R	Post & rail
P/W	Post & wire
W/M	Wire mesh

Fence
Safety barrier
Gate
Stile
Hedge
Limit of foliage & tree canopy

Spot level
Survey control station (Coordinated point)
Tree

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

Drainage/Services Legend

Drainage
Electric
Gas pipe
Telecommunications
Water pipe
Misc. services
Oil pipe
Steam Pipe

Borehole
Trial Pit
Probe Hole

Survey Station Coordinates

Stn	Easting	Northing	Level
0001	4969.35	5005.40	20.22
0002	5000.00	5000.00	20.14
0003	5011.50	5026.36	20.32
0004	4985.75	5040.44	19.75
0005	4963.31	5037.49	19.61

Head and Registered Office
Willow Bank House
Old Road
Handforth • Wilmslow
Cheshire SK9 3AZ
Tel. 01625 533444
Fax 01625 526815

Levels are related to **TBM**
Value **20.00m**
Located on IC cover, as shown by arrow.

Coordinates are related to **Local Grid**

Scale **1:200**

0 2 4 6 8 10 12 14 16 18
metres

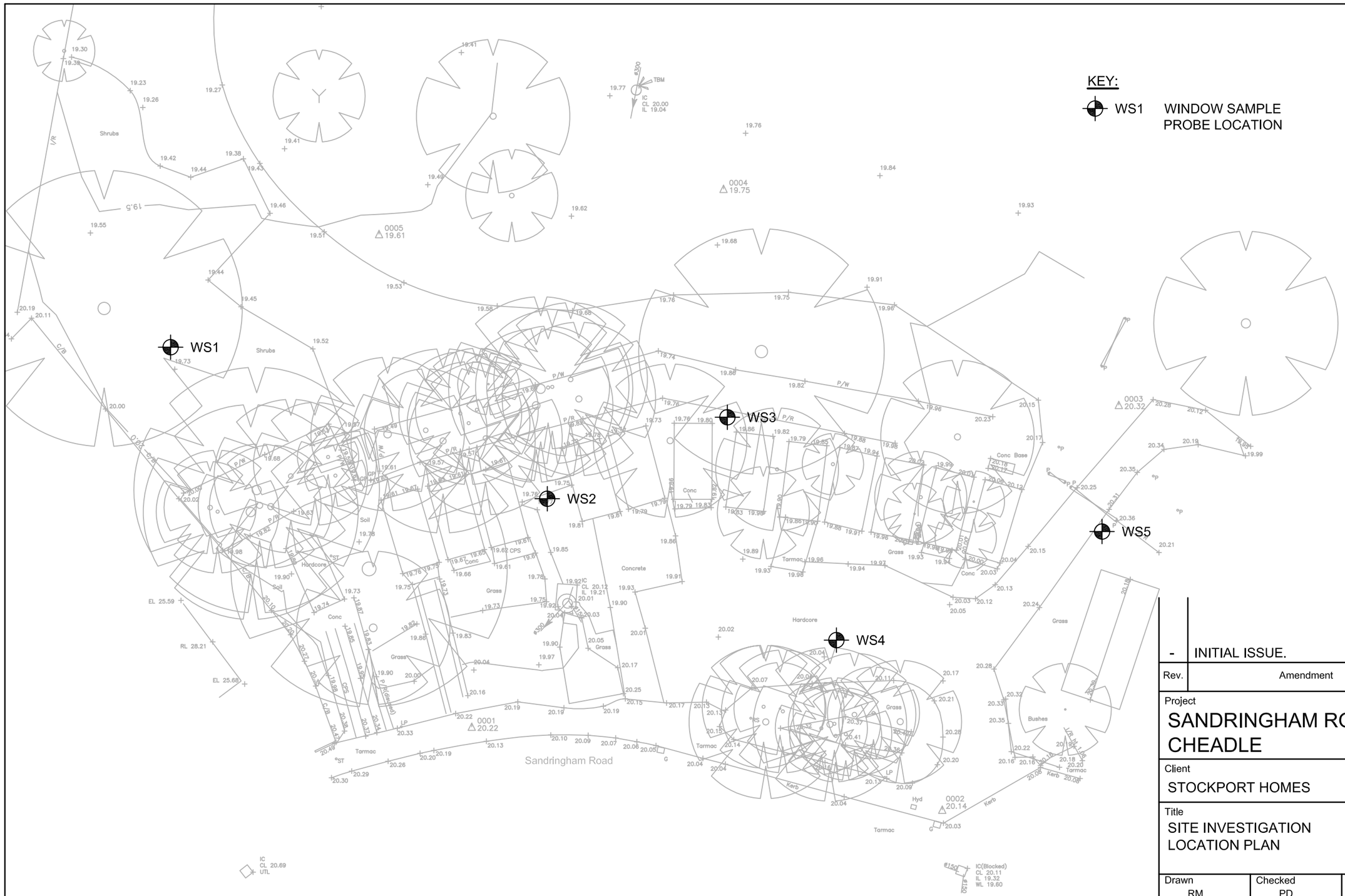
Client Pozzoni LLP

Title
Topographical Survey
Sandringham Road
Cheadle

Surveyed	GO NB PN	Drawn	PG
Date	Nov 2009	Checked	AG
CAD file name	13117	Revision No.	

Drawing No. **SSL:13117:200:1:1**

SURVEYSystems LIMITED
www.surveys.co.uk • mail@surveys.co.uk



Rev.	Amendment	Date	By	Chkd
-	INITIAL ISSUE.	08-02-12	RM	PD

Project
SANDRINGHAM ROAD
CHEADLE

Client
STOCKPORT HOMES

Title
SITE INVESTIGATION
LOCATION PLAN

Drawn	Checked	Date	Scale
RM	PD	02.12	1:250

WML CONSULTING
Chartered Civil and Structural Engineers

No.8 Oak Green
Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire SK8 6QL
Tel 0161 482 0600
Fax 0161 486 9210
e-mail info@wmlconsulting.com
www.wmlconsulting.com

Job No.	Drawing No.
5062G	SI-01 -

APPENDIX 02

WINDOW SAMPLING LOGS

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Number
Sandringham Road, Cheadle Hulme	WS1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler				12-394
	Location	**Dates** 12/12/2011	**Engineer** Wright Mottershaw Lydon Consulting Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.30	D					Stiff brown sandy CLAY			
0.50	D								
1.00-1.45	SPT N=4		1,1/1,1,1,1		(2.00)				
1.00-1.45	D								
2.00-2.45	SPT N=9		1,1/2,2,2,3		2.00	Loose grey / brown medium slightly gravelly SAND			
2.00-2.45	D				(0.80)				
2.50	D				2.80	Stiff grey / brown slightly sandy CLAY			
3.00-3.45	SPT N=12		2,2/2,3,3,4						
3.00-3.45	D				(1.65)				
4.00-4.45	SPT N=14		2,2/3,3,4,4						
4.00-4.45	D				4.45	Complete at 4.45m			

Remarks
Services inspection pit excavated by hand to 1.00m

Scale (approx)	Logged By
1:50	Drill Crew

Figure No. 12-394.WS5

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Number
Sandringham Road, Cheadle Hulme	WS2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler				12-394
	Location	**Dates** 12/12/2011	**Engineer** Wright Mottershaw Lydon Consulting Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
0.20	D				0.20	Stiff brown sandy CLAY with bands of brown fine sand		
0.50	D							
1.00-1.45	SPT N=6		1,1/2,1,2,1					
1.00-1.45	D				(2.30)			
2.00-2.45	SPT N=11		1,2/3,3,2,3					
2.00-2.45	D				2.50	Medium dense orange / brown silty fine SAND		
3.00-3.45	SPT N=11		2,2/3,2,3,3		(1.00)			
3.00-3.45	D							▽1
			Seepage(1) at 3.40m.		3.50	Medium dense grey / brown fine SAND		
4.00-4.45	SPT N=12		1,1/2,3,3,4		(0.95)			
4.00-4.45	D				4.45			
						Complete at 4.45m		

Remarks
Services inspection pit excavated by hand to 1.00m

Scale (approx)	Logged By
1:50	Drill Crew

Figure No. 12-394.WS5

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Number
Sandringham Road, Cheadle Hulme	WS3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler				12-394
	Location	**Dates** 12/12/2011	**Engineer** Wright Mottershaw Lydon Consulting Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.40)	MADE GROUND : soil and stone fill			
0.20	D				0.40				
0.50	D					Firm / stiff brown sandy CLAY with bands of brown fine sand			
1.00-1.45	SPT N=5		1,1/1,1,1,2						
1.00-1.45	D				(1.80)				
2.00-2.45	SPT N=7		1,1/2,1,2,2						
2.00-2.45	D				2.20	Loose grey fine / medium SAND			
3.00-3.45	SPT N=7		4,4/3,2,1,1		(1.70)				
3.00-3.45	D								
					3.90				
4.00-4.45	SPT N=10		1,2/3,2,2,3			Stiff grey / brown slightly sandy CLAY			
4.00-4.45	D				(0.55)				
					4.45				
						Complete at 4.45m			

Remarks
Services inspection pit excavated by hand to 1.00m

Scale (approx)	Logged By
1:50	Drill Crew

Figure No. 12-394.WS5

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Number
Sandringham Road, Cheadle Hulme	WS4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler				12-394
	Location	**Dates** 12/12/2011	**Engineer** Wright Mottershaw Lydon Consulting Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.05) 0.05	MADE GROUND : tarmac		
0.30	D				(0.35) 0.40	MADE GROUND : black gravelly ash fill		
0.50	D					Stiff brown sandy CLAY		
1.00-1.45	SPT N=8		1,2/2,2,2,2		(1.50)			
1.00-1.45	D							
2.00-2.45	SPT N=3		0,0/1,0,1,1		1.90	Soft / firm grey sandy CLAY		
2.00-2.45	D				(0.80)			
					2.70	Grey / brown fine / medium SAND		
3.00-3.45	SPT N=15		1,0/1,1,7,6		(0.60)			
3.00-3.45	D				3.30	Medium dense grey medium / coarse SAND and fine / medium sub-rounded / sub-angular GRAVEL		
					(1.15)			
4.00-4.45	SPT N=11		2,2/2,2,3,4					
4.00-4.45	D				4.45	Complete at 4.45m		

Remarks
Services inspection pit excavated by hand to 1.00m

Scale (approx)	Logged By
1:50	Drill Crew

Figure No. 12-394.WS5

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Number
Sandringham Road, Cheadle Hulme	WS5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler				12-394
	Location	**Dates** 12/12/2011	**Engineer** Wright Mottershaw Lydon Consulting Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.05) 0.05	MADE GROUND : tarmac			
0.30	D				(0.15) 0.20	MADE GROUND : stone fill			
0.50	D				(0.25) 0.45	MADE GROUND : black ash fill with fragments of broken brick			
1.00-1.45	SPT N=6		1,1/2,1,1,2			Stiff brown sandy CLAY			
1.00-1.45	D				(1.55)				
2.00-2.45	SPT N=3		1,0/1,1,1,0		2.00	Soft yellow / brown slightly sandy SILT			
2.00-2.45	D				(1.20)				
3.00-3.45	SPT N=14		1,2/3,4,4,3		3.20	Medium dense grey medium / coarse SAND and fine / medium sub-rounded GRAVEL			
3.00-3.45	D				(1.25)				
4.00-4.45	SPT N=12		2,2/3,3,2,4						
4.00-4.45	D				4.45	Complete at 4.45m			

Remarks
Services inspection pit excavated by hand to 1.00m

Scale (approx)	Logged By
1:50	Drill Crew

Figure No. 12-394.WS5

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Standard Penetration Test Results

Site : Sandringham Road, Cheadle Hulme

Client :

Engineer : Wright Mottershaw Lydon Consulting Limited

Job Number 12-394

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
WS1	1.00	1.15	1.45	SPT	1	1	1	1	1	1	N=4	
WS1	2.00	2.15	2.45	SPT	1	1	2	2	2	3	N=9	
WS1	3.00	3.15	3.45	SPT	2	2	2	3	3	4	N=12	
WS1	4.00	4.15	4.45	SPT	2	2	3	3	4	4	N=14	
WS2	1.00	1.15	1.45	SPT	1	1	2	1	2	1	N=6	
WS2	2.00	2.15	2.45	SPT	1	2	3	3	2	3	N=11	
WS2	3.00	3.15	3.45	SPT	2	2	3	2	3	3	N=11	
WS2	4.00	4.15	4.45	SPT	1	1	2	3	3	4	N=12	
WS3	1.00	1.15	1.45	SPT	1	1	1	1	1	2	N=5	
WS3	2.00	2.15	2.45	SPT	1	1	2	1	2	2	N=7	
WS3	3.00	3.15	3.45	SPT	4	4	3	2	1	1	N=7	
WS3	4.00	4.15	4.45	SPT	1	2	3	2	2	3	N=10	
WS4	1.00	1.15	1.45	SPT	1	2	2	2	2	2	N=8	
WS4	2.00	2.15	2.45	SPT	0	0	1	0	1	1	N=3	
WS4	3.00	3.15	3.45	SPT	1	0	1	1	7	6	N=15	
WS4	4.00	4.15	4.45	SPT	2	2	2	2	3	4	N=11	
WS5	1.00	1.15	1.45	SPT	1	1	2	1	1	2	N=6	
WS5	2.00	2.15	2.45	SPT	1	0	1	1	1	0	N=3	
WS5	3.00	3.15	3.45	SPT	1	2	3	4	4	3	N=14	
WS5	4.00	4.15	4.45	SPT	2	2	3	3	2	4	N=12	

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Borehole Number
Sandringham Road, Cheadle Hulme	WS1

Installation Type	Dimensions	Client	Job Number
Single Installation	Internal Diameter of Tube [A] = 35 mm Diameter of Filter Zone = 80 mm		12-394

Location	Ground Level (mOD)	Engineer	Sheet
		Wright Mottershaw Lydon Consulting Limited	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.10	Concrete
					Bentonite Seal
				1.00	
					Well Screen
				4.00	Bottom Fill
				4.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks

Remarks

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Borehole Number
Sandringham Road, Cheadle Hulme	WS3

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 35 mm
Diameter of Filter Zone = 80 mm

Client

Job Number 12-394

Location

Ground Level (mOD)

Engineer
Wright Mottershaw Lydon Consulting Limited

Sheet 1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.10	Concrete
					Bentonite Seal
				1.00	
					Well Screen
				4.00	
					Bottom Fill
				4.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks

Remarks

GEO-VENTURES (UK) LIMITED
Geotechnical and Environmental Services

Site	Borehole Number
Sandringham Road, Cheadle Hulme	WS5

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 35 mm
Diameter of Filter Zone = 80 mm

Client

Job Number 12-394

Location

Ground Level (mOD)

Engineer
Wright Mottershaw Lydon Consulting Limited

Sheet 1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.10	Concrete
					Bentonite Seal
				1.00	
					Well Screen
				4.00	Bottom Fill
				4.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks

Remarks

APPENDIX 03

GEOTECHNICAL SOILS TEST RESULTS

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL12/0240

Client's Reference: Report Date: 20 January 2012

Client Name: Geo-Ventures (UK) Limited
70 Riverside Close
Waterside
Howley
Warringtonm
WA1 2JD

For the attention of: Paul Platt

Contract Title: Sandringham Road, Cheadle.

Date Received: 10-Jan-12
Date Commenced: 10-Jan-12
Date Completed: 20-Jan-12

Notes: **Observations and Interpretations are outside the UKAS Accreditation**

Checked and Approved Signatories:

R Gunson	A Watkins	M Beastall
(Director)	(Director)	(Laboratory Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
WS1		D	0.50	Brown slightly sandy silty CLAY.
WS2		D	1.00	Brown silty CLAY.
WS3		D	0.50	Brown silty CLAY.
WS3		D	1.00	Brown very sandy CLAY.
WS3		D	4.00	Dark brown gravelly sandy CLAY.
WS4		D	0.50	Brown slightly sandy CLAY.
WS4		D	2.00	Brown sandy silty CLAY.
WS5		D	1.00	Brown sandy silty CLAY.
WS5		D	2.00	Brown very sandy CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	20/01/12		20/01/12		20/01/12

SANDRINGHAM ROAD, CHEADLE.

Contract No: PSL12/0240

Client Ref: 12-394

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.	Plasticity Index % Clause 6.	% Passing .425mm	Remarks
WS1		D	0.50	21				49	23	26	100	Intermediate plasticity CI.
WS2		D	1.00	34								
WS3		D	0.50	31								
WS3		D	1.00	25				32	17	15	100	Low plasticity CL.
WS3		D	4.00	15				39	19	20	100	Intermediate plasticity CI.
WS4		D	0.50	32								
WS4		D	2.00	23								
WS5		D	1.00	25								
WS5		D	2.00	22								

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	20/01/12		20/01/12		20/01/12

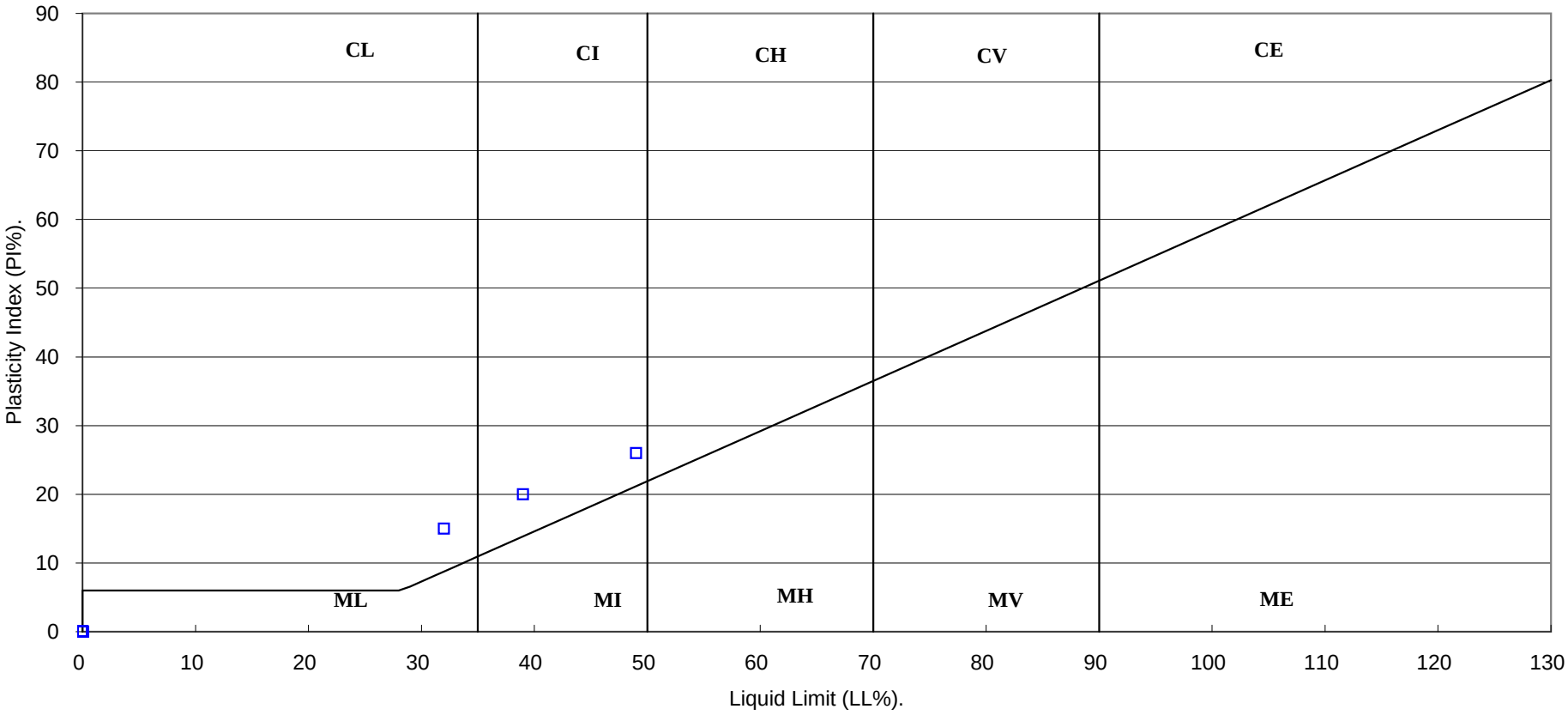
SANDRINGHAM ROAD, CHEADLE.

Contract No: **PSL12/0240**

Client Ref: **12-394**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		20/01/12		20/01/12		20/01/12
	SANDRINGHAM ROAD, CHEADLE.				Contract No:	PSL12/0240
					Client Ref:	12-394

APPENDIX 04

CHEMICAL TEST RESULTS

Scientific Analysis Laboratories is a
limited company registered in England and
Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 261948-1

Date of Report: 06-Jan-2012

Customer: WML Consulting Ltd
8 Oak Green Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire
SK8 6QL

Customer Contact: Mr Peter Davies

Customer Job Reference: 5062G
Customer Purchase Order: 5062G
Customer Site Reference: Sandringham Road, Cheadle
Date Job Received at SAL: 20-Dec-2011
Date Analysis Started: 21-Dec-2011
Date Analysis Completed: 05-Jan-2012

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs

UKAS TESTING
1549

Report checked
and authorised by :
Mr Ross Walker
Customer Services Manager
(Land)

Issued by :
Mr Ross Walker
Customer Services Manager
(Land)

SAL Reference: 261948
Project Site: Sandringham Road, Cheadle
Customer Reference: 5062G

Soil Analysed as Soil
WML Basic Suite

				SAL Reference	**261948 001**	**261948 002**	**261948 003**	**261948 004**
				Customer Sample Reference	**WS2 0.5**	**WS3 0.2**	**WS4 0.3**	**WS5 0.3**
				Date Sampled	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Arsenic	T6	AR	1	mg/kg	**13**	**9**	**23**	**260**
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1
Cadmium	T6	AR	1	mg/kg	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1
Copper	T6	AR	1	mg/kg	**27**	**36**	**57**	**150**
Lead	T6	AR	1	mg/kg	**33**	**77**	**61**	**110**
Mercury	T6	AR	1	mg/kg	<1	<1	<1	<1
Nickel	T6	AR	1	mg/kg	**30**	**19**	**38**	**78**
Selenium	T6	AR	3	mg/kg	<3	<3	<3	<3
Vanadium	T6	AR	1	mg/kg	**33**	**18**	**31**	**85**
Zinc	T6	AR	1	mg/kg	**77**	**100**	**92**	**120**
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1	<1
pH	T7	AR			**9.0**	**8.1**	**8.3**	**7.9**
Phenols(Mono)	T4	AR	1	mg/kg	<1	<1	<1	<1
Sulphur (total)	T6	AR	0.01	%	**0.02**	**0.03**	**0.07**	**0.13**

SAL Reference: 261948
Project Site: Sandringham Road, Cheadle
Customer Reference: 5062G

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

				SAL Reference	**261948 001**	**261948 002**	**261948 003**	**261948 004**
				Customer Sample Reference	**WS2 0.5**	**WS3 0.2**	**WS4 0.3**	**WS5 0.3**
				Date Sampled	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Naphthalene	T149	AR	0.01	mg/kg	**0.02**	**0.16**	**1.0**	**0.03**
Acenaphthylene	T149	AR	0.01	mg/kg	<0.01	**0.03**	**1.0**	**0.20**
Acenaphthene	T149	AR	0.01	mg/kg	**0.01**	**0.05**	**6.0**	**0.03**
Fluorene	T149	AR	0.01	mg/kg	**0.01**	**0.05**	**7.0**	**0.03**
Phenanthrene	T149	AR	0.01	mg/kg	**0.03**	**0.32**	**45**	**0.10**
Anthracene	T149	AR	0.01	mg/kg	**0.01**	**0.07**	**15**	**0.08**
Fluoranthene	T149	AR	0.01	mg/kg	**0.03**	**0.38**	**54**	**0.33**
Pyrene	T149	AR	0.01	mg/kg	**0.03**	**0.38**	**42**	**0.39**
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	**0.02**	**0.13**	**23**	**0.18**
Chrysene	T149	AR	0.01	mg/kg	**0.02**	**0.16**	**23**	**0.34**
Benzo(b/k)Fluoranthene	T149	AR	0.01	mg/kg	**0.04**	**0.29**	**45**	**0.61**
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	**0.02**	**0.15**	**24**	**0.38**
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	**0.01**	**0.08**	**11**	**0.19**
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	**0.01**	**0.04**	**6.0**	**0.10**
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	**0.01**	**0.08**	**9.0**	**0.22**
PAH(total)	T149	AR	0.01	mg/kg	**0.27**	**2.4**	**310**	**3.2**

SAL Reference: 261948
Project Site: Sandringham Road, Cheadle
Customer Reference: 5062G

Soil Analysed as Soil
Miscellaneous

				SAL Reference	**261948 001**	**261948 002**	**261948 003**	**261948 004**	**261948 005**
				Customer Sample Reference	**WS2 0.5**	**WS3 0.2**	**WS4 0.3**	**WS5 0.3**	**WS1 2.0**
				Date Sampled	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**	**19-DEC-2011**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Asbestos ID	T27	AR			-	N.D.	N.D.	-	-
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	<0.1	<0.1	<0.1

SAL Reference: 261948
Project Site: Sandringham Road, Cheadle
Customer Reference: 5062G

Soil Analysed as Soil
Miscellaneous

SAL Reference	**261948 006**
Customer Sample Reference	**WS4 1.0**
Date Sampled	**19-DEC-2011**

Determinand	Method	Test Sample	LOD	Units	
SO4(2:1)	T6	AR	0.1	g/l	<0.1

SAL Reference: 261948
Project Site: Sandringham Road, Cheadle
Customer Reference: 5062G

Leachate Analysed as Water
WML Basic Suite

SAL Reference	**261948 004**
Customer Sample Reference	**WS5 0.3**
Date Sampled	**19-DEC-2011**

Determinand	Method	Test Sample	LOD	Units	
As (Dissolved)	T281	10:1	10	µg/l	**25**
Boron	T6	10:1	10	µg/l	**12**
Cd (Dissolved)	T281	10:1	0.02	µg/l	**0.04**
Chromium VI	T4	10:1	30	µg/l	<30
Cu (Dissolved)	T281	10:1	0.5	µg/l	**3.8**
Pb (Dissolved)	T281	10:1	0.3	µg/l	**0.9**
Hg (Dissolved)	T281	10:1	0.05	µg/l	<0.05
Ni (Dissolved)	T373	10:1	10	µg/l	<10
Se (Dissolved)	T281	10:1	10	µg/l	<10
V (Dissolved)	T281	10:1	2	µg/l	<2
Zn (Dissolved)	T373	10:1	10	µg/l	<10
Cyanide(Total)	T4	10:1	0.05	mg/l	<0.05
pH	T7	10:1			**8.0**
Phenols(Mono)	T4	10:1	0.1	mg/l	<0.1
Sulphate ion	T11	10:1	0.05	mg/l	**0.79**
Sulphur (total)	T6	10:1	50	mg/l	<50

SAL Reference: 261948
Project Site: Sandringham Road, Cheadle
Customer Reference: 5062G

Leachate Analysed as Water
Total and Speciated USEPA16 PAH

SAL Reference	**261948 004**
Customer Sample Reference	**WS5 0.3**
Date Sampled	**19-DEC-2011**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T149	10:1	0.01	µg/l	**0.54**
Acenaphthylene	T149	10:1	0.01	µg/l	<0.01
Acenaphthene	T149	10:1	0.01	µg/l	**0.31**
Fluorene	T149	10:1	0.01	µg/l	**0.12**
Phenanthrene	T149	10:1	0.01	µg/l	**0.08**
Anthracene	T149	10:1	0.01	µg/l	**0.04**
Fluoranthene	T149	10:1	0.01	µg/l	**0.10**
Pyrene	T149	10:1	0.01	µg/l	**0.10**
Benzo(a)Anthracene	T149	10:1	0.01	µg/l	**0.07**
Chrysene	T149	10:1	0.01	µg/l	**0.07**
Benzo(b/k)Fluoranthene	T149	10:1	0.01	µg/l	**0.27**
Benzo(a)Pyrene	T149	10:1	0.01	µg/l	**0.13**
Indeno(123-cd)Pyrene	T149	10:1	0.01	µg/l	**0.08**
Dibenzo(ah)Anthracene	T149	10:1	0.01	µg/l	**0.03**
Benzo(ghi)Perylene	T149	10:1	0.01	µg/l	**0.07**
PAH(total)	T149	10:1	0.01	µg/l	**2.0**

Index to symbols used in 261948-1

Value	Description
AR	As Received
10:1	Leachate
N.D.	Not Detected
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T6	ICP/OES
T7	Probe
T281	ICP/MS (Filtered)
T4	Colorimetry
T27	PLM
T149	GC/MS (SIR)
T373	ICP/OES (Filtered)
T11	IC

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Asbestos ID	T27	AR			SU	002-003
SO4(2:1)	T6	AR	0.1	g/l	N	001-006
Naphthalene	T149	10:1	0.01	µg/l	U	004
Acenaphthylene	T149	10:1	0.01	µg/l	U	004
Acenaphthene	T149	10:1	0.01	µg/l	U	004
Fluorene	T149	10:1	0.01	µg/l	U	004
Phenanthrene	T149	10:1	0.01	µg/l	U	004
Anthracene	T149	10:1	0.01	µg/l	U	004
Fluoranthene	T149	10:1	0.01	µg/l	U	004
Pyrene	T149	10:1	0.01	µg/l	U	004
Benzo(a)Anthracene	T149	10:1	0.01	µg/l	U	004
Chrysene	T149	10:1	0.01	µg/l	U	004
Benzo(b/k)Fluoranthene	T149	10:1	0.01	µg/l	U	004
Benzo(a)Pyrene	T149	10:1	0.01	µg/l	U	004
Indeno(123-cd)Pyrene	T149	10:1	0.01	µg/l	U	004
Dibenzo(ah)Anthracene	T149	10:1	0.01	µg/l	U	004
Benzo(ghi)Perylene	T149	10:1	0.01	µg/l	U	004
PAH(total)	T149	10:1	0.01	µg/l	U	004
Naphthalene	T149	AR	0.01	mg/kg	U	001-004
Acenaphthylene	T149	AR	0.01	mg/kg	U	001-004
Acenaphthene	T149	AR	0.01	mg/kg	U	001-004
Fluorene	T149	AR	0.01	mg/kg	U	001-004
Phenanthrene	T149	AR	0.01	mg/kg	U	001-004
Anthracene	T149	AR	0.01	mg/kg	U	001-004
Fluoranthene	T149	AR	0.01	mg/kg	U	001-004
Pyrene	T149	AR	0.01	mg/kg	U	001-004
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	U	001-004
Chrysene	T149	AR	0.01	mg/kg	U	001-004
Benzo(b/k)Fluoranthene	T149	AR	0.01	mg/kg	U	001-004
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	U	001-004
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	U	001-004
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	U	001-004
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	U	001-004
PAH(total)	T149	AR	0.01	mg/kg	U	001-004
Arsenic	T6	AR	1	mg/kg	U	001-004
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-004
Cadmium	T6	AR	1	mg/kg	U	001-004
Chromium VI	T6	AR	1	mg/kg	N	001-004
Copper	T6	AR	1	mg/kg	U	001-004
Lead	T6	AR	1	mg/kg	U	001-004
Mercury	T6	AR	1	mg/kg	U	001-004
Nickel	T6	AR	1	mg/kg	U	001-004
Selenium	T6	AR	3	mg/kg	U	001-004

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Vanadium	T6	AR	1	mg/kg	U	001-004
Zinc	T6	AR	1	mg/kg	U	001-004
Cyanide(Total)	T4	AR	1	mg/kg	U	001-004
pH	T7	AR			U	001-004
Phenols(Mono)	T4	AR	1	mg/kg	U	001-004
Sulphur (total)	T6	AR	0.01	%	N	001-004
As (Dissolved)	T281	10:1	10	µg/l	U	004
Boron	T6	10:1	10	µg/l	N	004
Cd (Dissolved)	T281	10:1	0.02	µg/l	U	004
Chromium VI	T4	10:1	30	µg/l	N	004
Cu (Dissolved)	T281	10:1	0.5	µg/l	U	004
Pb (Dissolved)	T281	10:1	0.3	µg/l	U	004
Hg (Dissolved)	T281	10:1	0.05	µg/l	U	004
Ni (Dissolved)	T373	10:1	10	µg/l	U	004
Se (Dissolved)	T281	10:1	10	µg/l	U	004
V (Dissolved)	T281	10:1	2	µg/l	U	004
Zn (Dissolved)	T373	10:1	10	µg/l	U	004
Cyanide(Total)	T4	10:1	0.05	mg/l	U	004
pH	T7	10:1			U	004
Phenols(Mono)	T4	10:1	0.1	mg/l	N	004
Sulphate ion	T11	10:1	0.05	mg/l	N	004
Sulphur (total)	T6	10:1	50	mg/l	N	004

APPENDIX 05

GROUND GAS MONITORING RESULTS

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS1	0.0	0		0.0				0.0		20.7		79.2	0.42	991	
WS3	0.0	0		0.0				0.0		20.9		79.1	0.92	991	
WS5	0.0	0		0.0				0.0		21.1		79.0	1.11	991	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.
* LEL = Explosive Limit = 5%v/v
ND - Not Detected

Relevant Information at times of monitoring

Monitored by:	J. Crook
Weather :	Overcast
Equipment used:	LMS Type G3 xi Gas Meter
Visible signs of vegetation stress:	
Boreholes sampled for laboratory analysis:	
Other comments / observations:	

Contract:
Sandringham Road, Cheadle

Date:
03.01.2012

Job No.

Sheet No.
1

Geo-Ventures (UK) Limited
70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS1	0.0	0		0.0				0.0		20.6		79.3		1015	
WS3	0.0	0		0.0				0.0		20.1		79.7		1015	
WS5	0.0	0		0.0				0.0		21.0		79.0		1015	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.
* LEL = Explosive Limit = 5%v/v
ND - Not Detected

Relevant Information at times of monitoring

Monitored by:	J. Crook	Contract: **Sandringham Road, Cheadle**
Weather :		
Equipment used:	LMS Type G3 xi Gas Meter	Date: **12.01.2012**
Visible signs of vegetation stress:		
Boreholes sampled for laboratory analysis:		Job No.
Other comments / observations:		Sheet No. **2**

Geo-Ventures (UK) Limited
70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS1	0.0	0		0.0				0.1		20.7		79.1	1.24	1015	
WS3	0.0	0		0.0				0.0		20.9		79.0	0.75	1015	
WS5	0.0	0		0.0				0.0		20.7		79.2	0.97	1015	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.
* LEL = Explosive Limit = 5%v/v
ND - Not Detected

Relevant Information at times of monitoring

Monitored by:	J. Crook	Contract: **Sandringham Road, Cheadle**
Weather :		
Equipment used:	LMS Type G3 xi Gas Meter	Date: **24.01.2012**
Visible signs of vegetation stress:		
Boreholes sampled for laboratory analysis:		Job No.
Other comments / observations:		Sheet No. **3**

Geo-Ventures (UK) Limited
70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

APPENDIX 06

GENERIC ASSESSMENT CRITERIA

SANDRINGHAM ROAD, CHEADLE HULME
GENERIC ASSESSMENT CRITERIA (GAC)

Contaminant	GAC for Residential End Use (mg/kg) 1% Soil Organic Matter (SOM)
Arsenic SGV	32
Boron	290
Cadmium SGV	10
Chromium	3000
Copper	2330
Lead	290
Mercury SGV	170
Nickel SGV	130
Selenium SGV	350
Vanadium	75
Zinc	3750
Cyanide	780
Benz[a]anthracene	3.1
Benzo[a]pyrene	0.83
Benzo[b]fluoranthene	5.6
Benzo[ghi]perylene	44
Benzo[k]fluoranthene	8.5
Chrysene	6.0
Dibenz[ah]anthracene	0.76
Fluoranthene	260
Indeno[123-cd]pyrene	3.2
Naphthalene	1.5
Phenol SGV	420
Pyrene	560
Benzene (SGV)	0.054
EthylBenzene (SGV)	42
Toluene (SGV)	120
Xylene (SGV)	20
TPH (C16-C35 aliphatic)	45,000
TPH (C16-C21 aromatic)	250
TPH (C21-C35 aromatic)	890