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BELLSIDE ROAD, CLELAND
STAGE 2 SITE INVESTIGATION
FOR
TAYLOR HOMES (SCOTLAND) LTD

Report No.	1748-203	**Version:**	Revision 1
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SITE SUMMARY INFORMATION

Name of Site:	North & South Rd, Shawstonfoot, Bellside
Ordnance Survey Grid Reference:	NS 81471 57979
Site Address:	North & South Rd, Shawstonfoot, Bellside
Local Authority:	North Lanarkshire Council
Land Use (Existing):	Field
On site buildings:	No
Proposed Site Use:	Residential Properties with Gardens and Driveway
Area (hectares):	1.05 ha
Type of Investigation:	Stage 2 Ground Investigation – Intrusive Works & Conceptual Site Model

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Coal Mining Risk Assessment

Terrenus Land & Water Ltd Intrusive Coal Mining Risk Assessment 15th March 2019

Contaminated Land Risk Assessment

Supporting Information

1 INTRODUCTION

1.1 BACKGROUND

Taylor Homes (Scotland) Ltd, the Client, is seeking to develop land to the east of North & South Road, on the southern side of Bellside, Cleland, North Lanarkshire. In pursuing ground information of the site, Terrenus Land & Water has been asked to provide a Stage 2 (intrusive) investigation report, detailing the ground conditions present at the site and a conceptual site model.

This interpretative report includes trial pit information, borehole information, chemical test results taken from the site soils and associated gas monitoring.

1.2 SCOPE OF STUDY

The risks from the potential contamination status of the site were assessed by developing a Conceptual Site Model (CSM), as well as assessing the suitability of the site for the proposed use with respect to local authority Planning guidance (notably PAN 33).

The Stage 2 Investigation entails the results of an intrusive investigation which was used to update the CSM and provide recommendations on the development solutions for the site. This was supported by a walkover inspection of the site to provide further information on environmental issues or concerns.

1.3 NATIONAL PLANNING FRAMEWORK 4 (NPF4)

The new National Planning Framework 4 (NFP4) replaces the former Scottish Planning Policy (SPP). Whilst not explicitly addressed in NPF4, the risk-based approach adopted under SPP will be adopted throughout this report including the use of a source-pathway-receptor methodology leading to a Conceptual Site Model (CSM) for the site via a qualitative risk assessment.

1.4 OBJECTIVES OF INVESTIGATION

The aim of the Interpretative Report is to:

- Report on the sequence and general engineering properties of the strata at the site;
- Report on the environmental conditions with respect to ground contamination;
- Provide gas monitoring data, and
- Provide conclusions and recommendations for the site development based on the intrusive works.

1.5 PROPOSED SITE END-USE

It is understood that the site will be developed as for residential properties, with associated access, landscaping and gardens. A development layout is unavailable as the site as it is understood that plots will be sold for individual development.

1.6 LIMITATIONS OF REPORT

Terrenus Land & Water Ltd. has prepared this report for the sole use of the Client, in accordance with generally accepted consulting practice and for the intended purpose as stated in the related contract agreement. No other warranty, expressed or implied, is made as to the professional advice included in this report. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Terrenus Land & Water Ltd; a charge may be levied against such approval.

To the best of our knowledge, information contained in this report is accurate at the date of issue; however subsurface conditions including groundwater levels and contaminant concentrations may vary

spatially and with time. It should be noted, however, that this report is based on the information obtained from the sources listed in Section 2 below and the ground investigations undertaken.

There may be conditions pertaining at the site not disclosed by these sources, which might have a bearing on the recommendations provided if such conditions were known. We have, however, used our professional judgement in attempting to limit this during the investigation.

It is important therefore that these implications be clearly recognised when the findings of this study are being interpreted. In addition, this should be borne in mind if this report is used without further confirmatory testing after significant delay. The conclusions and recommendations provided in this report in connection with ground contamination do not address the risks to site operatives during development of the site. These issues should be addressed by the Principal Contractor in accordance with relevant statutory procedures and regulations.

2 SITE DESCRIPTION

2.1 LOCATION

Local maps together were procured and, combined with information obtained during the site walkover, to form the basis of the understanding of the current site use.

The site lies on the eastern side of North & South Road within North Lanarkshire. The site is centred on National Grid Reference NS 81471 57979 as shown on Figure 1 contained within the Appendix.

2.2 DESCRIPTION

The site occupies some 1.05ha and forms an irregular shaped plot of land that is currently used as field of pasture. Access to the site is from a single entrance facing North & South Road.

The site area is bound to the west, south and east by traditional wire and post fencing and to the north by the foot of a raised platform. The fenced boundaries are lined with mature trees and bushes which form a hedge adjacent to the western site boundary.

The site area has a general fall to the south with a secondary fall to the east, towards the Shawston Burn. The highest point of the site is located in the northwest site corner. The level of the site western boundary lies below that of North & South Road.

The site comprises a grassed field with occasional stands of marsh grass and shrub. The northern site area has had the topsoil removed, associated with construction works (now complete) immediately to the north of the site boundary.

2.3 SITE NEIGHBOURS

To the north of the site lies a new build residential development facing Captains Walk. This lies atop a soil platform, the southern slope of which falls to towards the northern site boundary. To the east and south of the site lies Shawston Burn, which flows south and then southwest along the eastern and southern boundaries. The burn is wooded with mature trees on both banks and is crossed by a dilapidated sandstone bridge adjacent to the southwest site corner. Further across from the burn area lies fields. To the west of the site lies North & South Rd which crosses the Shawston Burn on the aforementioned bridge. Across the road lies the premises of Bellside Building and Timber Supplies, a builder's merchant.

2.4 ECOLOGY

No evidence of invasive plants, (e.g. Japanese Knotweed or Giant Hogweed) was apparent at the time of the site visit. It should however be noted that the site was inspected during the winter die-back period for these plants.

2.5 HISTORIC SITE USE

The available historical maps from the National Library of Scotland record the site as a field since the 1st edition Ordinance Survey in 1865. That edition records an 'Old ironstone pit' to the west of the site and North & South Rd, with a spoil heap shown to the south of the pit. Later map editions record no changes in land use at the site and the expansion of residential properties at Bellside, to the north of the site.

2.6 PHYSICAL CONSTRAINTS TO INVESTIGATION

The site ground can be soft in places and may cause wheeled vehicles to get stuck. Tracked vehicles were used for site investigation purposes.

3 QUALITATIVE RISK ASSESSMENT

The following Qualitative Risk Assessment has been prepared in accordance with the requirements of Planning Advice Note (PAN) 33 recognising the proposed use of the site. The regulatory and technical background to risk assessment is presented in the Appendix to this report.

3.1 CONCEPTUAL SITE MODEL

3.1.1 Sources

The site has historically remained as a field up until the present day. There are no known sources of potential contamination at the site.

3.1.2 Type 1 Receptor – Human Health

The risks to human health to the occupants of the site following development for a residential end-use have been assessed. Consideration is also given to personnel on site during the construction process.

3.1.2.1 Pathways

Current best practice adopts the commercial Land Exposure Assessment[1] (CLEA) model to assess the risk to Human Health. In this regard a comparison has been undertaken with the available default exposure pathways included in the conceptual exposure models presented in Environment Agency Science Report SC050021/SR3[2] to ascertain if the site under study is broadly compliant with the available scenarios.

The relevant pathways identified in the Environment Agency Science Report for a residential with gardens end use site with full time exposure are as follows:

- Direct soil ingestion & outdoor dust ingestion;
- Consumption of homegrown produce;
- Consumption of soil adhering to homegrown produce,
- Skin contact with soil and indoor dust; and
- Inhalation of indoor and outdoor dust and vapours.

3.1.2.2 Receptors

The following receptors are considered relevant to the site following development.

Human Health Receptors	Present?
Future Site Users	Yes
On-site construction personnel	Yes

[1] DEFRA and the Environment Agency, 2002.

[2] Updated Technical background to the CLEA model – August 2008

3.1.2.3 Pollutant Linkages and Assessed Risks

The site is presently covered by grassed topsoil that has been used as pasture. The proposed site layout includes three new residential properties with gardens and access in the centre of the site. There is currently no potential for contaminated ground to be present at surface and the pollutant linkage is therefore generally incomplete with respect to possible ground contamination at the site.

The following table provides a summary of the assessed risk, based on the probability and consequence of exposure to the identified contaminant sources, assuming complete exposure pathways following re-development.

		Future Users		
Sources	**Pathways**	**Probability**	**Consequence**	**Assessed Risk**
Potential sources identified in 3.1.1	**Ingestion of Soil & Outdoor Dust**	Unlikely	Minor	**Insignificant**
	Skin Contact with Soil	Unlikely	Minor	**Insignificant**
	Inhalation of Outdoor Dust	Unlikely	Minor	**Insignificant**
	Inhalation of Outdoor Gases & Vapours	Unlikely	Minor	**Insignificant**
	Inhalation of Indoor Gases & Vapours	Unlikely	Mild	**Very Low**

3.1.3 Type 2 Receptor – Ecological Systems

There are ecological receptors in the vicinity of the site in the form of ancient woodland along the eastern boundary of the site. The ancient wood lies downslope from the site. As there is no identified source of contamination at the site, the risk to ecological receptors is, therefore, assessed to be **Insignificant**.

3.1.4 Type 3 Receptor – Property (Animals and Crops)

Pets are considered likely to be present at the site once complete and will share the same probabilities and pathways as that of the Human Health risk assessment. The risk is, therefore, **Insignificant**.

3.1.5 Type 4 Receptor – Property (Buildings)

3.1.5.1 Pathways

The fabric of the building foundations and road furniture may be detrimentally affected by direct contact with contaminated soils, contaminated groundwater or the accumulation of soil gases or soil vapours.

3.1.5.2 Receptors

The following building receptors will be present at the site following development:

- Building materials (concrete), and
- Underground services (water supply pipes).

Type 4 Receptor – Property (Buildings)	Present?
Future property receptors	Yes

3.1.5.3 Pollutant Linkages and Assessed Risks

Source	Probability	Consequence	Assessed Risk	Discussion
Potential sources identified in 3.1.1	Unlikely	Minor concerning foundations Minor concerning water pipes	**Insignificant**	The lack of an identified source of contamination renders the risk to construction materials insignificant.

3.1.6 The Water Environment – Surface Water

The following pathways for possible migration of contamination to surface waters are considered relevant on this site:

- Migration of contaminated groundwater.
- Migration of contaminated surface water

3.1.6.1 Receptors

The following surface water receptors will be present at the site following development:

Water Environment – Surface Waters	Present?
On Site Surface Water receptors	No
Off Site Surface Water receptors	Yes

3.1.6.2 Pollutant Linkages and Assessed Risks

Source	Probability	Consequence	Assessed Risk	Discussion
N/A	Unlikely	Minor	**Insignificant**	Runoff from the site could reach the Shawston Burn via overland flow.

3.1.7 The Water Environment - Groundwater

The site allows small amounts of infiltration to local perched groundwater as it is predominantly covered by impermeable material. The groundwater beneath the local area is likely to be affected by the made ground stemming from the historic up filling and mining works. The groundwater beneath the site is expected to be no different from the surrounding area.

The vulnerability of the aquifer to pollution has been assessed in accordance with the SNIFFER screening methodology[3] as follows:

Thickness of Superficial Deposits (metres)	5-10
Permeability Class of Superficial Deposits [a]	Low-Medium
Bedrock Type	Fractured
Scenario [b]	4

[3] "Project WFD28 - Development of a Groundwater Vulnerability Screening Methodology for the Water Framework Directive", SNIFFER on behalf of SEPA, September 2004.

Assessed Vulnerability Code [c]		19
Notes	a	Refer sections 4.2.3 of SNIFFER report
	b	Refer section 5.1.4 of SNIFFER report
	c	Refer Appendix 1 Table 3 of SNIFFER report

Vulnerability Category	Description	Frequency of activity	Travel Time
5	Vulnerable to most water pollutants with rapid impact in many scenarios	Vulnerable to individual events ↓ Vulnerable only to persistent activity	Rapid ↓ Very Slow
4	Vulnerable to those pollutants not readily adsorbed or transformed		
3	Vulnerable to some pollutants with many significantly attenuated		
2	Vulnerable to some pollutants, but only when continuously discharged/leached		
1	**Only vulnerable to conservative pollutants in the long-term when continuously and widely discarded and leached**		

The aquifer is, therefore, assessed to be only vulnerable to conservative pollutants that may be present with the Made Ground and are discharged and widely leached on a continuous basis. Continuous leaching beneath the site is not expected due to the nature of the site ground cover.

The pollutant linkage is, therefore, incomplete and the risk to groundwater is assessed to be **Insignificant.**

3.2 SOIL GAS

There are known anthropogenic potential sources of soil gas at the site in the form of potential gas generated from known coal mining activity.

The site is out with a Radon affected area.

As there will be enclosed spaces in the proposed site use, the probability of exposure is considered to be likely with a mild consequence. The risk from soil gases following completion of the construction phase is therefore assessed to be **Moderate/Low.**

With respect to the construction phase of the works and in line with current Local Authority practise, the risk of gas build up in excavations of less than 1.2m depth is negligible and therefore the risk to human health is assessed to be insignificant. For excavations greater than 1.2m depth standard precautions for working in confined spaces should be put in place.

3.3 UNCERTAINTIES

From the desk study, the following uncertainties remain:

- The presence and nature of any soil contamination;
- The depth of superficial deposits beneath the site;
- The depth of worked coal and ironstone seams beneath the site; and
- The nature and extent of soil gas.

3.4 SUMMARY

The preliminary CSM and qualitative risk assessment have identified the following potential pollutant linkages at the site:

- The risk to the health of future site users was assessed as **Moderate/Low to Insignificant**;
- The risk to ecological receptors was assessed to be **Insignificant**;
- The risk to vegetation and animals was assessed as **Insignificant;**
- The risk to building materials was assessed as **Insignificant**;
- The risk to surface water receptors from on-site sources was assessed to be **Insignificant**;
- The risk to groundwater receptors from on-site sources was assessed to be **Insignificant;** and,
- The risk from soil gases is assessed to be **Moderate/Low.**

It is concluded that, based on the available information, further works to determine the nature of soils present at the site, mine workings and soil gas should be undertaken for the site. Trial pits and soil bores are recommended to allow chemical, geotechnical soil and soil gas testing from the site to establish the risks posed by the site ground conditions.

With respect to the construction phase of the works standard PPE should be used on site. Construction or maintenance work in excavations of greater than 1.2m depth will require health and safety precautions suitable to confined spaces.

3.5 MINERAL STABILITY

A separate Coal Mining Risk Assessment (CMRA) was conducted for the site and published on the 15th of March 2019. A copy of the report is included in the appendix of this report. The report found the site to be minerally stable.

Information from the CMRA is utilised in Section 6 below.

4 INTRUSIVE INVESTIGATION & GROUND CONDITIONS

4.1 FIELDWORKS

The fieldworks were carried out by Aitken Laboratories and Terrenus Land & Water on the 28th of February 2019. The intrusive works comprised twelve trial pits (TP1-12) and four percussive boreholes (BH1-4). The primary aim of the trial pits and boreholes was to investigate the nature and distribution of soils across the site. The locations of the exploratory positions are shown on the site investigation plan, Figure 2, included in the Appendix.

The borehole and trial pit record sheets are included in the Appendix of this report.

4.2 GROUND INVESTIGATION SUMMARY

The soil site investigation was un-targeted and designed to obtain information on the ground conditions at the site, including the presence of Made Ground and ground contamination.

4.3 STRATIGRAPHY

4.3.1 Topsoil

Situated across the site except for the northernmost area, where it has been stripped away. This layer is between 0.10m to 0.50m in thickness and contained rootlets and a small number of field drains.

4.3.2 Weathered Glacial Till

Situated across the site and found in all site investigation locations. Consists of orange, mottled grey, sandy, gravelly silt/clay and between 0.10 and 1.10m in thickness. This layer is predominantly 0.50m thick with the greatest thickness recorded in TP10 on the eastwards facing slope in the east of the site.

4.3.3 Un-weathered Glacial Till

This layer is recorded across the whole site and was recorded from depths between 0.0-2.50mbgl and varied between 0.60 to 1.20 metres in thickness. All trial pits and BHs 1, 2 & 4 terminated in this layer.

This layer consists of greyish brown sandy gravelly clay with cobbles with the gravel content ranging from fine to coarse in size.

4.3.4 Bedrock

Encountered between 4.30mbgl and 5.70mbgl in the rotary holes drilled as part of the Coal Mining Risk Assessment for the site and as highly weathered at 2.10mbgl in BH3 of the soil bores. The bedrock was found to be intact to depths greater than 30mbgl during the rotary drilling.

4.4 GROUNDWATER OBSERVATIONS

Groundwater was not encountered during the intrusive site works. Seepage from a broken field drain was noted in TP 8.

4.5 EVIDENCE OF POTENTIAL CONTAMINATION

No visible or olfactory evidence of contamination was encountered during the intrusive works.

4.6 MONITORING RECORDS

A standpipe was installed to the base of the on-site boreholes. Monitoring took place over a period of seven weeks and a summary of monitoring results to date is presented below. The complete gas monitoring results can be found in the Appendix.

Location	Max Methane (%v/v)	Min Oxygen (%v/v)	Max Carbon Dioxide (%v/v)	Max Hydrogen Sulphide (ppm)	Max Carbon Monoxide (ppm)	Max Recorded Flow Rate (l/h)	Water Level (Meters bgl)
BH1	0.2	16	1.2	0	10	9.7	0.80
BHR2	0.5	3.3	4.3	0	58	0.3	Dry
BH2	0.1	19.1	1.3	0	2	0.3	0.50
BH3	0.2	20.8	1.2	0	3	0	0.40
BH4	0.2	16	1.6	0	5	8.4	0.60

4.6.1 Radon

A review of the UK radon map published by the UKHSA reveals that the site lies within an area where less than 1% of homes at or above the Action Level and as such radon protection measures are not required for the site.

5 LABORATORY TESTING

5.1 GEOCHEMICAL TESTING STRATEGY

The chemical testing strategy for the site is untargeted and seeks to provide a general coverage for the purpose of potential contamination analysis. Soil samples were recovered from the Topsoil material at the site as well as the underlying weathered and un-weathered Glacial Till material.

A total of 15 soil samples were recovered from the trial pits and submitted, under chain of custody documentation, to Concept Life Sciences Laboratory in East Kilbride for chemical analysis.

Selected soil samples were analysed for the following suite of chemical parameters:

- Arsenic (total), Cadmium (total), Chromium 3, Chromium 6, Copper (total), Lead (total), Mercury (total), Nickel (total), Selenium (total), Zinc (total), pH, Asbestos, Cyanide (total), Sulphate 2:1 water / soil extract, Magnesium 2:1 Water / soil extract.
- Speciated PAH (polycyclic aromatic hydrocarbons).
- TPH (aliphatic/aromatic split)
- Organic Content
- Phenol
- UKWIR Testing Suite

5.2 CHEMICAL TEST RESULTS - SOIL

The test results were subjected to initial screening against Tier 1 Generic Assessment Criteria (GAC) for a commercial end use, which were derived using assessment criteria published by LQM/CIEH in S4ULs for Human Health Risk Assessment. The GAC adult action level for Lead was derived from C4SL using CLEA Software and the CLEA SR3 report. The results from the UKWIR testing suite were analysed against the criteria as described in UKWIR guidance[4]

Statistical analysis was not undertaken due to the limited number of samples analysed. The assessment is therefore based on a direct comparison of the soil concentrations and GAC.

From this methodology it was found that determinant levels were marginally above the thresholds for lead in the Topsoil of TP4 and TP5. For all other tested inorganic compounds, PAH and TPH hydrocarbons the amounts were found to be below the relevant thresholds.

Further analysis was undertaken to determine Site Specific Assessment Criteria values for lead using CLEA V 1.071 software and CLEA SR3 report. Using this method the lead threshold calculated for the site rose slightly to a value of 86mg/kg from 82mg/kg. The values of lead found in the topsoil of TP4 and TP5 are 88mg/kg and 89mg/kg respectively.

No asbestos fibres were detected.

5.3 CHEMICAL TEST RESULTS - LEACHATE

Leachate testing was conducted and found that the leachate generated was below groundwater resource protection values (RPV) but above annual average (AA) allowable surface water values (EQS) for zinc and copper. The complete test results can be found in the Appendix as well as the tables of analysis. Tables 1 to 4 provide the assessment criteria on a contaminate basis.

[4] Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. Report Ref. No. 10/WM/03/21

5.4 GEOTECHNICAL TEST RESULTS

Undisturbed and bulk samples were taken from the soil boreholes and trial pits at the site. Bulk samples were taken from the weathered glacial till layer during the excavation of the trial pits to determine CBR and Atterberg limits of the material. The undisturbed samples were taken from the un-weathered glacial till layer and were used to determine average shear strength and Atterberg Limits of the material.

The site CBR tests produced values between 1.2-2.6%

Atterberg Limit results are summarised below:

Location	Depth	Percentage Passing <425µm	Liquid Limit (%)	Plastic Limit (%)	Plasticity (%)	Moisture Content (%)
BH1	1.20	84.3	24	15	9	14.4
BH2	1.20	84.5	25	15	10	12.9
BH3	1.20	40.8	34	21	13	21.3
BH4	1.20	77.8	27	17	10	17.0
TP3	0.80	95	65	28	37	37.4
TP9	0.65	58	44	19	25	31.7

Average shear strength and densities from the undisturbed samples are shown below:

Location	Depth	Natural Wet Density (mg/m^3)	Natural Dry Density (mg/m^3)	Average Shear Strength (kPa)
BH1	1.20	2.13	1.86	130
BH2	1.20	2.16	1.91	217
BH4	1.20	2.02	1.73	58

In situ hand vane tests of the weathered and un-weathered glacial till were taken during the excavations of the trial pits.

- Results from the weathered glacial till material ranged from between 66-130+ kPa.
- Results from the un-weathered glacial till material were 130+ kPa.

The factual report of the geotechnical results can be found in the appendix

6 QUANTITATIVE RISK ASSESSMENT

The following section provides a quantitative risk assessment following the analysis of soil gas and soil samples recovered from the site and provides an update of the CSM presented above in Section 3 above. The quantitative risk assessment considers the sources, pathways and receptors for a residential with gardens development. The regulatory and technical background to risk assessment is presented in the Appendix to this report.

6.1 UPDATED CONCEPTUAL SITE MODEL

6.1.1 Sources

No deposits of Made Ground were encountered during the site investigation.

A potential offsite source for the elevated lead levels within the topsoil of TP4 and TP5 may be the neighbouring builder's yard, which has been known to burn waste material resulting in airborne particulate matter. TP4 and TP5 are situated upwind, on the prevailing wind direction, of this burning area.

Levels of the measured contaminants decreased with depth, which would indicate that the concentrations of contaminants encountered in the Topsoil were not derived from site Glacial Tills.

Gas monitoring is complete and is reported on in Section 6.3 below

6.2 RECEPTORS & PATHWAYS

6.2.1 Human Health

Lead contamination in excess of GAC values for a residential with gardens end use was encountered in the topsoil of TP4 & TP5. The most vulnerable receptor to lead is an adult who lives in a property all their working life, which allows for the build-up of lead concentrations within the body. This lowers the acceptable limit of lead in soil from 200mg/kg (child receptor) to 82mg/kg. CLEA generated Site Specific Assessment Criteria produced a lead threshold of 86mg/kg (the settings of which can be found in the appendix of this report). The values of lead recorded in the site soils are therefore, marginal and not representative of the topsoil across the site.

S4ULs and C4SLs are strongly precautionary in nature regarding acceptable levels of contaminants within soil. The threshold for lead is site specific and has been derived using the CLEA version 1.071 software, the outputs of which have been included in the complete report. The CLEA 1.071 software utilises the C4SL approach for determining acceptable thresholds of an element in soils and this includes the Low Level Toxicological Concern (LLTC) parameter to represent damaging daily uptake of an element by humans.

The software can utilise 3 values of LLTC to determine soil thresholds; 0.6 µg kg-1 bw day-1 (equivalent to a blood level of 1.6µg d L -1), 1.4µg kg-1 bw day-1 (3.5µg d L -1) and 2.1µg kg-1 bw day-1 (5µg d L -1). The different limits represent different acceptable daily intakes before certain health issues arise. From p17 of SP1010 Appendix H Provisional C4SLs For Lead:

a) *1.6 µg dL-1, derived using the BMD10 (adult renal toxicity) with a CSM of 1. This is slightly lower than the BMD01 for neurobehavioural effects in children and is protective of all effects.*
b) *3.5 µg dL-1, chosen in considering all 3 effects as follows: - slightly lower than the BMDL01 for SBP effects (3.6 µg dL-1) in adults, and therefore is protective of this effect. - lower than the median BMD01 (3.7 µg dL-1) for neurobehavioural effects in children considering both the piecewise linear (1.8 µg dL-1) and linear model (5.6 µg dL-1) values - an approximation*

of a BMD20 (adult renal toxicity, and with the caveats of poor model fit in this analysis - thus the accuracy of this value is questionable).

c) *5 µg dL-1, would be a 'policy choice' following the 2c route on the framework to set at the US CDC action standard - is lower than the BMD01 for neurobehavioural effects in children using the linear model (5.6 µg dL-1) - is lower than the BMD01 for systolic blood pressure effects in adults (6.1 µg dL-1). - is unknown in terms of where this value sits in relation to the BMR for renal effects in adults (but is higher than an estimated BMD20 from the Navas-Acien (2009) study. - action standard value is included here for illustration but care should be chosen if this is used as the basis of a UK guideline value, as this is derived in relation to known blood Pb monitoring data from a US population survey in US children, and this may not be transferable to UK children. Also it is set by the US in the context that the value will be reviewed every 4 years with the intention of this reducing over time, as risk management measures are implemented in the US.*

Given the above, the LLTCs of 5 µg dL-1 and 3.5 µg dL-1 have not been used. The lead threshold values in the report are derived using the LLTC of 0.6 µg kg-1 bw day-1 (1.6µg d L -1) which produces a soil threshold value of 86 mg/kg. Soil thresholds based on the LLTC of 3.5µg d L -1 produce values of 200mg/kg and, as stated in b) above, are close to being acceptable for adult renal toxicity risk. As such, whilst it is considered that 86mg/kg is an appropriate threshold for the site assessment as it is the safest value for all potential effects of lead poisoning, the increased risk to end users from spot soil lead values of 89mg/kg is negligible.

As such, it is considered that while the principal exposure pathways are complete, the risk to human health is assessed to be **Low**.

6.2.2 Ecological Receptors

A phytotoxic assessment of the site has not been included as part of the report as there is no recent guidance on thresholds for phytotoxic thresholds for soil. Using the ICRCL Guidance Note 59/83 1987 which provides the last accepted phytotoxic thresholds for copper (130mg/kg), nickel (70mg/kg) and zinc (200mg/kg) for the UK (Table 1, Group B), the site soils do not pose a phytotoxic risk as the site levels are below the phytotoxic trigger levels. The phytotoxic risk would depend on the type of plants grown on the site and plant specific risk assessment is beyond the scope of this study. To quote ICRCL guidance:

"*Grass is more resistant to phytotoxic effects than are most other plants and its growth may not be adversely affected by the trigger level concentrations*"

The site soils are natural and presently provide a suitable growing medium for native plant species. No areas of poor growth were noted during the site walkover and investigation.

The contamination noted in section 6.2.1 is not mobile and will only affect the ecology in direct contact with it. The risk to this receptor is therefore assessed to be **Low**.

6.2.3 Property (Animal & Crops)

The proposed development comprises a residential with garden use therefore the pollution linkage is complete. The encountered contamination renders the risk to property and crops **Very Low to Moderate**.

6.2.4 Property (Building Materials)

The risk of concrete attack is considered to be **Insignificant.**

Assessment of the risk to new water supply pipes through UKWIR testing demonstrations that the encountered weathered and un-weathered Glacial Till is suitable for PE & PVC water pipes. The full analysis of UKWIR results can be found in the appendix of this report.

Conversation with the developer has revealed that they intend to use barrier pipe for all water supply pipes within the site and to connect to the mains water supply. This is due to the proposed pipe locations being sited below the proposed driveways.

6.2.5 Water Environment - Groundwater

Local groundwater below the site is perched and lies within the un-weathered Glacial Till horizon. Water was not encountered during the field works. Monitoring of the site borehole over a six week period, recorded water depths between 0.40mbgl and 1.30mbgl.

The site soils have low-very low permeability and heavily impede water movement. No water was recorded in the monitored site rotary borehole and this will be due to an incomplete seal at the base of the monitoring installation.

The leachate testing conducted found all contaminants to be below SEPA Groundwater Protection Values (RPV). The risk to this receptor from the site is therefore considered to be **Insignificant**.

6.2.6 Water Environment – Surface Water

Leachate testing was carried out on soil samples taken from TP3 and TP6. Both of these samples were taken in natural soils (topsoil and weathered glacial till respectively) and are considered to be representative of these layers which occur throughout the site and the wider area. As such, the values are considered to be naturally occurring and indicative of the surrounding natural soils. Remediation of natural soils producing natural values of leachate is not considered appropriate.

Groundwater sampling was not undertaken as no man made source of potential groundwater contamination was identified onsite.

The Shawston Burn surface water feature flows adjacent to the eastern site boundary. Presently, all site generated runoff infiltrates to Groundwater with no overland flow noted at the site. The pollutant linkage is therefore incomplete and the risk to Surface Water features is **Insignificant**.

6.2.7 Soil Gas

Strong flows of gas were recorded from two separate boreholes on two separate occasions. Concentrations of CH4 and CO2 were found to be below the actionable thresholds set out in BS8485:2015 but, combined with the strong gas flows, indicate that the site is affected by soil gas.

There is no risk to the site from Radon, as shown on the UK Radon map.

6.2.8 Soil Gas Sources & Behaviour

Soil gas generation at the site is identified to occur within two sources. Boreholes 1-4 are all sited within the superficial deposits and have CO2 concentrations between 0.9 and 1.5 %v/v and methane concentrations between 0.1-0.2%v/v. Water levels in these bores were between 0.40-1.30

Borehole R2 extends well into the bedrock and through intact coal seams (see Terrenus Mining Risk Assessment 1748-202 18th March 2019). This bore was plugged and sealed at rockhead with a monitoring well installed through the superficial deposits. During the course of the gas monitoring programme, BHR2 was constantly dry and produced CO2 concentrations between 0.9-4.3 %v/v.

It is therefore concluded that the seal at the base of the monitoring installation is not complete and that the gas concentrations recorded are representative of the encountered coal seams, rather than the site soils.

Given that the coals are known to lie below at least 10m of intact rock, and the difference in gas regimes between the bores terminating well within the soil cover, there is no recorded pathway connecting coal generated gas to the site, other than BHR2.

The results would also indicate that the superficial clay deposits, and potentially the upper rock strata, create an effective barrier between the surface and deeper gas regimes.

Strong gas flows were recorded on independent days from BH1 (9.7 l/h dropping to 0.2 l/h over 1 minute) and BH4 (8.8 l/h dropping to 7.4 l/h over 2:30 minutes). The cause of these flows is conjectured to be natural perched water table pumping (See below) as the affect was limited to each individual borehole. The shallow water encountered in the bores limits the amount of headspace within the bore and will accentuate the water pumping effect on the gas flow.

The variable nature of the water level can act as a pump, drawing down gas during dry periods and expelling soil gas during wetter periods. A rise in groundwater is likely to be accompanied by low pressure and a rainfall event. The combined groundwater rise, and low pressure will increase the soil gas generation from the 'dry' section of the soil for a short time, prior to the drowning and suppressing of available pore space by rainfall and groundwater rise.

Given the proposed development at the site, the scale of impact of weather patterns on the soil gas production and the results of the gas monitoring on site, the expected change of local gas production due to changeable weather conditions is unlikely to significantly change the longer-term gas levels at this site.

A gas tri-plot for the site utilising all gas readings from the previous reports is included in the appendix of this report and shows that all the gas readings fall within the envelope of Microbial respiration of organic material in soil and migration of CO2 from depths. It is considered that both these sources have been monitored during the previous site investigations.

6.2.9 Mine Gas Risk Assessment

The site lies within a Coal Mine Reporting Area as defined by the Coal Authority with recorded coal workings in the Virtuewell Coal and potentially in the Bellside Ironstone seams. These workings were accessed from a shaft located adjacent to the northwest corner of the neighbouring GB Autos yard, 100m to the west of the site.

Due to the potential for mining instability, an intrusive investigation comprising two rotary holes (BHR1 & BHR2) was conducted at the site. The boreholes found an intact coal seam at 21mbgl and 23mbgl respectively, identified as the Airdrie Black Band coal seam, which is assessed to be unworked in the site area. No further seams of potentially workable thickness were encountered and a tentative identification of a closed up working in the Virtuewell Coal was identified in BHR2 at 41.50mbgl. This identification was primarily based on the known dip angle of the bedrock and recorded Virtuewell depth in the neighbouring mine shaft. The abandonment plan identified the mining method for the Virtuewell Seam as longwall mining.

Superficial cover during the drilling was found to comprise glacial till to depths of 4.3 and 5.7mbgl and groundwater is recorded to be between 2-7mbgl by the BGS. Water strikes were not recorded during drilling due to the use of water flush. Groundwater was not recorded in BHR2 during monitoring, indicating the level is below 4.5mbgl. The nearby Shawston Burn lies within a bedrock channel immediately to the east of the site, at a level approximately 5m below the site and groundwater is assumed to be in continuity with the level of the burn.

Using the Decision Support Tool provided in CL:AIRE 2021 Good Practice for Risk Assessment of Coal Mine Gas Emissions the site is initially assessed as lying within a high risk zone and requires a detailed assessment of the risk. This is primarily due to the known depth to coal seams.

6.2.9.1 Detailed Mine Gas Risk Assessment

Source

There are two potential sources of mine gas identified beneath the site. Gas from the unworked Airdrie Black Band coal seam and that from the closed up Virtuewell working (worked using longwall methods).

The longwall method would have removed all available coal from the seam and allow the seam to collapse very shortly after the coal had been extracted. The longwall method would also ensure that very limited/no voids are left once mining has been completed. As such the gas generation and gas reservoir potential from the longwall mined Virtuewell seam is considered to be limited.

The unworked Airdrie Black Band seam was encountered at 21 and 23mbgl was found to be between 0.4-0.5m thick and intact. Gas generation from this seam will be limited to oxygen interaction with the exposed surface area of the seam within the borehole of BHR2, which is the only the surface available for "weathering". The potential gas reservoir from this seam is considered to be limited to the borehole volume above groundwater level.

Both seams are considered to lie well below the groundwater table which will largely prevent methane generation and inhibit carbon dioxide generation.

Monitoring of gas from BHR2 found concentrations of CO2 to be 4.3%v/v with minimum oxygen concentrations of 3.3%/v/v. Methane concentrations were found to be 0.1%v/v. When plotted on a gas tri-plot the values of methane and CO2 fall within the envelope of microbial respiration and migration from depths. Monitoring data from site boreholes situated entirely within soils recorded peak values of CO2 of 2%v/v and minimum oxygen of 16%v/v. Values for both data sets were recorded during periods of falling and rising pressure.

Combined with the encountered oxygen levels it is concluded that the monitored values in BHR2 are representative of gas from deeper in the ground, associated with the encountered drowned seam and drowned closed working.

Pathway

The known mine shaft associated with the site workings lies 100m to the west of the site and as such is considered to be beyond influencing distance of the site.

There are no faults lying beneath the site.

Soil cover at the site comprises up to 5m of glacial till which will act as a significant inhibitor to gas migration to surface. Gas monitoring locations located within the site soils recorded gas values different to those of BHR2, indicating an independent gas regime and no interaction between the deeper gas and gas monitored in superficial cover.

The monitoring installation of BHR2 is situated within the superficial deposits of the site but during the monitoring period the bore was found to be dry whilst all others contained water close to ground surface. This, combined with the difference in monitored gas composition has been taken as evidence of a faulty monitoring installation with incomplete/faulty seal at the base. Therefore, the gas regime monitored in BHR2 is considered to represent the deeper rock gas regime. The drillers logs provided record the details of the monitoring well and seal construction.

BHR2 lies within the site and presently connects the site surface to the unworked Airdrie Black Band coal seam and closed Virtuewell seam. As such there is a pathway for deeper gas to surface. For all other areas of the site the pathway between the site surface and deeper coal/mine gas is considered to be incomplete

with a barrier provided by the site glacial till soil cover and intact bedrock between the surface and coal seams.

Receptor

The site will be developed for a residential end use with gardens. Human health receptors will be present at the site. The area adjacent to BHR2 will be affected by coal/mine gas. The gas concentrations encountered during the monitoring period whilst indicative of coal/mine gas, are not above an actionable threshold when using GSVs. The low oxygen concentrations, not included in GSV methodology, pose a risk to human health if allowed to build up in constructed voids.

Environmental Variation

Grouting is not required for the site, therefor the gas environment will not be altered and the assessment will not be altered by this variable.

Variations in groundwater depth, due to normal weather fluctuations or wider climate change, are not considered to impact down to 22mbgl (approximately 15m below assessed groundwater level) and will therefor not materially change the outcome of this assessment.

Atmospheric pressure variation was captured during the gas monitoring program with falling and low pressure events included. Further significant variation from the monitoring is considered unlikely.

Risk

The development plots adjacent to BHR2 are within its zone of influence with regards to mine gas and are at **Low-Moderate Risk.** The plots further from BHR2 are considered to be at **Insignificant-Low Risk** from mine gas.

6.2.10 Soil Gas Risk Assessment

Using the highest encountered flow rates and concentrations of carbon dioxide and methane from the boreholes terminating in soil to calculate a Gas Screening Value (GSV) produced a GSV of 0.097 which determines that the site could be classified as Characteristic Situation (CS) 2 (see table 6 in Appendix. The risk to the site from soil gas has been assessed to be Low and equivalent to Characteristic Situation 2.

A GSV for the site based on maximum flows and concentrations from all the available monitoring around the site is found to be 0.41 which also falls within the CS 2 category.

Based on this Characteristic Situation 2 definition, the recorded soil gases are gas to be of **Low-Moderate** risk and gas protection measures will be required.

As such the site will require suitable gas protection measures.

6.2.11 Impacts of Weather Conditions on Soil Gas Generation

Soil gas generation is dependent on a number of environmental factors, all closely related to weather trends both short and long term. Prolonged dry spells can encourage the release of carbon monoxide from the soil and low or falling air pressure allows increased gas generation from soils for all gas species. Extreme weather events such as droughts or prolonged periods of low pressure are likely to cause an increase in soil gas generation during the period of the weather event.

The site has been shown to have relatively high levels of groundwater (up to 0.60mbgl), and as such much of the available pore space within the soil can be occupied by water rather than gas. The variable nature of the water level can act as a pump, drawing down gas during dry periods and expelling soil gas during wetter periods. A rise in groundwater is likely to be accompanied by low pressure and a rainfall event. The combined groundwater rise, and low pressure will increase the soil gas generation from the

'dry' section of the soil for a short time, prior to the drowning and suppressing of available pore space by rainfall and groundwater rise.

Given the proposed development at the site, the scale of impact of weather patterns on the soil gas production and the results of the gas monitoring on site, the expected change of local gas production due to changeable weather conditions is unlikely to significantly change the longer term gas levels at this site.

The methodology adopted in Section 6.3. above is precautionary and the assessment will not change as a result of environmental conditions.

6.3 STAGE 2 QUANTITATIVE RISK ASSESSMENT SUMMARY

The Stage 2 site investigation fieldworks and quantitative risk assessment have enabled the assessment of the potential pollutant linkages identified during the Stage 1 risk assessment (Section 7). The result of the Stage 2 Quantitative Risk assessment is summarised below:

- The risk to human health from site soils is assessed to be **Low**,
- The risk to ecological receptors has been assessed to be **Low**;
- The risk to property receptors (animals & crops) has been assessed as **Very Low-Moderate**;
- The risk to property receptors has been assessed as **Insignificant**;
- The risk to the water environment has been assessed as **Insignificant**;
- The risk to human health from Mine Gas is **Low-Moderate**; and
- The risk to human health from Soil Gas is **Low-Moderate**

7 CONCLUSIONS & RECOMMENDATIONS

7.1 HISTORICAL DEVELOPMENT

The site has historically been undeveloped and has been utilised field.

7.2 GROUND CONDITIONS

The sequence of strata recorded by the ground investigation can be summarised as follows:

TOPSOIL	Light brown with rootlets and grassed covering.
WEATHERED GLACIAL TILL	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and natural coal frags.
GLACIAL TILL	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles.
BEDROCK	Encountered at 5.70m and 4.30m below ground level in BHR1 and BHR2 respectively.

Chemical analysis of the soils on site recorded exceedances in Lead in two topsoil locations, no other exceedances were recorded in the substances tested.

7.3 WATER ENVIRONMENT

Groundwater is recorded to be variable in depth, lying within the weathered and un-weathered Glacial Till layers.

The contaminant levels recorded do not pose a risk to the groundwater environment.

The Shawston Burn lies adjacent to the eastern site boundary but there are presently no pathways linking the surface water from the site to the burn.

7.4 GROUND ENGINEERING

The proposed development comprises the construction of detached residential properties with gardens. The un-weathered Glacial Till layer is considered suitable for the support of conventional strip foundations for the proposed buildings. For the proposed site building, it is recommended that a solution be adopted to transfer loadings to the dark brown grey sandy gravelly SILT/CLAY, between about 0.50-1.30 mbgl. An allowable bearing pressure in the order of 250kpa is likely to be suitable.

The deeper strata (from 1.30-1.90 mbgl) has a higher allowable bearing pressure of up to 300kpa and could be utilized if required.

Any deposits of soft, organic, very loose or otherwise unsuitable material encountered at formation level should be removed and the excavation extended to the deeper, stronger strata. Excavated materials should be re-used on site where possible and disposed of correctly offsite if required.

The superficial deposits are considered to be susceptible to deterioration in the presence of water or when disturbed. Accordingly, care should be taken to ensure all formations are protected as soon as possible after exposure.

7.5 GROUND CONTAMINATION

The site has not been the subject of previous potentially contaminative uses however, there is evidence of marginal lead contamination. It is concluded, that due to the marginal nature of the encountered lead contamination, that no further work is required in this regard.

7.6 WASTE DISPOSAL

All waste arisings from the site should be disposed of in accordance with the Environmental Protection (Duty of Care) Regulations 1991 and other appropriate legislation. In this regard it is recommended that proposed waste disposal contractors are provided with the soil test results in order that Duty of Care requirements can be fully assessed and implemented.

7.7 GAS PROTECTION

Gas protection measures are required to protect against carbon dioxide. The protection measures should be to Characteristic Situation 2, as set out in BS8485: 2015, which will require a combined score of 3.5pts. The recommended protection measures are set out below with their associated points score:

7.7.1 CS 2 Protection Measures

- Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations 1 point
- Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips 0.5 points
- Gas resistant membrane meeting all of the criteria set out Table 7 of BS8485: 2015+A1:2019. 2 points

The proposed gas protection measures will mitigate any potential movement of soil gas via the proposed strip foundations. In addition, the proposed foundation will not impact the bedrock material and will not act as a possible path for gas migration from the underlying bedrock.

It is concluded that the proposed gas protection measures are in line with the guidance as set out in BS8485:2015. With the proposed gas protection measures, the impact of the proposed shallow spread and strip foundations on the risk of soil gas migration is low.

7.7.2 Soil Gas Pathways

BH1-4 were situated in the superficial deposits and lie beneath the proposed housing footprints. As such they provide a pathway for the monitored soil gases derived from the superficial deposits to the housing footprint. The proposed development will include gas protection measures to CS2 and this is considered appropriate to protect against soil derived gases with a preferential pathway beneath the house.

BHR1 was sealed at rockhead and backfilled with arisings on completion of drilling and is therefore not considered to be a pathway.

The borehole for BHR2 was not decommissioned following the completion of monitoring. The borehole was located in June 2023, excavated and capped at rockhead with a 300mm cement cap prior to backfill with excavation natural cohesive arisings. A photographic record of the excavation and cap is attached to this report. This work is considered to provide a suitable barrier against the potential migration of mine gas from BHR2 and this feature is not considered to be a pathway.

The gas protection measures recommended above will continue to provide sufficient protection from the known soil gas sources.

-oo000oo-

Terrenus Land & Water Ltd wishes to thank Taylor Homes (Scotland) Ltd for the opportunity to prepare this report and trust that it meets with your requirements. However, should you wish to discuss the contents of the report then please do not hesitate to contact the undersigned.

Signed for and on behalf of

Terrenus Land & Water Ltd

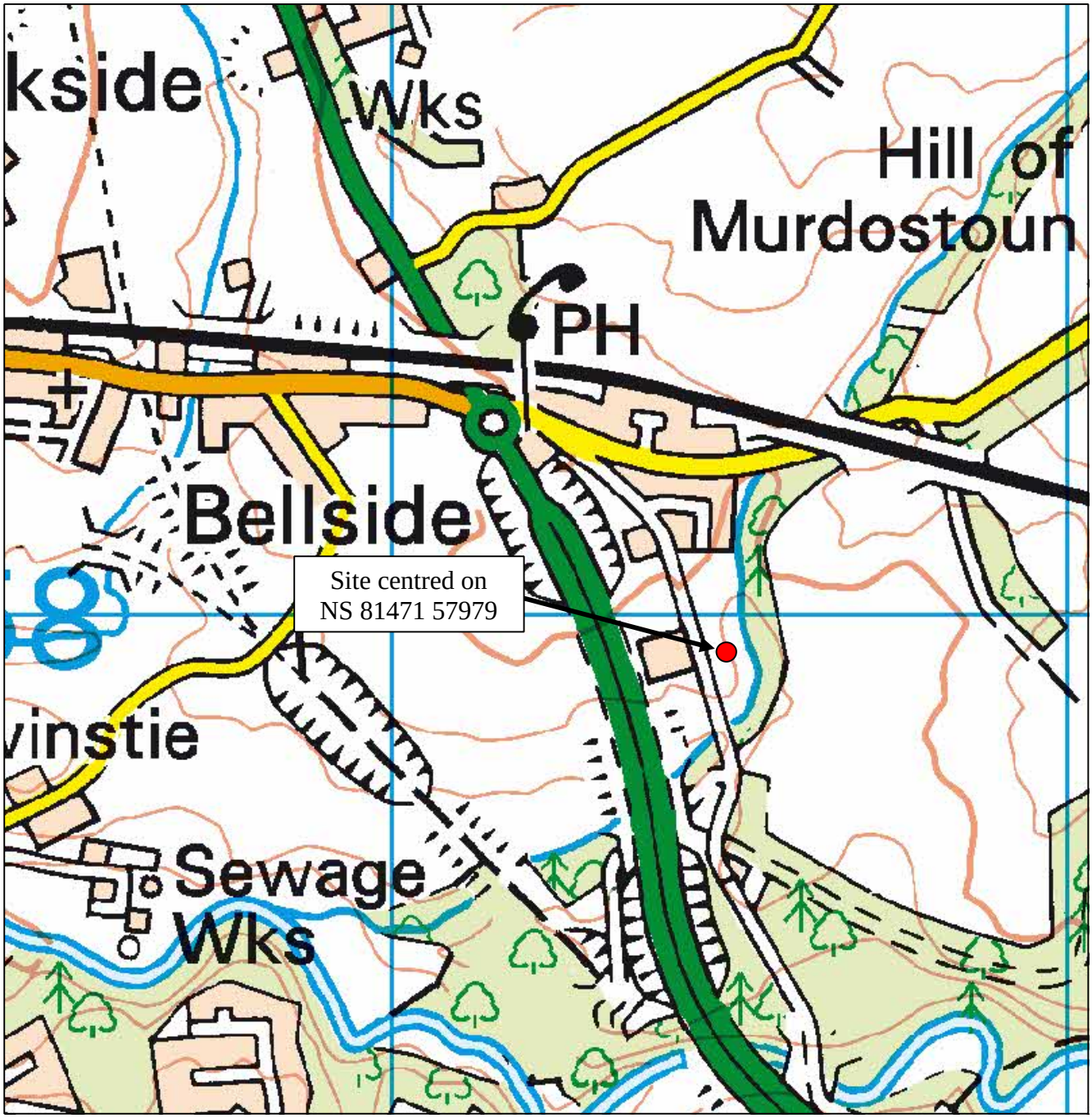
Alex Muir

Senior Environmental Consultant

William Hume

Director

APPENDIX



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Client: Taylor Homes (Scotland) Ltd	Drawing Title: Site Location Plan	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside, Cleland		
Date:25/1/2019	Figure 1	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

Client: Taylor Homes (Scotland) Ltd	Drawing Title: Site Boundary	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside Rd, Cleland Stage 2		
Date:28/2/2019	Figure 2	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

Client: Taylor Homes (Scotland) Ltd	Drawing Title: Site Soil Investigation Locations	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside Rd, Cleland Stage 2		
Date:28/2/2019	Figure 3	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

Client: Taylor Homes (Scotland) Ltd	Drawing Title: Rotary Bore Locations	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside, Cleland		
Date 12/3/2019	Figure 4	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

FACTUAL REPORT
ON
GROUND INVESTIGATION
AT
NORTH AND SOUTH ROAD
CLELAND

March 2019

Ref No: M108

Engineer: Terrenus Land and Water Limited

Aitken Laboratories Ltd

SITE INVESTIGATION CONTRACTORS

Castlehill House, Slamannan, FK1 3EZ.
Tel: 01324 851389 Fax: 01324 851326

Date: 27 March 2019

Our Ref: JA/M108

Your Ref:

Terrenus Land and Water Limited
International House
Hamilton International Park
Stanley Boulevard
Hamilton
G72 0BN

FAO: Mr A. Muir

Dear Sirs

SITE INVESTIGATION AT NORTH AND SOUTH ROAD, CLELAND

Please find enclosed our report for the above ground investigation.

This report was prepared by Mr A. Dobinson.

We trust this report is satisfactory, however if we can be of any further assistance please do not hesitate to contact us.

As part of our Quality System, we encourage feedback from our clients. On this basis, if you have any comments or suggestions, or if you feel we could improve our service to you in any way, we would be most interested to hear from you.

Yours faithfully
for and on behalf of
AITKEN LABORATORIES LIMITED

[redacted]

Alastair Dobinson
B. Eng. (Hons), C. Eng., M.I.C.E.

CONTENTS

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FACTUAL REPORT
ON
GROUND INVESTIGATION
AT
NORTH AND SOUTH ROAD
CLELAND

1. INTRODUCTION

It is proposed to construct a residential development at North and South Road, Cleland.

At the request of Terrenus Land and Water Limited, Consulting Engineers for the project, an investigation was carried out to confirm the ground conditions at the site to provide an assessment to the conditions with respect to design and construction of the proposed scheme.

This report presents the information established by observation, boring, sampling and in-situ testing. It should be noted that natural strata vary from point to point and that man-made deposits are subject to an even greater diversity. Groundwater conditions are dependent upon seasonal and other factors. Whilst an attempt is made in reporting to assess the likelihood or extent of such variations at the site, it should be recognised that there may be conditions pertaining which are not disclosed by the investigation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

2. SITE WORK

The field works were carried out on 28th February 2019 and comprised:-

4 No. Terrier Rig Boreholes to a maximum depth of 3.90 metres

Details of the boreholes including daily progress of hole and casing, descriptions of strata encountered, records of sampling and in-situ testing carried out, observations of groundwater conditions while boring, depths to changes in strata and details of standpipe installations are presented in the exploratory hole records in Appendix 1.

The locations of the exploratory holes were set out and recorded by the Engineer.

3. LABORATORY TESTING

The samples of soil taken during the site works were transported to the laboratory for systematic examination and testing. The characteristics of the soils determined in the laboratory were used to supplement field observations in the preparation of the final exploratory holes records.

Testing was carried out on selected samples to the requirements of the relevant British Standards, or in accordance with current good practice, as appropriate.

The Laboratory Testing References section of Appendix 2 details the tests performed in the laboratory which are UKAS accredited.

Tests marked "Not UKAS Accredited" in this report are not included in the UKAS Accreditation Schedule for our laboratory.

Laboratory Testing Comprised:-

Classification Tests
Undrained Triaxial Strength Tests
Compaction Tests
Loss on Ignition Tests

The results are presented in summary and detailed Tables and Figures in Appendices 2 and 3.

REFERENCES

1. BS5930:2015 Code of Practice for "Site Investigation" British Standard Code of Practice, British Standards Institution, London

2. BS1377:1990 Parts 1 to 9 British Standard "Methods of Test of Soils for civil engineering purposes". British Standards Institution, London.

3. BS10175:2011 Investigation of potentially contaminated site – Code of Practice.

4. Building Research Establishment, Special Digest 2005, Concrete in Aggressive Ground.

Appendix 1

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Site	Borehole Number
NORTH AND SOUTH ROAD, CLELAND	BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
TERRIER RIG				M108
	Location	**Dates** 28/02/2019	**Engineer** TERRENUS LAND AND WATER LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.15) 0.15	TOPSOIL			
0.20	E1						Firm consistency mottled brown sandy slightly gravelly CLAY. Gravel content is fine and medium			
0.50	E2									
						(1.75)				
1.00	E3						...below 1.20m, high strength stiff consistency			
1.20-2.00	U4									
						1.90				
2.00-2.45	SPT N=33			4,6/8,9,8,8			Stiff consistency brown sandy gravelly CLAY with cobbles. Gravel content is fine to coarse			
2.00-2.45	B5					(0.60)				
				28/02/2019:DRY		2.50	#OBSTRUCTION (Bedrock or boulder)			
							Complete at 2.50m			

Remarks
# Denotes driller's description
A 50mm diameter standpipe was installed at a depth of 2.50m
Excavating from 0.00m to 1.20m for 1 hour.

Scale (approx)	Logged By
1:50	PM

Figure No. M108.BH1

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Site	Borehole Number
NORTH AND SOUTH ROAD, CLELAND	BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
TERRIER RIG				M108

Location	Dates	Engineer	Sheet
	28/02/2019	TERRENUS LAND AND WATER LIMITED	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.20) 0.20	TOPSOIL			
0.20	E1						Firm consistency mottled brown and grey sandy slightly gravelly CLAY. Gravel content is fine and medium			
0.50	E2					(1.10)				
1.00	E3									
1.20-2.00	U4					1.30				
						(0.40)	Very high strength stiff consistency greyish brown sandy gravelly CLAY with cobbles. Gravel content is fine to coarse			
				28/02/2019:DRY		1.70	#OBSTRUCTION (Bedrock or boulder)			
							Complete at 1.70m			

Remarks
# Denotes driller's description
A 50mm diameter standpipe was installed at a depth of 1.70m
Excavating from 0.00m to 1.20m for 1 hour.

Scale (approx)	Logged By
1:50	PM

Figure No. M108.BH2

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Site	Borehole Number
NORTH AND SOUTH ROAD, CLELAND	BH3

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
TERRIER RIG				M108
	Location	**Dates** 28/02/2019	**Engineer** TERRENUS LAND AND WATER LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.30)	TOPSOIL			
0.20	E1					0.30	Firm consistency mottled brown sandy slightly gravelly CLAY. Gravel content is fine and medium			
0.50	E2									
1.00	E3					(1.80)				
1.20-2.00	U4									
2.00-2.45	SPT N=37			4,5/8,9,8,12		2.10	Grey and brown weathered SANDSTONE (Probable bedrock)			
2.00-2.45	B5									
3.00-3.90	U6					(1.80)				
				28/02/2019:DRY		3.90	Complete at 3.90m			

Remarks
# Denotes driller's description
A 50mm diameter standpipe was installed at a depth of 3.90m
Excavating from 0.00m to 1.20m for 1 hour.

Scale (approx)	Logged By
1:50	PM

Figure No. M108.BH3

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AITKEN LABORATORIES LTD

Site	Borehole Number
NORTH AND SOUTH ROAD, CLELAND	BH4

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
TERRIER RIG				M108
	Location	**Dates** 28/02/2019	**Engineer** TERRENUS LAND AND WATER LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.30)	TOPSOIL			
0.20	E1					0.30	Firm consistency mottled brown and grey sandy slightly gravelly CLAY. Gravel content is fine and medium			
0.50	E2					(0.80)				
1.00	E3					1.10	Medium strength firm consistency greyish brown sandy gravelly CLAY with cobbles. Gravel content is fine to coarse			
1.20-1.90	U4					(0.80)				
				28/02/2019:DRY		1.90	#OBSTRUCTION (Bedrock or boulder)			
							Complete at 1.90m			

Remarks
# Denotes driller's description
A 50mm diameter standpipe was installed at a depth of 1.90m
Excavating from 0.00m to 1.20m for 1 hour.

Scale (approx)	Logged By
1:50	PM

Figure No. M108.BH4

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Appendix 2

Laboratory Testing References

Laboratory Test	Standard Specification in Accordance with
Moisture Content	BS 1377: Part 2 1990: Clause 3.2
Liquid Limit	BS 1377: Part 2 1990: Clause 4.3
Plastic Limit	BS 1377: Part 2 1990: Clause 5.3
Placticity Index and Liquidity Index	BS 1377: Part 2 1990: Clause 5.4
Density Measurement	BS 1377: Part 2 1990: Clause 7.2
Particle Size Distribution	BS 1377: Part 2 1990: Clause 9.2
Particle Size Distribution	BS 1377: Part 2 1990: Clause 9.3
Particle Size Distribution	BS 1377: Part 2 1990: Clause 9.5
Sulphate Content of Soil and Groundwater *	BS 1377: Part 2 1990: Clause 5.6
pH *	BS 1377: Part 2 1990: Clause 9
California Bearing Ratio	BS 1377: Part 2 1990: Clause 7
One Dimension Consolidation Properties	BS 1377: Part 5 1990: Clause 3
Undrained Shear Strength, Triaxial Compression	BS 1377: Part 2 1990: Clause 8
Undrained Shear Strength, Triaxial Compression (Multi-stage)	BS 1377: Part 2 1990: Clause 9
Dry Density/Moisture Content Relationship (2.5kg Rammer)	BS1377: Part 4 1990: Clause 3.3.3.4
Dry Density/Moisture Content Relationship (4.5kg Rammer)	BS1377: Part 4 1990: Clause 3.5.3.6

***Tests marked with asterisk are not UKAS Accredited.**

M108, North and South Road, Cleland

Geotechnical Test Results Summary

Table 1

Exp. Point No	Sample Depth (m)	Sample Type/No.	MC (%)	Natural Wet Density (Mg/m3)	Natural Dry Density (Mg/m3)	<425 (µm)	LL (%)	PL (%)	PI (%)	Average Shear Strength (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (degrees)	Other Testing and Remarks
BH1	1.20	U	14.4	2.13	1.86	84.3	24	15	9	130			
BH2	1.20	U	12.9	2.16	1.91	84.5	25	15	10	217			
BH3	1.20	U	21.3			40.8	34	21	13				
BH4	1.20	U	17.0	2.02	1.73	77.8	27	17	10	58			
TP3	0.80	B	37.4			95.0	65	28	37				CBR
TP4	0.65	B											
TP5	0.60	B											Loss on Ignition
TP7	0.50	B											
TP9	0.65	B	31.7			58.0	44	19	25				CBR, Loss on Ignition
TP11	0.55	B	43.5										CBR

M108, North and South Road, Cleland

CBR Test Results

Table 2

Exp. Point No	Sample Depth (m)	Sample Type/No.	Natural Moisture Content (%)	Method of Sample Preparation	Test Dry Density (Mg/m^3)	C.B.R. (%)	Retained on 20mm Sieve (%)
TP3	0.80	B	37.4	2.5kg Rammer	1.32	2.6	2
TP9	0.65	B	31.7	2.5kg Rammer	1.45	1.2	0
TP11	0.55	B	43.5	2.5kg Rammer	1.26	2.3	0

SITE : North & South Road, Cleland. M108

Job Number M – : 108
Exp.Point : BH1
DEPTH : 1.20 m.
Description : Mottled brown gravelly sandy clay

SPECIMEN/STAGE No :	1	2	3	
CELL PRESSURES =	100			kN/m²
WEIGHT OF SPECIMEN =	3339			gms.
DIAMETER OF SPECIMEN =	99.2			m.m.
HEIGHT OF SPECIMEN =	203			m.m.
WT.of WET SAMPLE + TIN =	424			gms.
WT.of DRY SAMPLE + TIN =	376			gms.
WT.of TIN =	41.5			gms.
LOAD FACTOR =	39.1			N/Div.
PRESSURE ZERO =	1			Div.

SPEC. / STAGE No :	1	2	3	
WATER CONT. =	14.4			% dry weight
BULK DENSITY =	2.13			Mg/m³
DRY DENSITY =	1.86			Mg/m³
CELL PRESSURES =	100			kN/m²
SHEAR STRENGTH =	130			kN/m²
STRAIN at FAILURE =	21			%
RATE of STRAIN =	2	2	2	%/min.

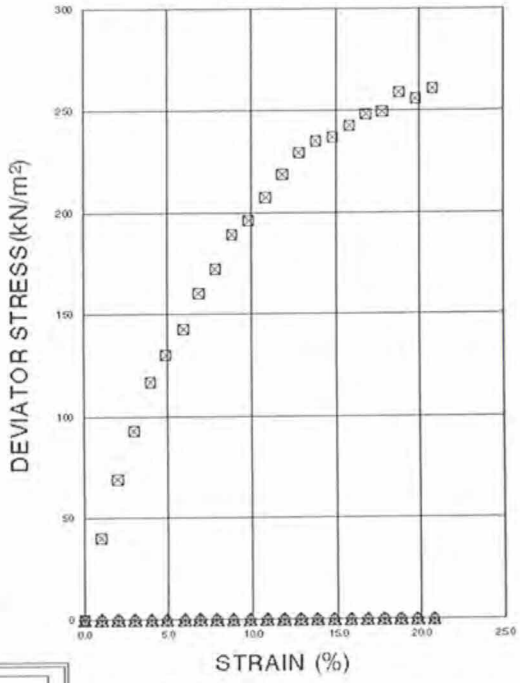
MEMBRANE TYPE = Standard Latex – 0.5mm. thick.

AVERAGE SHEAR STRENGTH = 130 kN/m²

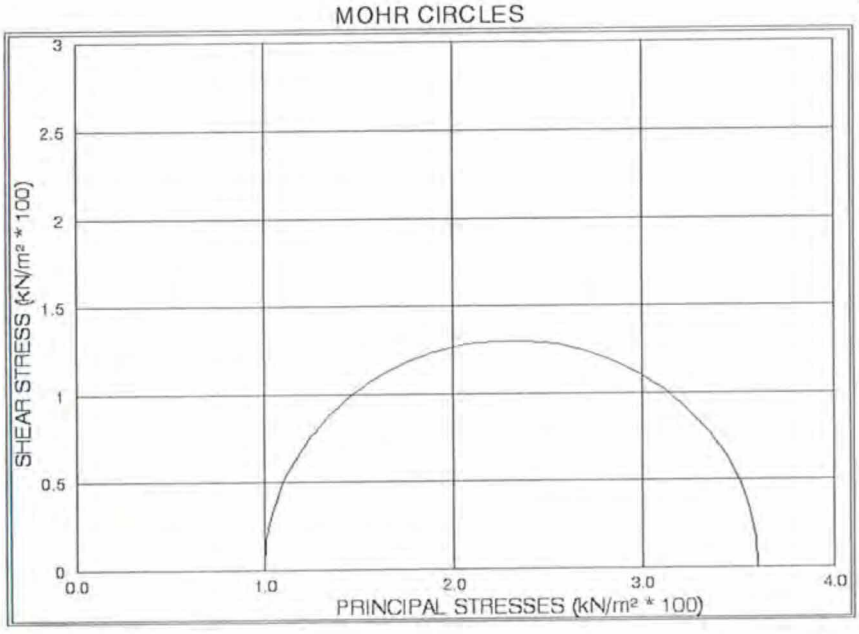
APPARENT COHESION = kN/m²
ANGLE of SHR. RESISTANCE = Degrees

READ No	AREA cm²	STRAIN %	STRAIN mm	PROVING RING DIAL Divs.	APPLIED LOAD kN	DEVIATOR STRESS kN/m²
	77.35		0			
1	78.12	1.0	2	9	0.31	40
2	78.91	2.0	4	15	0.55	69
3	79.71	3.0	6	20	0.74	93
4	80.53	3.9	8	25	0.94	116
5	81.37	4.9	10	28	1.06	130
6	82.22	5.9	12	31	1.17	143
7	83.09	6.9	14	35	1.33	160
8	83.98	7.9	16	38	1.45	172
9	84.89	8.9	18	42	1.60	189
10	85.82	9.9	20	44	1.68	196
11	86.77	10.9	22	47	1.80	207
12	87.75	11.8	24	50	1.92	218
13	88.74	12.8	26	53	2.03	229
14	89.76	13.8	28	55	2.11	235
15	90.80	14.8	30	56	2.15	237
16	91.86	15.8	32	58	2.23	243
17	92.95	16.8	34	60	2.31	248
18	94.07	17.8	36	61	2.35	249
19	95.21	18.8	38	64	2.46	259
20	96.38	19.7	40	64	2.46	256
21	97.58	20.7	42	66	2.54	260

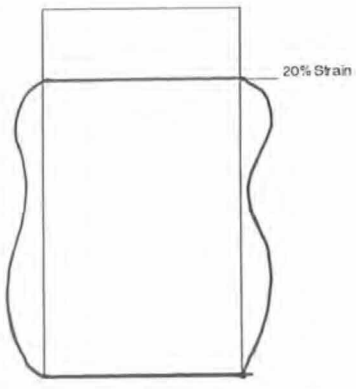
STRESS / STRAIN PLOT



MOHR CIRCLES



FAILURE



PLASTIC \ ~~BRITTLE\ COMPOUND~~

COMMENTS:
Prepared by : Vertical Extrusion \ ~~Remoulding~~.
99mm Diameter Single stage test – (one specimen)

Originator	SM	QUICK UNDRAINED TRIAXIAL COMPRESSION TEST in accordance with *B.S.1377:Part 7:1990 clauses 8 and 9/~~B.S.17892: Part8~~	Aitken Laboratories Limited
Checked & Approved	SM	North & South Road, Cleland. M108	

Template: RS03
Aitken Laboratories Ltd, Castlehill House, Bank St, Stamanan, FK13EZ
Print Date: 18/03/2019
Print Time: 10:00 AM

SITE : North & South Road, Cleland. M108

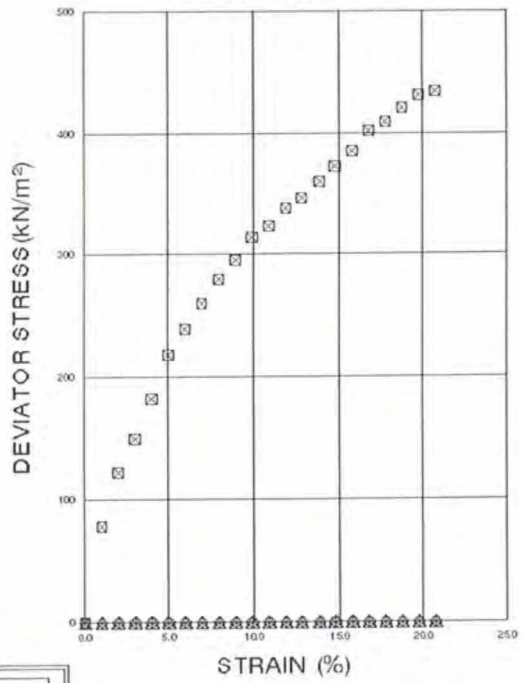
Job Number M–: 108
Exp.Point : BH2
DEPTH : 1.20 m.
Description : Brown gravelly sandy clay

SPECIMEN/STAGE No :	1	2	3	
CELL PRESSURES =	100			kN/m²
WEIGHT OF SPECIMEN =	3426			gms.
DIAMETER OF SPECIMEN =	100			m.m.
HEIGHT OF SPECIMEN =	202			m.m.
WT.of WET SAMPLE+TIN =	324			gms.
WT.of DRY SAMPLE+TIN =	292			gms.
WT.of TIN =	42.5			gms.
LOAD FACTOR =	39.1			N/Div.
PRESSURE ZERO =	1			Div.

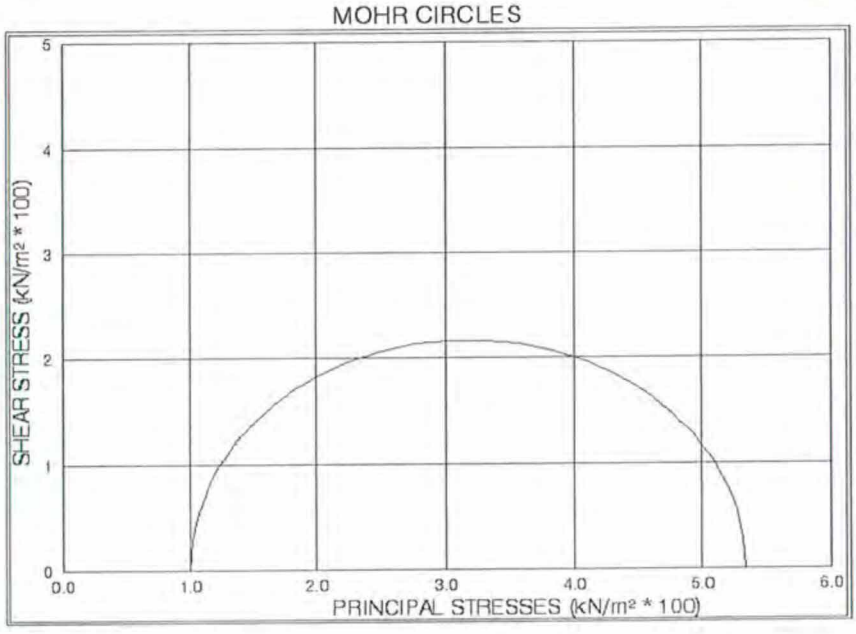
SPEC. / STAGE No :	1	2	3	
WATER CONT. =	12.9			% dry weight
BULK DENSITY =	2.16			Mg/m³
DRY DENSITY =	1.91			Mg/m³
CELL PRESSURES =	100			kN/m²
SHEAR STRENGTH =	217			kN/m²
STRAIN at FAILURE =	21			%
RATE of STRAIN =	2	2	2	%/min.
MEMBRANE TYPE =	Standard Latex – 0.5mm. thick.			
AVERAGE SHEAR STRENGTH =	217			kN/m²
APPARENT COHESION =				kN/m²
ANGLE of SHR. RESISTANCE =				Degrees

READ No	AREA cm²	STRAIN %	STRAIN mm	PROVING RING DIAL Divs.	APPLIED LOAD kN	DEVIATOR STRESS kN/m²
	78.52		0			
1	79.31	1.0	2	17	0.63	79
2	80.11	2.0	4	26	0.98	122
3	80.92	3.0	6	32	1.21	150
4	81.76	4.0	8	39	1.49	182
5	82.61	4.9	10	47	1.80	218
6	83.47	5.9	12	52	1.99	239
7	84.36	6.9	14	57	2.19	259
8	85.27	7.9	16	62	2.38	280
9	86.19	8.9	18	66	2.54	295
10	87.14	9.9	20	71	2.74	314
11	88.10	10.9	22	74	2.85	324
12	89.09	11.9	24	78	3.01	338
13	90.10	12.8	26	81	3.13	347
14	91.13	13.8	28	85	3.28	360
15	92.19	14.8	30	89	3.44	373
16	93.27	15.8	32	93	3.60	386
17	94.38	16.8	34	98	3.79	402
18	95.52	17.8	36	101	3.91	409
19	96.68	18.8	38	105	4.07	421
20	97.87	19.8	40	109	4.22	431
21	99.09	20.8	42	111	4.30	434

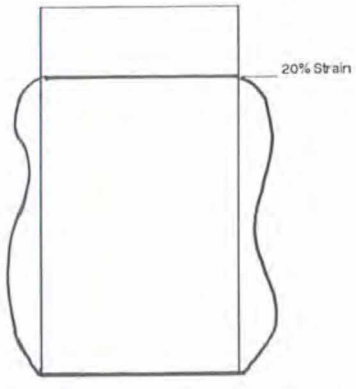
STRESS / STRAIN PLOT



MOHR CIRCLES



FAILURE



PLASTIC \ ~~BRITTLE~~ \ ~~COMPOUND~~

COMMENTS:
Prepared by : Vertical Extrusion \ ~~Remoulding.~~
100mm Diameter Single stage test– (one specimen)

Originator	SM	QUICK UNDRAINED TRIAXIAL COMPRESSION TEST in accordance with *B.S.1377:Part 7:1990 clauses 8 and 9/~~B.S.17892: Part~~8	Aitken Laboratories Limited
Checked & Approved	SM	North & South Road, Cleland. M108	

Aitken Laboratories Ltd, Castlehill House, Bank St, Stamanan, FK13EZ
Templater: RS03
Print Date: 18/03/2019
Print Time: 10:02 AM

SITE : North & South Road, Cleland. M108

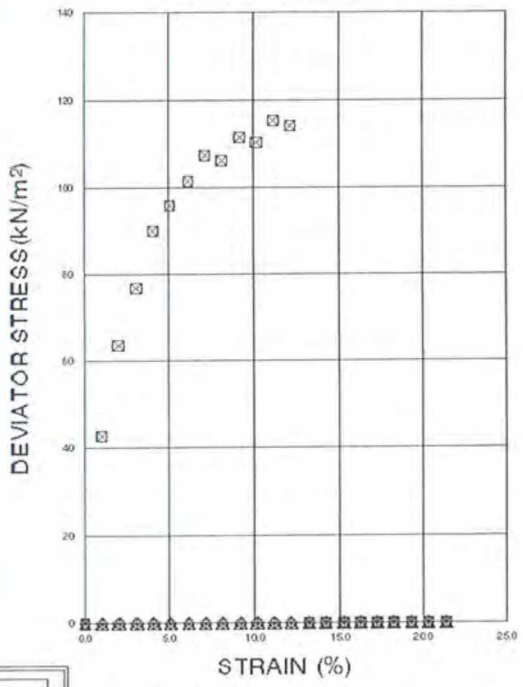
Job Number M – : 108
Exp.Point : BH4
DEPTH : 1.20 m.
Description : Mottled brown gravelly sandy clay

SPECIMEN/STAGE No :	1	2	3	
CELL PRESSURES =	100			kN/m²
WEIGHT OF SPECIMEN =	2163			gms.
DIAMETER OF SPECIMEN =	83.1			m.m.
HEIGHT OF SPECIMEN =	197			m.m.
WT. of WET SAMPLE+TIN =	432			gms.
WT. of DRY SAMPLE+TIN =	375			gms.
WT. of TIN =	42.6			gms.
LOAD FACTOR =	39.1			N/Div.
PRESSURE ZERO =	1			Div.

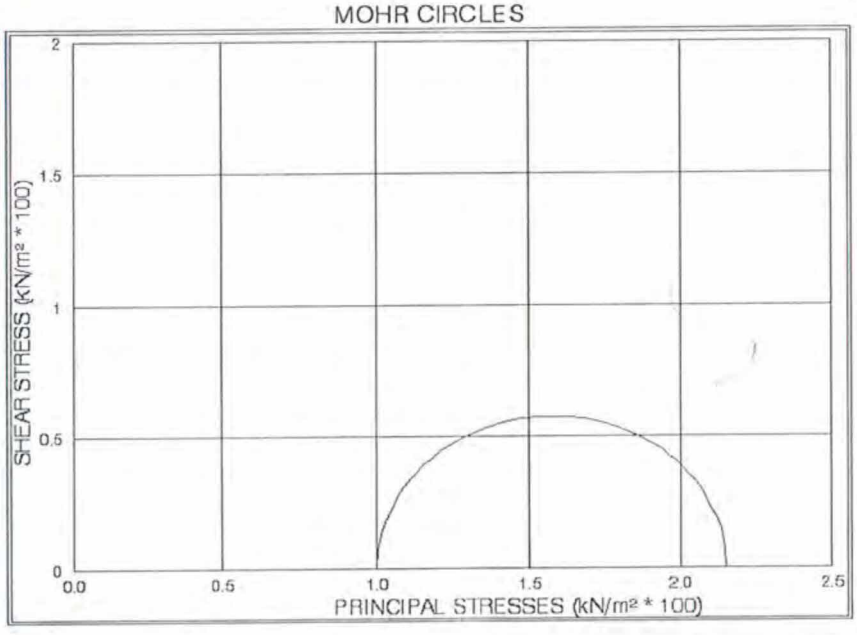
SPEC. / STAGE No :	1	2	3	
WATER CONT. =	17.0			% dry weight
BULK DENSITY =	2.02			Mg/m³
DRY DENSITY =	1.73			Mg/m³
CELL PRESSURES =	100			kN/m²
SHEAR STRENGTH =	58			kN/m²
STRAIN at FAILURE =	11			%
RATE of STRAIN =	2	2	2	%/min.
MEMBRANE TYPE =	Standard Latex – 0.5mm. thick.			
AVERAGE SHEAR STRENGTH =	58			kN/m²
APPARENT COHESION =				kN/m²
ANGLE of SHR. RESISTANCE =				Degrees

READ No	AREA cm²	STRAIN %	STRAIN mm	PROVING RING DIAL Divs.	APPLIED LOAD kN	DEVIATOR STRESS kN/m²
	54.22		0			
1	54.78	1.0	2	7	0.23	43
2	55.35	2.0	4	10	0.35	64
3	55.92	3.0	6	12	0.43	77
4	56.52	4.1	8	14	0.51	90
5	57.12	5.1	10	15	0.55	96
6	57.74	6.1	12	16	0.59	102
7	58.37	7.1	14	17	0.63	107
8	59.01	8.1	16	17	0.63	106
9	59.67	9.1	18	18	0.66	111
10	60.34	10.1	20	18	0.66	110
11	61.03	11.2	22	19	0.70	115
12	61.73	12.2	24	19	0.70	114
13	62.45	13.2	26			
14	63.19	14.2	28			
15	63.95	15.2	30			
16	64.72	16.2	32			
17	65.51	17.2	34			
18	66.33	18.2	36			
19	67.16	19.3	38			
20	68.01	20.3	40			
21	68.89	21.3	42			

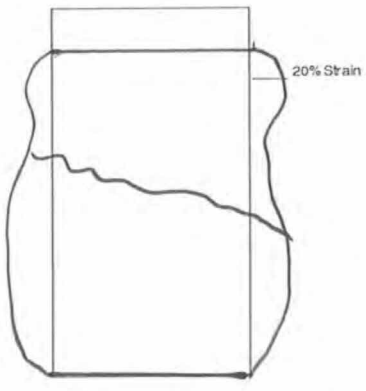
STRESS / STRAIN PLOT



MOHR CIRCLES



FAILURE



~~PLASTIC~~ \ ~~BRITTLE~~ \ COMPOUND

COMMENTS:
Prepared by : Vertical Extrusion \ ~~Remoulding~~.
83mm Diameter Single stage test – (one specimen)

Originator	SM	QUICK UNDRAINED TRIAXIAL COMPRESSION TEST in accordance with *B.S.1377:Part 7:1990 clauses 8 and 9/~~B.S.17892: Part~~8	Aitken Laboratories Limited
Checked & Approved	SM	North & South Road, Cleland. M108	

Templater: RS03
Aitken Laboratories Ltd, Castlehill House, Bank St, Stamanan, FK13EZ
Print Date: 18/03/2019
Print Time: 10:03 AM

Appendix 3

Certificate of Analysis

Certificate Number 19-04986

20-Mar-19

Client Aitken Laboratories Ltd
Casterhill House
Bank Street
Slamannan
FK1 3EZ

Our Reference 19-04986

Client Reference M108

Order No (not supplied)

Contract Title North and South Road

Description 2 Soil samples.

Date Received 15-Mar-19

Date Started 15-Mar-19

Date Completed 20-Mar-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-04986
Client Ref M108
Contract Title North and South Road

			Lab No	1474803	1474804
			Sample ID	TP5	TP9
			Depth	0.60	0.65
			Other ID		
			Sample Type	B	B
			Sampling Date	n/s	n/s
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	6.1	5.8

Information in Support of the Analytical Results

Our Ref 19-04986
Client Ref M108
Contract North and South Road

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1474803	TP5 0.60 SOIL		PG	Sample date not supplied, Loss on Ignition (730 days)	
1474804	TP9 0.65 SOIL		PG	Sample date not supplied, Loss on Ignition (730 days)	

Key: P-Plastic G-Bag

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 1
Location:	North & South Road, Cleland	**Ground Level:**	150m
Date:	28th February 2019	**Grid Reference:**	NS 81439 58066
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.65	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	T/J/J	0.60	90, 92, 130+
0.65	1.50	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till	T/J/J	1.35	
		BASE OF PIT AT 1.50m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further. Topsoil strip in this area

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test – Final value = Remoulded Strength**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
V – VOC sample	**J ~ 330ml Amber Jar**
AB – One Litre Amber Jar	**W - water sample**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 2
Location:	North & South Road, Cleland	**Ground Level:**	149m
Date:	28th February 2019	**Grid Reference:**	NS 81478 58069
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	1.20	Brown, mottled blue/grey, sandy, gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till BASE OF PIT AT 1.20m	T/J/J	0.40	130+, 130+, 130+

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further. Topsoil strip in this area

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 3
Location:	North & South Road, Cleland	**Ground Level:**	147m
Date:	28th February 2019	**Grid Reference:**	NS 81448 58021
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.50	Topsoil: light brown with rootlets and a brick and field drain at base of layer	T/J/J	0.40	
0.50	1.00	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	T/J/J/B	0.80	102, 110, 122
1.00	1.50	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till			
		BASE OF PIT AT 1.50m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further.

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 4
Location:	North & South Road, Cleland	**Ground Level:**	146.5m
Date:	28th February 2019	**Grid Reference:**	NS 81485 58032
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		Description of strata	Sample		Hand Vane Tests (kPa)
From	**To**		**Type**	**Depth (m)**	
GL	0.30	Topsoil: light brown with rootlets	T/J/J	0.20	
0.30	0.70	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	T/J/J/B	0.65	110, 130+, 130+
0.70	1.60	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till			
		BASE OF PIT AT 1.50m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further.

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 5
Location:	North & South Road, Cleland	**Ground Level:**	143m
Date:	28th February 2019	**Grid Reference:**	NS 81458 57985
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		Description of strata	Sample		Hand Vane Tests (kPa)
From	To		Type	Depth (m)	
GL	0.35	Topsoil: light brown with rootlets	T/J/J	0.20	
0.35	0.70	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	B	0.60	70, 82, 94,100
0.70	1.40	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till	T/J/J	1.30	
		BASE OF PIT AT 1.50m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further.

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 6
Location:	North & South Road, Cleland	**Ground Level:**	142m
Date:	28th February 2019	**Grid Reference:**	NS 81490 58000
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.40	Topsoil: light brown with rootlets	T/J/J	0.20	
0.40	0.90	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	T/J/J	0.70	130+, 130+, 130+
0.90	1.55	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till BASE OF PIT AT 1.55m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further.

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 7
Location:	North & South Road, Cleland	**Ground Level:**	142m
Date:	28th February 2019	**Grid Reference:**	NS 81466 57954
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.10	Topsoil: light brown with rootlets			
0.10	0.60	Orange, mottled grey, coarse sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	T/J/J	0.20	130+, 130+,
0.60	1.50	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till BASE OF PIT AT 1.50m	B	0.50	130+

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further.

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 8
Location:	North & South Road, Cleland	**Ground Level:**	139m
Date:	28th February 2019	**Grid Reference:**	NS 81494 57971
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.50	Topsoil: light brown with rootlets and field drain at base of layer			
0.50	1.00	Orange, mottled grey, coarse sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till			
1.00	1.45	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till			
		BASE OF PIT AT 1.45m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Seepage from field drain

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

terrenus land&water

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 9
Location:	North & South Road, Cleland	**Ground Level:**	140m
Date:	28th February 2019	**Grid Reference:**	NS 81476 57925
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		Description of strata	Sample		Hand Vane Tests (kPa)
From	To		Type	Depth (m)	
GL	0.10	Topsoil: light brown with rootlets.			
0.10	0.90	Orange, mottled grey, coarse sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till	T/J/J B	0.30 0.65	66, 70, 82
0.90	1.50	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till. Hand Vanes taken using extender poles. Vane only just entered material. BASE OF PIT AT 1.50m		1.50	130+, 130+, 130+

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 10
Location:	North & South Road, Cleland	**Ground Level:**	138.5m
Date:	28th February 2019	**Grid Reference:**	NS 81498 57919
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		Description of strata	Sample		Hand Vane Tests (kPa)
From	To		Type	Depth (m)	
GL	0.30	Topsoil: light brown with rootlets.			
0.30	0.80	Light grey brown, silty, slightly gravelly, fine SAND with dark brown flecks	T/J/J	0.40	82, 90, 92
0.80	1.90	Orange, mottled grey, coarse sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Large cobbles of coal at base of layer			
1.90	2.40	Dark grey blue gravelly SILT/CLAY. Gravel comprised of coal, sandstone and mudstone. Assessed firm-stiff	T/J/J	2.40	
		BASE OF PIT AT 2.40m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 11
Location:	North & South Road, Cleland	**Ground Level:**	139m
Date:	28th February 2019	**Grid Reference:**	NS 81484 57904
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.10	Topsoil: light brown with rootlets.			
0.10	0.60	Pink/orange mottled blue/grey SILT/CLAY. Weathered glacial till	T/J/J/B	0.55	108, 130+, 130+
0.60	1.50	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till.	T/J/J	1.50	
		BASE OF PIT AT 1.50m			

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Trial Pit Log

Contract No:	1748-203	**Pit No:**	TP 12
Location:	North & South Road, Cleland	**Ground Level:**	138m
Date:	28th February 2019	**Grid Reference:**	NS 81494 57895
Logged By:	AM	**Machine Type:**	Machine Excavated

Strata depth (m)		**Description of strata**	**Sample**		**Hand Vane Tests (kPa)**
From	**To**		**Type**	**Depth (m)**	
GL	0.20	Topsoil: light brown with rootlets.			
0.20	0.30	Orange, mottled grey, sandy, slightly gravelly SILT/CLAY. Gravel is fine-coarse and sub-rounded to angular in shape. Gravel comprised of sandstone, mudstone and coal. Weathered Glacial Till			
0.30	1.20	Dark brown grey, sandy, gravelly SILT/CLAY with rounded sandstone boulder and cobbles. Assessed as stiff and becoming very stiff with depth. Material excavated from pit in large gravel sized pieces. Unweathered Glacial Till. BASE OF PIT AT 1.20m	T/J/J	0.54	130+, 130+, 130+

Ground Water:	Pit Dry
Pit Stability:	Pit Stable
Remarks:	Pit stopped as machine having difficulty to excavate further.

Notes:	
T - Tub sample	**HV - In-situ Hand Vane test**
B - Geotechnical bulk sample	**HV(B) - Hand Vane from large bulk sample**
C - Contamination sample	**W - water sample**
AB – One Litre Amber Jar	**J ~ 330ml Amber Jar**

Certificate of Analysis

Certificate Number	19-04986
	20-Mar-19
Client	Aitken Laboratories Ltd Casterhill House Bank Street Slamannan FK1 3EZ
Our Reference	19-04986
Client Reference	M108
Order No	(not supplied)
Contract Title	North and South Road
Description	2 Soil samples.
Date Received	15-Mar-19
Date Started	15-Mar-19
Date Completed	20-Mar-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-04986
Client Ref M108
Contract Title North and South Road

			Lab No	1474803	1474804
			Sample ID	TP5	TP9
			Depth	0.60	0.65
			Other ID		
			Sample Type	B	B
			Sampling Date	n/s	n/s
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	6.1	5.8

Information in Support of the Analytical Results

Our Ref 19-04986
Client Ref M108
Contract North and South Road

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1474803	TP5 0.60 SOIL		PG	Sample date not supplied, Loss on Ignition (730 days)	
1474804	TP9 0.65 SOIL		PG	Sample date not supplied, Loss on Ignition (730 days)	

Key: P-Plastic G-Bag

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 806572-1

Date of Report: 12-Mar-2019

Customer: Terrenus Land & Water Ltd
Prospect Business Centre
Hamilton International Park
Stanley Boulevard
Hamilton
G72 0BN

Customer Contact: Mr Alex Muir

Customer Job Reference: 1748-203
Customer Site Reference: North and South Road, Cleland
Date Job Received at Concept: 28-Feb-2019
Date Analysis Started: 04-Mar-2019
Date Analysis Completed: 12-Mar-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

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 Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked
and authorised by :
Ashleigh Cunningham
Customer Service Advisor

Issued by :
Ashleigh Cunningham
Customer Service Advisor

[redacted]

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Soil Suite 1

				Concept Reference	**806572 001**	**806572 002**	**806572 004**	**806572 006**	**806572 008**
				Customer Sample Reference	**TP1 0.60m**	**TP1 1.30m**	**TP3 0.40m**	**TP4 0.20m**	**TP5**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T82	A40	2	mg/kg	**7**	**4**	**7**	**10**	**10**
Magnesium	T112	A40	1	mg/l	**4**	**7**	**4**	**2**	**2**
Cadmium	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T82	A40	1	mg/kg	**39**	**35**	**50**	**34**	**34**
Chromium (hexavalent)	T82	A40	1	mg/kg	<1(64)	<1(64)	<1(64)	<1(64)	<1(64)
Chromium (trivalent)	T85	A40	2	mg/kg	**39**	**35**	**50**	**34**	**34**
Copper	T82	A40	1	mg/kg	**28**	**26**	**34**	**34**	**34**
Lead	T82	A40	3	mg/kg	**23**	**17**	**46**	**88**	**89**
Mercury	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T82	A40	1	mg/kg	**63**	**33**	**29**	**23**	**20**
Selenium	T82	A40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T82	A40	1	mg/kg	**58**	**67**	**92**	**160**	**170**
pH	T7	A40			**8.0**	**7.7**	**7.7**	**6.4**	**6.4**
Asbestos ID	T27	A40			N.D.	N.D.	N.D.	N.D.	N.D.
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1	<1	<1
SO4(2:1)	T82	A40	10	mg/l	**24(64)**	**20(64)**	<10(64)	<10(64)	**13(64)**

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Soil Suite 1

				Concept Reference	**806572 010**	**806572 011**	**806572 012**	**806572 014**	**806572 017**
				Customer Sample Reference	**TP6 0.20m**	**TP6 0.70m**	**TP7 0.20m**	**TP10 0.40m**	**TP11 1.5m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T82	A40	2	mg/kg	**7**	**4**	**5**	**4**	**3**
Magnesium	T112	A40	1	mg/l	**3**	**1**	<1	**2**	**3**
Cadmium	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T82	A40	1	mg/kg	**32**	**37**	**43**	**37**	**29**
Chromium (hexavalent)	T82	A40	1	mg/kg	<1(64)	<1(64)	<1(64)	<1(64)	<1(64)
Chromium (trivalent)	T85	A40	2	mg/kg	**32**	**37**	**43**	**37**	**29**
Copper	T82	A40	1	mg/kg	**27**	**28**	**35**	**15**	**26**
Lead	T82	A40	3	mg/kg	**66**	**16**	**21**	**14**	**15**
Mercury	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T82	A40	1	mg/kg	**21**	**27**	**19**	**14**	**35**
Selenium	T82	A40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T82	A40	1	mg/kg	**95**	**52**	**47**	**52**	**62**
pH	T7	A40			**6.3**	**6.5**	**6.7**	**6.6**	**6.6**
Asbestos ID	T27	A40			N.D.	N.D.	N.D.	N.D.	N.D.
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1	<1	<1
SO4(2:1)	T82	A40	10	mg/l	<10(64)	<10(64)	<10(64)	**12(64)**	<10(64)

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Leachate Analysed as Water
Water Suite 1

Concept Reference	**806572 004**	**806572 011**
Customer Sample Reference	**TP3 0.40m**	**TP6 0.70m**
Receipt at Lab Temperature (C)	**9.6**	**9.6**
Date Sampled	**28-FEB-2019**	**28-FEB-2019**

Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	10:1	0.2	µg/l	**0.3**	<0.2
Cd (Dissolved)	T281	10:1	0.02	µg/l	<0.02	<0.02
Cr (Dissolved)	T281	10:1	1	µg/l	**3**	**3**
Cu (Dissolved)	T281	10:1	0.5	µg/l	**2.0**	**1.2**
Pb (Dissolved)	T281	10:1	0.3	µg/l	**0.9**	**0.6**
Hg (Dissolved)	T281	10:1	0.05	µg/l	<0.05	<0.05
Ni (Dissolved)	T281	10:1	1	µg/l	**2**	**2**
Se (Dissolved)	T281	10:1	0.5	µg/l	<0.5	<0.5
Zn (Dissolved)	T281	10:1	2	µg/l	**15**	**17**
Cyanide(Total)	T4	10:1	0.05	mg/l	<0.05	<0.05
pH	T7	10:1			**7.56**	**7.53**

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Soils Suite 3

				Concept Reference	**806572 001**	**806572 002**	**806572 004**	**806572 006**	**806572 008**
				Customer Sample Reference	**TP1 0.60m**	**TP1 1.30m**	**TP3 0.40m**	**TP4 0.20m**	**TP5**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Organic Matter	T2	A40	0.1	%	**6.5**	**3.4**	**4.9**	**7.3**	**10.4**

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Soils Suite 3

				Concept Reference	**806572 010**	**806572 011**	**806572 012**	**806572 014**	**806572 017**
				Customer Sample Reference	**TP6 0.20m**	**TP6 0.70m**	**TP7 0.20m**	**TP10 0.40m**	**TP11 1.5m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Organic Matter	T2	A40	0.1	%	**6.3**	**3.7**	**6.1**	**4.2**	**3.6**

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Phenol and PAH US EPA 16 (B and K split)

				Concept Reference	**806572 001**	**806572 002**	**806572 004**	**806572 006**	**806572 008**
				Customer Sample Reference	**TP1 0.60m**	**TP1 1.30m**	**TP3 0.40m**	**TP4 0.20m**	**TP5**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.02(450)	**0.01**	**0.01**
Acenaphthylene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.02(450)	<0.01	<0.01
Acenaphthene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.02(450)	**0.01**	**0.02**
Fluorene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.02(450)	**0.01**	**0.01**
Phenanthrene	T149	AR	0.01	mg/kg	<0.01	**0.01**	**0.20**	**0.07**	**0.09**
Anthracene	T149	AR	0.01	mg/kg	<0.01	<0.01	**0.08**	**0.02**	**0.02**
Fluoranthene	T149	AR	0.01	mg/kg	<0.01	**0.01**	**0.78**	**0.14**	**0.15**
Pyrene	T149	AR	0.01	mg/kg	<0.01	**0.01**	**0.66**	**0.14**	**0.15**
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	<0.01(13)	<0.01(13)	**0.36(13)**	**0.05(13)**	**0.06(13)**
Chrysene	T149	AR	0.01	mg/kg	<0.01	**0.01**	**0.34**	**0.06**	**0.06**
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg	<0.01	**0.01**	**0.44**	**0.07**	**0.08**
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg	<0.01	<0.01	**0.17**	**0.02**	**0.03**
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	<0.01	<0.01	**0.36**	**0.06**	**0.06**
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	<0.01	<0.01	**0.16**	**0.03**	**0.03**
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	<0.01	<0.01	**0.04**	**0.01**	**0.01**
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	<0.01	<0.01	**0.19**	**0.04**	**0.04**
PAH(total)	T149	AR	0.01	mg/kg	<0.01	**0.05**	**3.8**	**0.74**	**0.82**
Phenol	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.02(450)	<0.01	<0.01

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Phenol and PAH US EPA 16 (B and K split)

				Concept Reference	**806572 010**	**806572 011**	**806572 012**	**806572 014**	**806572 017**
				Customer Sample Reference	**TP6 0.20m**	**TP6 0.70m**	**TP7 0.20m**	**TP10 0.40m**	**TP11 1.5m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	T149	AR	0.01	mg/kg	<0.01	**0.01**	<0.01	<0.01	<0.01
Acenaphthene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	T149	AR	0.01	mg/kg	**0.02**	**0.01**	<0.01	**0.01**	**0.01**
Anthracene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	T149	AR	0.01	mg/kg	**0.04**	<0.01	<0.01	**0.01**	<0.01(13)
Pyrene	T149	AR	0.01	mg/kg	**0.04**	<0.01	<0.01	**0.01**	<0.01(13)
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	**0.02(13)**	<0.01(13)	<0.01(13)	<0.01(13)	<0.01(13)
Chrysene	T149	AR	0.01	mg/kg	**0.03**	<0.01	<0.01	**0.01**	<0.01(13)
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg	**0.04**	**0.01**	<0.01	**0.01**	<0.01(13)
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg	**0.01**	<0.01	<0.01	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	**0.03**	**0.01**	<0.01	**0.01**	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	**0.02**	**0.01**	<0.01	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	**0.02**	**0.01**	<0.01	**0.01**	<0.01
PAH(total)	T149	AR	0.01	mg/kg	**0.27**	**0.06**	<0.01	**0.07**	**0.01**
Phenol	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Leachate Analysed as Water
TPH (CWG)

Concept Reference	**806572 004**	**806572 011**
Customer Sample Reference	**TP3 0.40m**	**TP6 0.70m**
Receipt at Lab Temperature (C)	**9.6**	**9.6**
Date Sampled	**28-FEB-2019**	**28-FEB-2019**

Determinand	Method	Test Sample	LOD	Units		
TPH (C5-C6 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C6-C8 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C8-C10 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH DW(C10-C12 aliphatic)	T81	10:1	0.01	mg/l	<0.01	<0.01
TPH DW(C12-C16 aliphatic)	T81	10:1	0.01	mg/l	<0.01	<0.01
TPH DW(C16-C21 aliphatic)	T81	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH DW(C21-C35 aliphatic)	T81	10:1	0.01	mg/l	<0.01	<0.01
TPH (C6-C7 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C7-C8 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C8-C10 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH DW(C10-C12 aromatic)	T81	10:1	0.01	mg/l	<0.01	<0.01
TPH DW(C12-C16 aromatic)	T81	10:1	0.01	mg/l	<0.01	<0.01
TPH DW(C16-C21 aromatic)	T81	10:1	0.01	mg/l	<0.01	<0.01
TPH DW(C21-C35 aromatic)	T81	10:1	0.01	mg/l	<0.01	<0.01

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Leachate Prep

Concept Reference	**806572 004**	**806572 011**
Customer Sample Reference	**TP3 0.40m**	**TP6 0.70m**
Receipt at Lab Temperature (C)	**9.6**	**9.6**
Date Sampled	**28-FEB-2019**	**28-FEB-2019**

Determinand	Method	Test Sample	LOD	Units		
Leach Prep	T2	AR			Extracted	Extracted

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
TPH (CWG)

				Concept Reference	**806572 001**	**806572 002**	**806572 004**	**806572 006**	**806572 008**
				Customer Sample Reference	**TP1 0.60m**	**TP1 1.30m**	**TP3 0.40m**	**TP4 0.20m**	**TP5**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	<1	<1	**1**	<1	<1
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<20(448)	<20(448)	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	<1	<1	**1**	<1	<1

Concept Reference: 806572
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
TPH (CWG)

				Concept Reference	**806572 010**	**806572 011**	**806572 012**	**806572 014**	**806572 017**
				Customer Sample Reference	**TP6 0.20m**	**TP6 0.70m**	**TP7 0.20m**	**TP10 0.40m**	**TP11 1.5m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1

Index to symbols used in 806572-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
10:1	Leachate
N.D.	Not Detected
450	LOD raised due to dilution of sample; sample diluted due to sample consistency
13	Results have been blank corrected.
64	Analysis was performed by an alternative technique
448	LOD raised due to dilution of samples. Samples diluted due to poor internal standard recovery.
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T81	GC/FID (LV)
T27	PLM
T54	GC/MS (Headspace)
T8	GC/FID
T281	ICP/MS (Filtered)
T7	Probe
T85	Calc
T112	ICP/OES (SIM)(Water Extract)
T215	GC/MS (Headspace)(LV)
T4	Colorimetry
T82	ICP/OES (Sim)
T149	GC/MS (SIR)
T2	Grav

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T82	A40	2	mg/kg	U	001-002,004,006,008,010-012,014,017
Magnesium	T112	A40	1	mg/l	N	001-002,004,006,008,010-012,014,017
Cadmium	T82	A40	1	mg/kg	U	001-002,004,006,008,010-012,014,017
Chromium	T82	A40	1	mg/kg	U	001-002,004,006,008,010-012,014,017
Chromium (hexavalent)	T82	A40	1	mg/kg	N	001-002,004,006,008,010-012,014,017
Chromium (trivalent)	T85	A40	2	mg/kg	N	001-002,004,006,008,010-012,014,017
Copper	T82	A40	1	mg/kg	U	001-002,004,006,008,010-012,014,017
Lead	T82	A40	3	mg/kg	U	001-002,004,006,008,010-012,014,017
Mercury	T82	A40	1	mg/kg	U	001-002,004,006,008,010-012,014,017
Nickel	T82	A40	1	mg/kg	U	001-002,004,006,008,010-012,014,017
Selenium	T82	A40	3	mg/kg	U	001-002,004,006,008,010-012,014,017
Zinc	T82	A40	1	mg/kg	U	001-002,004,006,008,010-012,014,017
pH	T7	A40			U	001-002,004,006,008,010-012,014,017
Asbestos ID	T27	A40			SU	001-002,004,006,008,010-012,014,017
Cyanide(Total)	T4	AR	1	mg/kg	U	001-002,004,006,008,010-012,014,017
SO4(2:1)	T82	A40	10	mg/l	N	001-002,004,006,008,010-012,014,017
Organic Matter	T2	A40	0.1	%	N	001-002,004,006,008,010-012,014,017
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	N	001-002,004,006,008,010-012,014,017
Naphthalene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Acenaphthylene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Acenaphthene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Fluorene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Phenanthrene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Anthracene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Fluoranthene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Pyrene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Chrysene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
PAH(total)	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
Phenol	T149	AR	0.01	mg/kg	U	001-002,004,006,008,010-012,014,017
TPH (C5-C6 aliphatic)	T215	10:1	10	µg/l	N	004,011
TPH (C6-C8 aliphatic)	T215	10:1	10	µg/l	N	004,011
TPH (C8-C10 aliphatic)	T215	10:1	10	µg/l	N	004,011
TPH DW(C10-C12 aliphatic)	T81	10:1	0.01	mg/l	N	004,011
TPH DW(C12-C16 aliphatic)	T81	10:1	0.01	mg/l	N	004,011
TPH DW(C16-C21 aliphatic)	T81	10:1	0.01	mg/l	N	004,011
TPH DW(C21-C35 aliphatic)	T81	10:1	0.01	mg/l	N	004,011
TPH (C6-C7 aromatic)	T215	10:1	10	µg/l	N	004,011
TPH (C7-C8 aromatic)	T215	10:1	10	µg/l	N	004,011
TPH (C8-C10 aromatic)	T215	10:1	10	µg/l	N	004,011
TPH DW(C10-C12 aromatic)	T81	10:1	0.01	mg/l	N	004,011
TPH DW(C12-C16 aromatic)	T81	10:1	0.01	mg/l	N	004,011
TPH DW(C16-C21 aromatic)	T81	10:1	0.01	mg/l	N	004,011
TPH DW(C21-C35 aromatic)	T81	10:1	0.01	mg/l	N	004,011
As (Dissolved)	T281	10:1	0.2	µg/l	U	004,011
Cd (Dissolved)	T281	10:1	0.02	µg/l	U	004,011
Cr (Dissolved)	T281	10:1	1	µg/l	U	004,011
Cu (Dissolved)	T281	10:1	0.5	µg/l	U	004,011
Pb (Dissolved)	T281	10:1	0.3	µg/l	U	004,011
Hg (Dissolved)	T281	10:1	0.05	µg/l	U	004,011
Ni (Dissolved)	T281	10:1	1	µg/l	U	004,011
Se (Dissolved)	T281	10:1	0.5	µg/l	U	004,011
Zn (Dissolved)	T281	10:1	2	µg/l	U	004,011
Cyanide(Total)	T4	10:1	0.05	mg/l	U	004,011
pH	T7	10:1			U	004,011
Leach Prep	T2	AR			N	004,011

CONCEPT LIFE SCIENCES
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Concept Life Sciences

Certificate of Analysis

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Report Number: 807307-1

Date of Report: 12-Mar-2019

Customer: Terrenus Land & Water Ltd
Prospect Business Centre
Hamilton International Park
Stanley Boulevard
Hamilton
G72 0BN

Customer Contact: Mr Alex Muir

Customer Job Reference: 1748-203
Customer Site Reference: North and South Road, Cleland
Date Job Received at Concept: 28-Feb-2019
Date Analysis Started: 06-Mar-2019
Date Analysis Completed: 12-Mar-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked
and authorised by :
Kimberley Macmaster
Customer Services Manager

Issued by :
Kimberley Macmaster
Customer Services Manag[redacted]

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
UKWIR Suite(EK)

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Electrical Conductivity	T7	A40	10	µS/cm	**100**	**71**	**58**	**26**	**53**
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
pH	T7	A40			**7.7**	**7.3**	**7.7**	**7.5**	**7.4**
Redox Potential	T7	A40		mV	**160**	**170**	**180**	**180**	**190**
TPH (C11-C20)	T8	AR	1	mg/kg	<1	<1	**2**	<1	<1
TPH (C20-C40)	T8	AR	1	mg/kg	<1	<1	**13**	<1	<1
Total Petroleum Hydrocarbons (C5 - C10 aliphatic/aromatic)	T85	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil

SVOC 625 + Tentatively Identified Compounds (EK)

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
SVOC screen (extra peaks)	T16	AR	10	mg/kg	<10	<10	<10	<10	<10

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)(EK)

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Phenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2-methyl phenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
3/4-Methylphenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butylphthalate	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	<0.1
Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	<0.1
Butyl benzylphthalate	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	<0.1
Chrysene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	<0.1
4-Nitrophenol	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-octylphthalate	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.1**	<0.1	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)(EK)

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	**0.1**	<0.1	<0.1

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
BTEX

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T54	AR	1	µg/kg	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
Toluene	T54	AR	1	µg/kg	**2**	<1	**2**	<1	<1
EthylBenzene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil

VOC 624 + Tentatively Identified Compounds

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
VOC Screen	T54	AR	100	µg/kg	<100	<100	<100	<100	<100

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624)

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Dichlorodifluoromethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Chloromethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Vinyl chloride	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Bromomethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Chloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Trichlorofluoromethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1-Dichloroethylene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Dichloromethane	T54	AR	50	µg/kg	<50	<50	<50	<50	<50
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1-Dichloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
2,2-Dichloropropane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Chloroform	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Bromochloromethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1-Dichloropropene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Carbon tetrachloride	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,2-Dichloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Benzene	T54	AR	1	µg/kg	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
1,2-Dichloropropane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1,2-Trichloroethylene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Bromodichloromethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Dibromomethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Toluene	T54	AR	1	µg/kg	**2**	<1	**2**	<1	<1
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,3-Dichloropropane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Tetrachloroethene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Chlorodibromomethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,2-dibromoethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Chlorobenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1,1,2-Tetrachloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
EthylBenzene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
Styrene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Bromoform	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Isopropyl benzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,2,3-Trichloropropane	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
n-Propylbenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
Bromobenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
T-Butylbenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,2,4-Trimethylbenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
S-Butylbenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
p-Isopropyltoluene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
2-Chlorotoluene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
4-Chlorotoluene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,4-Dichlorobenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5
1,2-Dichlorobenzene	T54	AR	5	µg/kg	<5	<5	<5	<5	<5

Concept Reference: 807307
Project Site: North and South Road, Cleland
Customer Reference: 1748-203

Soil Analysed as Soil
Phenols (Speciated) (EK)

				Concept Reference	**807307 001**	**807307 002**	**807307 003**	**807307 004**	**807307 005**
				Customer Sample Reference	**TP2 0.40m**	**TP3 0.80m**	**TP5 1.30m**	**TP9 0.30m**	**TP11 0.55m**
				Receipt at Lab Temperature (C)	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
				Date Sampled	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**	**28-FEB-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Cresols	T16	AR	0.01	mg/kg	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
Phenol	T149	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenols	T16	AR	0.01	mg/kg	<0.01(13)	<0.01(13)	<0.01(13)	<0.01(13)	<0.01(13)

Index to symbols used in 807307-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

This report should be read in conjunction with previous Report Number 806572.

Method Index

Value	Description
T16	GC/MS
T149	GC/MS (SIR)
T8	GC/FID
T54	GC/MS (Headspace)
T85	Calc
T7	Probe

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Electrical Conductivity	T7	A40	10	µS/cm	N	001-005
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001-005
pH	T7	A40			U	001-005
Redox Potential	T7	A40		mV	N	001-005
TPH (C11-C20)	T8	AR	1	mg/kg	N	001-005
TPH (C20-C40)	T8	AR	1	mg/kg	N	001-005
Total Petroleum Hydrocarbons (C5 - C10 aliphatic/aromatic)	T85	AR	10	µg/kg	N	001-005
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	N	001-005
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	N	001-005
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	N	001-005
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	N	001-005
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	N	001-005
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	N	001-005
SVOC screen (extra peaks)	T16	AR	10	mg/kg	N	001-005
Phenol	T16	AR	0.1	mg/kg	U	001-005
Bis (2-chloroethyl) ether	T16	AR	0.1	mg/kg	U	001-005
2-Chlorophenol	T16	AR	0.1	mg/kg	U	001-005
1,3-Dichlorobenzene	T16	AR	0.1	mg/kg	U	001-005
1,4-Dichlorobenzene	T16	AR	0.1	mg/kg	U	001-005
1,2-Dichlorobenzene	T16	AR	0.1	mg/kg	U	001-005
Bis (2-chloroisopropyl) ether	T16	AR	0.1	mg/kg	U	001-005
2-methyl phenol	T16	AR	0.1	mg/kg	U	001-005
3/4-Methylphenol	T16	AR	0.1	mg/kg	U	001-005
Hexachloroethane	T16	AR	0.1	mg/kg	U	001-005
Nitrobenzene	T16	AR	0.1	mg/kg	U	001-005
Isophorone	T16	AR	0.1	mg/kg	U	001-005
2,4-Dimethylphenol	T16	AR	0.1	mg/kg	U	001-005
Bis (2-chloroethoxy) methane	T16	AR	0.1	mg/kg	U	001-005
2,4-Dichlorophenol	T16	AR	0.1	mg/kg	U	001-005
1,2,4-Trichlorobenzene	T16	AR	0.1	mg/kg	U	001-005
Naphthalene	T16	AR	0.1	mg/kg	U	001-005
4-Chloroaniline	T16	AR	0.1	mg/kg	U	001-005
Hexachlorobutadiene	T16	AR	0.1	mg/kg	U	001-005
4-Chloro-3-methylphenol	T16	AR	0.1	mg/kg	U	001-005
2-Methylnaphthalene	T16	AR	0.1	mg/kg	U	001-005
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg	U	001-005
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg	U	001-005
2-Chloronaphthalene	T16	AR	0.1	mg/kg	U	001-005
2-Nitroaniline	T16	AR	0.1	mg/kg	U	001-005
Dimethyl phthalate	T16	AR	0.1	mg/kg	U	001-005
2,6-Dinitrotoluene	T16	AR	0.1	mg/kg	U	001-005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Hexachlorocyclopentadiene	T16	AR	0.1	mg/kg	N	001-005
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-005
Acenaphthene	T16	AR	0.1	mg/kg	U	001-005
3-Nitroaniline	T16	AR	0.1	mg/kg	U	001-005
Dibenzofuran	T16	AR	0.1	mg/kg	U	001-005
2,4-Dinitrophenol	T16	AR	0.1	mg/kg	N	001-005
2,4-Dinitrotoluene	T16	AR	0.1	mg/kg	U	001-005
2-Nitrophenol	T16	AR	0.1	mg/kg	U	001-005
Diethyl phthalate	T16	AR	0.1	mg/kg	U	001-005
Fluorene	T16	AR	0.1	mg/kg	U	001-005
Pentachlorophenol	T16	AR	0.1	mg/kg	N	001-005
4-Chlorophenyl phenylether	T16	AR	0.1	mg/kg	U	001-005
4-Nitroaniline	T16	AR	0.1	mg/kg	U	001-005
Azobenzene	T16	AR	0.1	mg/kg	U	001-005
4-Bromophenyl phenylether	T16	AR	0.1	mg/kg	U	001-005
Hexachlorobenzene	T16	AR	0.1	mg/kg	U	001-005
Phenanthrene	T16	AR	0.1	mg/kg	U	001-005
Anthracene	T16	AR	0.1	mg/kg	U	001-005
Carbazole	T16	AR	0.1	mg/kg	U	001-005
Di-n-butylphthalate	T16	AR	0.1	mg/kg	U	001-005
Fluoranthene	T16	AR	0.1	mg/kg	U	001-005
Pyrene	T16	AR	0.1	mg/kg	U	001-005
Butyl benzylphthalate	T16	AR	0.1	mg/kg	U	001-005
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	001-005
4-Nitrophenol	T16	AR	0.1	mg/kg	N	001-005
Chrysene	T16	AR	0.1	mg/kg	U	001-005
Bis (2-ethylhexyl)phthalate	T16	AR	0.1	mg/kg	U	001-005
Di-n-octylphthalate	T16	AR	0.1	mg/kg	U	001-005
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	001-005
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	001-005
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	001-005
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	001-005
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001-005
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	U	001-005
Benzene	T54	AR	1	µg/kg	U	001-005
VOC Screen	T54	AR	100	µg/kg	N	001-005
Dichlorodifluoromethane	T54	AR	5	µg/kg	U	001-005
Chloromethane	T54	AR	5	µg/kg	U	001-005
Vinyl chloride	T54	AR	5	µg/kg	U	001-005
Bromomethane	T54	AR	5	µg/kg	U	001-005
Chloroethane	T54	AR	5	µg/kg	U	001-005
Trichlorofluoromethane	T54	AR	5	µg/kg	U	001-005
1,1-Dichloroethylene	T54	AR	5	µg/kg	U	001-005
Dichloromethane	T54	AR	50	µg/kg	N	001-005
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg	U	001-005
1,1-Dichloroethane	T54	AR	5	µg/kg	U	001-005
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg	U	001-005
2,2-Dichloropropane	T54	AR	5	µg/kg	U	001-005
Chloroform	T54	AR	5	µg/kg	U	001-005
Bromochloromethane	T54	AR	5	µg/kg	U	001-005
1,1,1-Trichloroethane	T54	AR	5	µg/kg	U	001-005
1,1-Dichloropropene	T54	AR	5	µg/kg	U	001-005
Carbon tetrachloride	T54	AR	5	µg/kg	U	001-005
1,2-Dichloroethane	T54	AR	5	µg/kg	U	001-005
1,2-Dichloropropane	T54	AR	5	µg/kg	U	001-005
1,1,2-Trichloroethylene	T54	AR	5	µg/kg	U	001-005
Bromodichloromethane	T54	AR	5	µg/kg	U	001-005
Dibromomethane	T54	AR	5	µg/kg	U	001-005
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg	U	001-005
Toluene	T54	AR	1	µg/kg	U	001-005
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg	U	001-005
1,1,2-Trichloroethane	T54	AR	5	µg/kg	U	001-005
1,3-Dichloropropane	T54	AR	5	µg/kg	U	001-005
Tetrachloroethene	T54	AR	5	µg/kg	U	001-005
Chlorodibromomethane	T54	AR	5	µg/kg	U	001-005
1,2-dibromoethane	T54	AR	5	µg/kg	U	001-005
Chlorobenzene	T54	AR	5	µg/kg	U	001-005
1,1,1,2-Tetrachloroethane	T54	AR	5	µg/kg	U	001-005
EthylBenzene	T54	AR	1	µg/kg	U	001-005
M/P Xylene	T54	AR	1	µg/kg	U	001-005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
O Xylene	T54	AR	1	µg/kg	U	001-005
Styrene	T54	AR	5	µg/kg	U	001-005
Bromoform	T54	AR	5	µg/kg	U	001-005
Isopropyl benzene	T54	AR	5	µg/kg	U	001-005
1,1,2,2-Tetrachloroethane	T54	AR	5	µg/kg	U	001-005
1,2,3-Trichloropropane	T54	AR	5	µg/kg	U	001-005
n-Propylbenzene	T54	AR	5	µg/kg	U	001-005
Bromobenzene	T54	AR	5	µg/kg	U	001-005
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg	U	001-005
T-Butylbenzene	T54	AR	5	µg/kg	U	001-005
1,2,4-Trimethylbenzene	T54	AR	5	µg/kg	U	001-005
S-Butylbenzene	T54	AR	5	µg/kg	U	001-005
p-Isopropyltoluene	T54	AR	5	µg/kg	U	001-005
2-Chlorotoluene	T54	AR	5	µg/kg	U	001-005
4-Chlorotoluene	T54	AR	5	µg/kg	U	001-005
1,3-Dichlorobenzene	T54	AR	5	µg/kg	U	001-005
1,4-Dichlorobenzene	T54	AR	5	µg/kg	U	001-005
1,2-Dichlorobenzene	T54	AR	5	µg/kg	U	001-005
Cresols	T16	AR	0.01	mg/kg	N	001-005
Phenol	T149	AR	0.01	mg/kg	U	001-005
Xylenols	T16	AR	0.01	mg/kg	N	001-005

SITE	Bellside Building & Timber Supplie
PROJECT NO.	1748-203
OPERATOR (S)	AM

EQUIPMENT		
Instrument / Model Type	Serial No.	Comments
GA5000		

terrenus land&water

		CH_4		CO_2		O_2		CO		H_2S		Balance								
		%v/v		%v/v		%v/v		ppm		ppm		%v/v	Gas Flow			Atmos Press	UK Observation Data Branchalwood Station	Trend	WL	Base
Borehole	Date	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady		Initial flow l/h	Final flow l/h	time to steady	mb	MSL(mb)		Metres below GL	Metres below GL	Comments
BH1	12-Mar-19	0.2	0.2	0.2	0.2	20.9	21.0	10	1	0	0	78.70	9.7	0.2	00:01:00	981	987	Falling	0.80		
	16-Mar-19	0.2	0.2	2.0	2.0	20.1	20.1	10	10	0.0	0.0	77.80	-12.3	-1.2	00:01:30	1001	990	Falling	0.00	2.00	Pump failed. Bore bailed after measurement. Headworks requiring repair to seal standpipe
	28-Mar-19	0.1	0.1	1.0	1.0	20.6	20.6	7	6	0	0	78.30	-24.3	0.2	00:03:50	1014	1030	Rising	1.10		Headworks repaired after last visit
	10-Apr-19	0.1	0.1	1.0	1.0	16.0	20.1	1	1	0	0	78.50	-22.4	0.3	00:03:50	1008	1025	Rising	1.10		
	22-Apr-19	0.1	0.0	1.0	0.9	16.4	19.8	1	1	0	0	79.20	-26.0	0.3	00:04:00	989	1002	Falling	1.13		
	8-May-19	0.1	0.1	1.2	1.1	19.7	21.1	1	1	0	0	77.80	-26.0	0.3	00:03:30	983	997	Falling	1.00		
BHR2	12-Mar-19	0.3	0.2	0.9	0.4	21.4	21.6	58	30	0	0	77.80	0.3	0.2	00:01:00	976	987	Falling	2.19		
	16-Mar-19	0.2	0.2	0.1	0.1	21.2	21.2	1	1	0	0	78.50	0.1	0.2	00:01:00	1001	990	Falling	4.20		Dry
	28-Mar-19	0.5	0.5	2.5	2.5	14.2	14.2	2	2	0	0	82.90	0.1	0.2	00:01:00	1014	1030	Rising	4.20		Dry
	10-Apr-19	0.1	0.1	3.8	3.8	3.3	3.3	1	1	0	0	92.90	0.1	0.3	00:02:15	1008	1025	Rising	4.20		Dry
	22-Apr-19	0.0	0.0	4.2	4.2	8.4	8.4	3	3	0	0	87.40	0.1	0.2	00:01:00	988	1002	Falling	4.20		Dry
	8-May-19	0.0	0.0	4.3	4.3	13.6	13.6	1	1	0	0	82.00	0.1	0.2	00:01:00	983	997	Falling	4.20		Dry
BH2	12-Mar-19																				Standpipe flooded- not able to take gas reradings
	16-Mar-19																				Pump failed. Bore bailed
	28-Mar-19	0.1	0.1	0.4	0.1	19.1	21.1	1	1	0	0	82.50	-26.6	0.1	00:03:00	1014	1030	Rising	0.50		
	10-Apr-19	0.1	0.1	0.9	0.9	20.5	20.5	1	1	0	0	78.50	-26.6	0.2	00:05:00	1008	1025	Rising	1.30		Bung Pushed out of standpipe by gas pressure when valve was initially connected
	22-Apr-19	0.1	0.1	1.0	1.0	20.2	20.2	2	2	0	0	78.80	-14.8	0.3	00:03:00	989	1002	Falling	1.30		
	8-May-19	0.1	0.1	1.3	1.3	21.2	21.2	1	1	0	0	77.50	-24.5	0.3	00:04:00	983	997	Falling	1.20		
BH3	12-Mar-19																				Standpipe flooded- not able to take gas reradings
	16-Mar-19	0.2	0.2	0.2	0.2	21.8	21.8	0	0	0	0	77.90	-7.0	-1.8	00:02:00	1001	990	Falling	GI	3.65	Pump failed. Bore bailed after measurement. Headworks requiring repair to seal standpipe
	28-Mar-19	0.1	0.1	0.1	0.1	21.8	21.8	1	1	0	0	78.00	-14.1	-0.5	00:05:00	1014	1030	Rising	0.40		Headworks repaired after last visit
	10-Apr-19	0.1	0.1	1.2	1.2	20.8	20.8	1	1	0	0	72.90	-18	-1.0	00:06:15	1007	1025	Rising	0.40		
	22-Apr-19	0.1	0.1	0.5	0.5	20.8	20.8	3	3	0	0	78.60	-17.0	-0.5	00:07:00	989	1002	Falling	0.75		
	8-May-19	0.1	0.1	0.6	0.6	21.8	21.8	1	1	0	0	77.60	-11.0	-0.4	00:08:00	983	997	Falling	0.98		
BH4	12-Mar-19	0.2	0.2	0.8	0.6	21.0	21.0	5	5	0	0	78.20	0.2	0.2	00:00:45	975	987	Falling	0.00		when bung removed standpipe was noted to be flooded to GL
	16-Mar-19	0.2	0.2	0.8	0.8	21.0	21.0	1	0	0	0	78.10	-11.0	-0.2	00:01:30	1001	990	Falling	0.00		Pump failed. Bore bailed
	28-Mar-19	0.1	0.1	1.3	1.3	20.6	20.6	2	2	0	0	78.10	8.8	7.4	00:02:30	1014	1030	Rising	0.60	1.80	
	10-Apr-19	0.1	0.1	1.5	1.5	20.7	20.7	2	2	0	0	72.80	-4.9	0.0	00:03:00	1007	1025	Rising	0.49		
	22-Apr-19	0.1	0.1	1.6	1.2	19.9	19.9	2	2	0	0	79.00	-11.9	-0.3	00:12:00	987	1002	Falling	0.70		
	8-May-19	0.1	0.1	0.8	0.8	16.0	21.4	2	1	0	0	77.80	-13.4	-0.5	00:09:00	983	997	Falling	0.77		

SERVICE REPORT

Issued by: QED Environmental Systems Ltd.

Customer Name: Terrenus Land and Water Limited

Model: GA5000
Part Number: GA5KB0C0-101
Serial Number: G501827

Date of Service: 08-Oct-2018
Service Engineer: Ricky Cottrill
Calibration Engineer: Suk Balrey

Verification / Approved By: Graham Ingles **Signature:**

Reason for Return (inc. Customer Comments):

Returned for full service and calibration

Service Comments/Feedback:

Thank you for returning your gas analyser to the Geotech Service Centre for full service and calibration. We are pleased to inform you that the analyser was received and fully assessed by one of our experienced Service Engineers and no significant faults or issues were observed during the assessment. Our extensive service was carried out, and any necessary components replaced. The analyser has successfully passed all of our rigorous testing and quality checks and has been calibrated using our bespoke, state of the art calibration facility.

For further information about how to get the best use from your instrument please visit our YouTube channel http://www.youtube.com/GeotechTV and on our Website http://www.geotechuk.com

We have replaced the battery because it is over 2 years old. This is in accordance to the battery cell manufacturer's recommendation.

If you require any further assistance with your instrument please email our Technical Support Team at technical@geotech.co.uk or call us on +44 1926 338111 (Monday to Thursday 08.30 - 17.00 & Friday 08.30 - 15.30) UK time zone.

Next Service Due: 05-Apr-2019

17025	5	50	65	7,384	340	25
Our ISO accreditation for our customised auto-calibration facilities	Number of days we aim to complete your service within	Number of checks instruments are subject to when serviced	Number of countries from which we service instruments /accessories each year	Number of calibrations completed in last 12 months	Minimum number of service instruments we process each month	Cost (in £) of fully insured analyser collection for our UK customers

www.qedenv.com **+44 (0) 333 800 0088** **sales@qedenv.co.uk**

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 05-Oct-2018

Certificate Number: G501827_2/21582

Issued by: QED Environmental Systems Ltd.

Customer: **Terrenus Land and Water Limited**
Orbital Court East Kilbride Glasgow
Lanarkshire G74 5PH UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G501827

UKAS Accredited results:

Results after adjustment :

Methane (CH_4)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	5.0	0.41
15.0	15.0	0.64
49.9	49.4	0.94

Carbon Dioxide (CO_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.8	0.43
15.0	14.6	0.70
50.1	50.1	1.1

Oxygen (O_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
21.1	21.2	0.31

The inwards assessment was carried out 24-Sep-2018.
The maximum adjustment is larger than the inwards assessment uncertainty.
Inwards assessment data is available if requested.

All concentrations are molar.

CH_4, CO_2 readings recorded at : 32.5 °C ± 2.5 °C

O2 readings recorded at : 22.4 °C ± 2.5 °C

Barometric Pressure : 1006 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:99 IGC Instance:99

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QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

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CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 05-Oct-2018

Certificate Number: G501827_2/21582

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	**Instrument Reading**
1006	1006

Additional Gas Cells		
Gas	**Certified Gas (ppm)**	**Instrument Reading (ppm)**
CO	497	497
H_2S	257	257

Internal Flow	
Applied (l/hr)	**Instrument Reading (l/hr)**
5	5.2
10	10.3

Date of Issue : 08-Oct-2018

Approved by Signatory

[redacted]

Graham Ingles

Laboratory Inspection

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:99 IGC Instance:99

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Registered in England and Wales 1898734

BELLSIDE ROAD, CLELAND

STAGE 2 SITE INVESTIGATION

FOR

TAYLOR HOMES (SCOTLAND) LTD

Plate 1 – View South from TP2 location

Plate 2 – Trial Pit 1

Plate 3 – Trial Pit 2

Plate 4 –Trial Pit 3

Plate 5 – Trial Pit 4

Plate 6 – Trial Pit 6

Plate 7 – Trial Pit 9

Plate 8 – Trial Pit 10

Plate 9 – Trial Pit 12

Plate 1 –BHR02 after surface scrape

Plate 2 –Excavation of BHR02

Plate 3 –BHR02 at Rockhead

Plate 4 –BHR02 installation

Plate 5 –Cement cap poured into excavation

SITE NAME: North & South Road, Bellside, Cleland

TABLE 1 - SUMMARY OF SOIL ANALYSES (INORGANICS)

Location	Depth (m)	Type	mg/kg											mg/l	mg/l	pH units	mg/kg	Y/N
TP1	0.6	**Weathered Glacial Till**	7	1.00	39	1.00	28	23	1.00	63	3.00	58	1	4.00	24	8	0.01	n
TP1	1.3	**Glacial Till**	4	1.00	35	1.00	26	17	1.00	33	3.00	67	1	7.00	20	7.7	0.01	n
TP3	0.4	**Topsoil**	7	1.00	50	1.00	34	46	1.00	29	3.00	92	1	4.00	10	7.7	0.02	n
TP4	0.2	**Topsoil**	10	1.00	34	1.00	34	**88**	1.00	23	3.00	160	1	2.00	10	6.4	0.01	n
TP5	0.3	**Topsoil**	10	1.00	34	1.00	34	**89**	1.00	20	3.00	170	1	2.00	13	6.4	0.01	n
TP6	0.2	**Topsoil**	7	1.00	32	1.00	27	66	1.00	21	3.00	95	1	3.00	10	6.3	0.01	n
TP6	0.7	**Weathered Glacial Till**	4	1.00	37	1.00	28	16	1.00	27	3.00	52	1	1.00	10	6.5	0.01	n
TP7	0.2	**Weathered Glacial Till**	5	1.00	43	1.00	35	21	1.00	19	3.00	47	1	1.00	10	6.7	0.01	n
TP10	0.4	**Sandy Topsoil**	4	1.00	37	1.00	15	14	1.00	14	3.00	52	1	2.00	12	6.6	0.01	n
TP11	1.5	**Glacial Till**	3	1.00	29	1.00	26	15	1.00	35	3.00	62	1	3	10	6.6	0.01	n

																	Number of Detections
	Max	10.0	1.0	50.0	1.0	35.0	89.0	1.0	63.0	3.0	170.0	1.0	7.0	24.0	8.0		
	Min	3.0	1.0	29.0	1.0	15.0	14.0	1.0	14.0	3.0	47.0	1.0	1.0	10.0	6.3		
	Mean	6.1	1.0	37.0	1.0	28.7	39.5	1.0	28.4	3.0	85.5	1.0	2.9	12.9	6.9		0
	No Samples	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
Tier 1 Human Health Screening Criteria	SOURCE	S4UL GAC	S4UL GAC	S4UL GAC	S4UL GAC	S4UL GAC	C4SL GAC	S4UL GAC	S4UL GAC	S4UL GAC	S4UL GAC	CLEA GAC	BRE SD1	BRE SD1	N/A	S4UL GAC	
Land Use: **Residential with Garden**	Limit	37	11	910	6	2400	86	1	180	250	3700	133	1200	1200		280	Detection
	Pass / Fail	Pass	Pass	Pass	Pass	Pass	**Fail**	Pass	Pass	Pass	Pass	Pass	Pass	Pass		Pass	Pass

Value below detection limit, assumed value at detection limit	
N/A	Not Applicable
N/S	Not Analysed

SITE NAME: North & South Road, Bellside, Cleland

TABLE 2 - SUMMARY OF SOIL ANALYSES (PAH) Residential with Gardens

Client Ref.	Depth (m)	Type	naphthalene	acenaphthylene	acenaphthene	fluorene	phenanthrene	anthracene	fluoranthene	pyrene	benzo(a)anthracene	chrysene	benzo(b)fluoranthene	benzo(k)fluoranthene	benzo(a)pyrene	indeno(123cd)pyrene	dibenzo(a,h)anthracene	benzo(ghi)perylene	TOTAL PAH	Organic Matter
			mg/kg																	%
TP1	0.6	Weathered Glacial Till	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	8.5
TP1	1.3	Glacial Till	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	3.4
TP3	0.4	Topsoil	0.02	0.02	0.02	0.02	0.2	0.08	0.78	0.66	0.36	0.34	0.44	0.17	0.36	0.16	0.04	0.19	3.8	4.9
TP4	0.2	Topsoil	0.01	0.01	0.01	0.01	0.07	0.02	0.14	0.14	0.05	0.06	0.07	0.02	0.06	0.03	0.01	0.04	0.74	7.3
TP5	0.3	Topsoil	0.01	0.01	0.02	0.01	0.09	0.02	0.15	0.15	0.06	0.06	0.08	0.03	0.06	0.03	0.01	0.04	0.82	10.4
TP6	0.2	Topsoil	0.01	0.01	0.01	0.01	0.02	0.01	0.04	0.04	0.02	0.03	0.04	0.01	0.03	0.02	0.01	0.02	0.27	6.3
TP6	0.7	Weathered Glacial Till	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	3.7
TP7	0.2	Weathered Glacial Till	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	6.1
TP10	0.4	Sandy Topsoil	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.07	4.2
TP11	1.5	Glacial Till	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	3.6
0	0	0																		
0	0	0																		
0	0	0																		
0	0	0																		
0	0	0																		
0	0	0																		

	naphthalene	acenaphthylene	acenaphthene	fluorene	phenanthrene	anthracene	fluoranthene	pyrene	benzo(a)anthracene	chrysene	benzo(b)fluoranthene	benzo(k)fluoranthene	benzo(a)pyrene	indeno(123cd)pyrene	dibenzo(a,h)anthracene	benzo(ghi)perylene	TOTAL PAH	Organic Matter
Max	0.02	0.02	0.02	0.02	0.20	0.08	0.78	0.66	0.36	0.34	0.44	0.17	0.36	0.16	0.04	0.19	3.80	10.40
Min	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	3.40
Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.6	5.6
No Samples	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
SOURCE																		
S4UL GAC	2.3	170.0	210.0	170.0	95.0	2400.0	280.0	620.0	7.2	15.0	2.6	77.0	2.2	27.0	0.2	320		
	5.6	420	510	400	220	5400	560	1200	11	22	3.3	93	2.7	36	0.28	340		
	13	920	1100	860	440	11000	890	2000	13	27	3.7	100	3	41	0.3	350		
Pass / Fail 1% Organic Matter	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		

Value below detection limit, assumed value at detection limit

N/A	Not Applicable
N/S	Not Analysed

Organic Matter Colour Scale		
GAC Value for	1%	SOM
GAC Value for	2.5%	SOM
GAC Value for	6%	SOM
CLEA v1.071 Derived Value		

SITE NAME: North & South Road, Bellside, Cleland

TABLE 3 - SUMMARY OF SOIL ANALYSES(TPH) - Residential with Gardens

																	Aliphatic (C5-C35)	**Aromatic (C5-C35)**	
			mg/kg																
Location	**Depth**	**Type**	Aliphatic							Aromatic							Aliphatic	Aromatic	**%**
TP1	0.6	Weathered Glacial Till	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	8.5
TP1	1.3	Glacial Till	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	3.4
TP3	0.4	Topsoi	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	4.9
TP4	0.2	Topsoi	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	7.3
TP5	0.3	Topsoi	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	10.4
TP6	0.2	Topsoil	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	8.2
TP6	0.7	Weathered Glacial Till	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	3.7
TP7	0.2	Weathered Glacial Till	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	8.1
TP10	0.4	Sandy Topsoil	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	4.2
TP11	1.5	Glacial Till	0.01	0.01	0.01	1	1	1	1	0.01	0.01	0.01	1	1	1	1	1	1	3.6
0	0	0																	0
0	0	0																	0
0	0	0																	0
0	0	0																	0
0	0	0																	0
0	0	0																	0

Max	0.01	0.01	0.01	1.00	1.00	1.00	1.00	0.01	0.01	0.01	1.00	1.00	1.00	1.00	1.00	1.00	10.40
Min	0.01	0.01	0.01	1.00	1.00	1.00	1.00	0.01	0.01	0.01	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Mean	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	3.5
No Samples	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	16
SOURCE																	
QM/CIEH S4UL	42	100	27	130	1100	65000	65000	70	130	34	74	660	930	1,100			
Pass / Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass			

Value below detection limit, assumed value at detection limit	
N/A	Not Applicable
N/S	Not Analysed

Organic Matter Colour Scale			
	GAC Value for	1%	SOM
	GAC Value for	2.5%	SOM
	GAC Value for	6%	SOM

SITE NAME: North & South Road, Bellside, Cleland

TABLE 4 - SUMMARY OF SOIL LEACHATE ANALYSES (INORGANICS)

Location	Depth	Type										
												pH units
TP3	0.4	**Leachate**	0.0003	0.00002	0.003	0.0020	0.0009	0.00005	0.002	0.0005	0.015	0.00005	7.56
TP6	0.7	**Leachate**	0.0002	0.00002	0.003	0.0012	0.0006	0.00005	0.002	0.0005	0.017	0.00005	7.53
Max			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6
Min			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5
Mean			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5
No Samples			2	2	2	2	2	2	2	2	2	2	2
Source/Receptor			EQS Freshwater	RPV	RPV	EQS Freshwater	EQS Freshwater	EQS Freshwater	EQS Freshwater	RPV	EQS Freshwater	EQS Freshwater	
Threshold (mg/l)			0.050	0.005	0.050	0.001	0.001	0.000070	0.0040	0.010	0.012	0.001	N/A
Pass / Fail			Pass	Pass	Pass	**Fail**	Pass	Pass	Pass	Pass	**Fail**	Pass	

Value below detection limit, assumed value at detection limit	
N/A	Not Applicable
N/S	Not Analysed

Sources	SEPA POSTION STATEMENT (WAT-PS-10-01)
	SEPA SUPPORTING GUIDENCE (WAT-SG-53) v6 2015
	WHO GUIDELINES FOR DRINKING WATER QUALITY 4th Ed 2011

SITE NAME: **North & South Road, Bellside, Cleland**

TABLE 5: UKWIR MATERIALS SELECTION

		Pipe Material					
		PE	PVC	Barrier Pipe	Wrapped Steel	Wrapped Ductile Iron	Copper
	Parameter Group	All threshold consentrations are in mg/kg					
1	Extended VOC	0.5	0.125	Pass	Pass	Pass	Pass
1a	• BTEX + MTBE	0.1	0.03	Pass	Pass	Pass	Pass
2	Extended SVOC (with TIC)	2	1.4	Pass	Pass	Pass	Pass
2e	• Phenols	2	0.4	Pass	Pass	Pass	Pass
2f	• Cresols and chlorinated phenols	2	0.04	Pass	Pass	Pass	Pass
3	Mineral Oils C11-C20	10	Pass	Pass	Pass	Pass	Pass
4	Mineral Oils C21-C40	500	Pass	Pass	Pass	Pass	Pass
5	Corrosive	Pass	Pass	Pass	Corrosive if pH<7 & Conductivity >400uS/cm	Corrosive if pH<5, Eh not neutral & Conductivity >400uS/cm	Corrosive if pH<5 or >8 & Eh positive
	Pipes that Pass Chemical Thresholds	)	)	)	)	)	)
	Preferred Selection	)					

Table 6: Gas Hazard Calculation and Mitigation

Date 09/05/2019
Job Number 1748-203

North & South Road

Completed By: AM

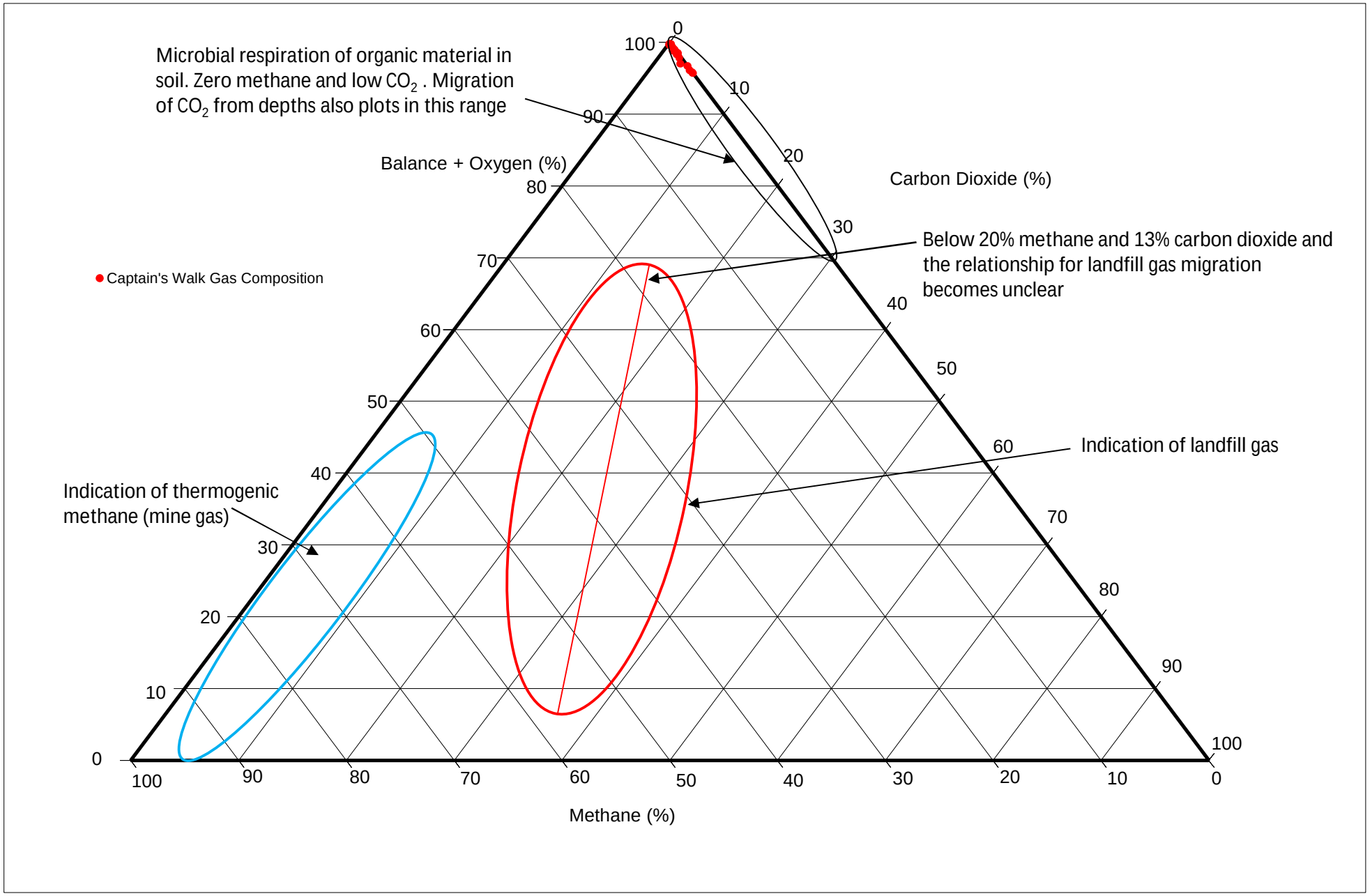
Gas Measurements and Calculations		Characteristic Situation (CS)	Building Type	Minimum Gas Protection Score
Maximum CH_4 Concentration (%)	0.5	2	Type A	3.5
Maximum CO_2 Concentration (%)	1			
Maximum flow rate (l/h)	9.7			
Gas Screening Value* (GSV)	0.097			

Gas Protection Scores for Mitigation Methods (From BS 8485:2015, Ch7)

Method	Score	To Be Used	Used Measures Score	Total Gas Protaction Score
Precast suspended segmental subfloor (i.e. beam and block)	0	No		3.5
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5	No		
Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended	1	Yes	1	
floor slab with minimal penetrations (To achieve a score of 1.5 the raft or suspended slab	1.5	No		
Basement floor and walls conforming to BS 8102:2009, Grade 2 waterproofing C)	2	No		
Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing C)	2.5	No		
Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building)	0.5	Yes	0.5	
Passive sub floor dispersal layer. Very good performance:	2.5	No		
Good Performance	1.5	No		
Gravel with Drains	1	No		
Gravel	0.5	No		
Active dispersal layer, usually comprising fans with active abstraction (suction) from a	1.5	No		
subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void	2.5	No		
	1.5	No		
Active positive pressurization by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket	2.5	No		
Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park)	4	No		
Gas resistant membrane meeting all of the following criteria: • sufficiently impervious to the gases with a methane gas transmission rate <40.0 ml/day/m2/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); • sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab); • sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc); • capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • verified in accordance with CIRIA C735 [N1]	2	Yes	2	

GSVequals maximum CH_4 or CO_2 conc^{n}. multiplied by the max. flow rate observed.

Barrier	Void Space	Membrane


Microbial respiration of organic material in soil. Zero methane and low CO_2 . Migration of CO_2 from depths also plots in this range
Balance + Oxygen (%)
Carbon Dioxide (%)
Below 20% methane and 13% carbon dioxide and the relationship for landfill gas migration becomes unclear
Captain's Walk Gas Composition
Indication of landfill gas
Indication of thermogenic methane (mine gas)
Methane (%)
0
10
20
30
40
50
60
70
80
90
100

CLEA Software Version 1.071

Report generated 15/05/2019

Report title

Created by

BASIC SETTINGS

Land Use	Residential with produce						
Building	Detached house						
Receptor	Female (res C4SL)	Start age class	1	End age class	6	Exposure Duration	6 years
Soil	Silty clay loam						

Exposure Pathways

Direct soil and dust ingestion	☐	Dermal contact with indoor dust	☐	Inhalation of indoor dust	☐
Consumption of homegrown produce	☐	Dermal contact with soil	☐	Inhalation of soil dust	☐
Soil attached to homegrown produce	☐			Inhalation of indoor vapour	☐
				Inhalation of outdoor vapour	☐

Land Use Residential with produce

Receptor Female (res C4SL)

Age Class	Exposure Frequencies (days yr^{-1})						Occupation Periods (hr day^{-1})		Soil to skin adherence factors (mg cm^2)						Max exposed skin factor		
1	180	180	180	180	365	365	23.0	1.0	0.06	1.00	0.10	5.60	0.7	5.4	0.32	0.26	3.43E-01
2	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10	9.80	0.8	8.0	0.33	0.26	4.84E-01
3	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10	12.70	0.9	8.9	0.32	0.25	5.82E-01
4	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10	15.10	0.9	10.1	0.35	0.28	6.36E-01
5	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10	16.90	1.0	10.1	0.35	0.28	7.04E-01
6	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10	19.70	1.1	10.1	0.33	0.26	7.94E-01
7	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	22.10	1.2	12.0	0.22	0.15	8.73E-01
8	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	25.30	1.2	12.0	0.22	0.15	9.36E-01
9	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	27.50	1.3	12.0	0.22	0.15	1.01E+00
10	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	31.40	1.3	12.0	0.22	0.15	1.08E+00
11	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	35.70	1.4	12.0	0.22	0.14	1.19E+00
12	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	41.30	1.4	15.2	0.22	0.14	1.29E+00
13	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	47.20	1.5	15.2	0.22	0.14	1.42E+00
14	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	51.20	1.6	15.2	0.22	0.14	1.52E+00
15	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	56.70	1.6	15.2	0.21	0.14	1.60E+00
16	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	59.00	1.6	15.2	0.21	0.14	1.63E+00
17	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	70.00	1.6	15.7	0.33	0.27	1.78E+00
18	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	70.90	1.6	13.6	0.33	0.27	1.80E+00

Consumption Rates

Consumption rates (g FW kg^{-1} bodyweight day^{-1}) by Produce Group

Age Class	MEAN RATES						90TH PERCENTILE RATES					
1							7.12E+00	1.07E+01	1.60E+01	1.83E+00	2.23E+00	3.82E+00
2							6.85E+00	3.30E+00	5.46E+00	3.96E+00	5.40E-01	1.20E+01
3							6.85E+00	3.30E+00	5.46E+00	3.96E+00	5.40E-01	1.20E+01
4							6.85E+00	3.30E+00	5.46E+00	3.96E+00	5.40E-01	1.20E+01
5							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
6							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
7							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
8							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
9							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
10							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
11							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
12							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
13							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
14							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
15							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
16							3.74E+00	1.77E+00	3.38E+00	1.85E+00	1.60E-01	4.26E+00
17							2.94E+00	1.40E+00	1.79E+00	1.61E+00	2.20E-01	2.97E+00
18							2.94E+00	1.40E+00	1.79E+00	1.61E+00	2.20E-01	2.97E+00

Top 2 applied?No

Where top 2 method is applied, two produce categories use 90th percentile rates, while the remainder use the mean. Produce categories vary on a chemical-by-chemical basis. Where top 2 method is not used, all produce categories for all chemicals assume 90th percentile rates.

Building Detached house

Soil Silty clay loam

Building footprint (m^2)	6.80E+01
Living space air exchange rate (hr^{-1})	5.00E-01
Living space height (above ground, m)	4.80E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	3.10E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm^2)	6.60E+02
Dust loading factor ($\mu g\ m^{-3}$)	5.00E+01

Porosity, Total ($cm^3\ cm^{-3}$)	5.80E-01
Porosity, Air-Filled ($cm^3\ cm^{-3}$)	1.20E-01
Porosity, Water-Filled ($cm^3\ cm^{-3}$)	4.60E-01
Residual soil water content ($cm^3\ cm^{-3}$)	2.10E-01
Saturated hydraulic conductivity ($cm\ s^{-1}$)	1.17E-03
van Genuchten shape parameter m (dimensionless)	3.07E-01
Bulk density ($g\ cm^{-3}$)	1.07E+00
Threshold value of wind speed at 10m ($m\ s^{-1}$)	7.20E+00
Empirical function (F_x) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	7.00E+00
Soil Organic Matter content (%)	6.00E+00
Fraction of organic carbon ($g\ g^{-1}$)	3.48E-02
Effective total fluid saturation (unitless)	6.76E-01
Intrinsic soil permeability (cm^2)	1.56E-08
Relative soil air permeability (unitless)	4.66E-01
Effective air permeability (cm^2)	7.28E-09

Soil - Vapour Model

Depth to top of source (no building) (cm)	0
Depth to top of source (beneath building) (cm)	65
Default soil gas ingress rate?	Yes
Soil gas ingress rate ($cm^3\ s^{-1}$)	2.50E+01
Building ventilation rate ($cm^3\ s^{-1}$)	4.53E+04
Averaging time surface emissions (yr)	6
Finite vapour source model?	No
Thickness of contaminated layer (cm)	200

Air Dispersion Model

Mean annual windspeed at 10m ($m\ s^{-1}$)	5.00
Air dispersion factor at height of 0.8m *	2400.00
Air dispersion factor at height of 1.6m *	0.00
Fraction of site cover ($m^2\ m^{-2}$)	0.75

* Air dispersion factor in $g\ m^{-2}\ s^{-1}$ per $kg\ m^{-3}$

Soil - Plant Model

	Dry weight conversion factor	Homegrown fraction		Soil loading factor	Preparation correction factor
		Average	High		
	$g\ DW\ g^{-1}\ FW$	dimensionless		$g\ g^{-1}\ DW$	dimensionless
Green vegetables	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	0.103	0.06	0.40	1.00E-03	1.00E+00
Tuber vegetables	0.210	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	0.058	0.06	0.40	1.00E-03	6.00E-01
Shrub fruit	0.166	0.09	0.60	1.00E-03	6.00E-01
Tree fruit	0.157	0.04	0.27	1.00E-03	6.00E-01

Gardener type Average

International House,
Hamilton International Park,
Stanley Boulevard,
Hamilton,
G72 0BN

www.terrenus.co.uk

Taylor Homes (Scotland) Ltd,
25 Woodhall Road,
Wishaw,
North Lanarkshire, ML2 8PY

Electronic Issue only

For the attention of Mr David Findlay

18th March 2019

Dear Mr Findlay,

MINING RISK ASSESSMENT (inc. Coal Mining Risk Assessment) – LAND TO THE EAST OF NORTH & SOUTH ROAD, SHAWSTONFOOT, CLELAND

Introduction

Terrenus Land and Water Ltd was appointed by Taylor Homes (Scotland) Ltd to conduct an investigation for a proposed new residential redevelopment to the east of North & South Road in Shawstonefoot, Cleland. This work includes a Mining Risk Assessment, incorporating a Coal Mining Risk Assessment (CMRA) and Ironstone Mining Risk Assessment at the above site which was issued in January 2019. Following additional rotary boreholes undertaken at the site this revised report provides the updated Mining Risk Assessment in accordance with the requirements of the Coal Authority and Planning Authority.

Sources of Information

The desk-based study as reported in January included an examination of published geological and mine abandonment plans together with a Coal Authority Report and internet based historical information.

The following tasks were undertaken during the course of the investigation:

Examination of historic mapping data;
Examination of historic mine abandonment plans;
Review of geological maps;
Review of geological borehole data;
Review of Coal Authority Report (a copy of the report is appended); and
Identification and Assessment of Mining Risks

Historical information indicates possible coal workings below the site. The table below summarises the potential risks associated with coal mining legacy for the proposed development site, identified from the sources listed above.

Mining Issue	Yes	No	Risk Assessment
Underground coal mining (recorded at depth)	✓		Refer below
Underground coal and ironstone mining (probable at shallow depths)	✓		
Mine entries and underground access (shafts, adits and tunnels)		✓	
Coal mining geology (fissures)	✓		
Record of past mine gas emissions		✓	
Recorded coal mining surface hazard		✓	
Surface mining (opencast workings)		✓	

Coal Authority Report

A Coal Authority report was obtained for the site which concludes that:

> The property is in the likely zone of influence from workings in 6 seams of coal at shallow to 120m depth, and last worked in 1921.
> The property is in the likely zone of influence from workings in 1 seam of ironstone at 50m to 60m depth, and last worked in 1900
> There are no known coal mine entries within, or within 20 metres of, the boundary of the property.
> Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.
> 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.
> 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 record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

A copy of the Coal Authority report is enclosed with this letter.

Desk Based Information

Published geological records and mine abandonment plans indicate that the natural superficial deposits comprise Glacial Till approximately 2 to 10 metres in thickness and thins from north to south. The site falls from north to south, commensurate with the thinning of the superficial cover

The underlying bedrock is representative of the Middle and Lower Coal Measures Formation and comprises sedimentary bedrock formed approximately 315 to 319 million years ago in the Carboniferous Period. The dip of strata beneath the site is fairly shallow and ranges from 4 to 6 degrees. The site is close to or partially underlain by a large fault which downthrows to the north with a vertical displacement of some 9m. The fault forms a natural boundary to mining with the records indicating that the area north of the fault is only partially worked.

Mine abandonment plan records indicate that there are mine workings beneath the majority of the site. These workings consisted of at least two levels of mining, suspected of being worked using the longwall method.

The Collieries of Spindleside, Cleland, Sunnyside and Murdostoun are all shown to have been active in the local area.

The workings below the site were access from Spidleside N^{o}1 pit which lies to the west of the present site. The abandonment plan records the depth to the Virtuewell coal seam to be 30 fathoms in the shaft (approx. 54.8mbgl). The pit location is adjacent to the northwest corner of the current Bellside Building and Timber yard on the west side of North & South Road. This mine entry is outside influencing distance of the site.

The abandonment plans definitively show the Virtuewell Coal and Bellside Ironstone as worked at shallow depths beneath the site. The dates of abandonment are given as 1886 for the Virtuewell Coal and 1855/1872 for the ironstone. The ironstone abandonment plans lack data or depths and seam thickness but the two different dates of abandonment could suggest two worked seams of ironstone beneath the site possibly including the Rough Band Ironstone which lies above the Virtuewell Coal seam. The area of the site adjacent to the Shawston Burn bridge is shown as unworked.

The abandonment plans of neighbouring collieries record packed waste in the Virtuewell and Bellside ironstone seams below the site and show pillars where they were left behind beneath buildings. It is assumed that pillars would have been removed in all areas where there were no structures at time of working.

The Kiltongue seam is shown as worked beneath the majority of the site, excluding the area closest to the bridge across the Shawston Burn.

The Upper and Mid Drumgray coal seams were worked beneath the north and central areas of the site with the southern site area unworked by the time of abandonment.

Desk Study Conclusion

In view of the above it is concluded that the mineral stability of the site is suspect and further investigations are required with regards to the depth and condition of the Bellside Ironstone seam and the Virtuewell Coal seam beneath the site and the potential workings in the Rough Band Ironstone.

Any ground surface movement due to the coal workings in the Kiltongue and Upper & Mid Drumgray Coal seams are likely to have ceased and will not impact the development of the site.

Ground instability arising from the presence of the fault in the northern site area is thought to be insignificant.

Intrusive Investigation

Following the conclusions of the desk study two rotary holes were drilled at the locations shown on Figure 2 in the appendix in order to intercept shallow workings. Borehole RB1 was drilled to 35mbgl using open hole methods and encountered coal of workable thickness (55cm) at 23.85m below ground level. RB1 did not encounter workings or further workable coal seams. Borehole RB2 was drilled using a combination of open hole and core to a depth of 42.7m below ground level and encountered coal of workable thickness (40cm) at 21.40m below ground level. RB2 did not encounter workings or further workable coal seams. A copy of the drilling records is included in the appendix of this report. The core recovered from RB2 was predominantly intact with no significant loss of core during the drilling process.

Using the dip directions recorded by the BGS in the Shawston Burn, the dip of the coal encountered in the site bores was calculated to be approximately 4˚. This dip was then used to project the level of the encountered coal at the Spindleside Nº1 shaft. This shaft records the depth of the Virtuewell as 54.8mbgl (92.54mOD) and using dips varying between 4˚-7˚, the calculated level of the site encountered coal in the No1 shaft varies between 114.8-105.9mOD. The encountered site coal is therefore not equivalent to the Virtuewell Coal.

Further examination of the Economic Geology Memoirs for the Cleland[1] area reveals the Airdrie Black Band coal to lie approximately 11 fathoms (20m) above the Virtuewell Coal with the Auchinlea Sandstone, recorded between the two coal seams. Calculating the projected level, at the strike distance of the Spindleside No1 shaft, of a coal seam 20m below the encountered site coal using a 4˚-6˚ dip produces levels between 93.8-88.6mOD. As these levels fall on either side of the recorded level in the shaft it is conclude that the Viruewell Coal lies approximately 20m below the encountered site coal. By extension, the coal encountered in the site bores is identified as the Airdrie Black Band Coal.

1 The economic geology of the Central Coalfield of Scotland, description of area 7 including the districts of Rutherglen, Hamilton and Wishaw (with contributions by RG Carruthers and CH Dinham). 1920. P78

Following the site intrusive works an updated site stratigraphy is set out below:

Rock Strata	Thickness (m)	Depth to base of seam below Rockhead (m)	Notes
Soil Cover	5		
Strata	15.8		
Airdrie Black Band Coal	0.55	21.66	Not recorded as worked in local abandonment plans. Intact in both site bores
Strata	18		Includes Auchinlea Sandstone
Rough Band Ironstone			Not encountered below site.
Strata	2		
Worked Virtuewell Coal	1.42	41.5	Abandonment plans show worked below the majority of the site. Unworked in the far south adjacent to the neighbouring bridge. Worked as a seam of 2m thickness in adjacent Murdostoun Colliery to the east of the site. Recorded as worked using longwall methods. Recorded boundary between sandstone and dark, shaley mudstone at 41.50mbgl in RB2 may be closed working.
Strata	7.5		
Worked Bellside Ironstone	Unknown	Estimate 49.0	Shown as worked beneath the site. No depths or seam thicknesses provided by the abandonment plan
Strata	8.3		
Worked Kiltongue Coal	1.4	58.7	
Strata	16.5		
Worked Upper Drumgray	1.5	76.7	
Strata	10.5		
Worked Mid Drumgray	1.4	88.7	

It is concluded that the Airdrie Black Band coal was not worked at the site or in the local vicinity. In addition, it is concluded that there is sufficient intact rock cover (36.5m) between the site surface and calculated depth of known workings in the Virtuewell coal with the strong possibility that the workings in the Virtuewell Coal have closed up.

The site is therefore assessed as minerally stable and does not require further works in this regard.

-oo000oo-

We trust this report meets with your current requirements. However, should you wish to discuss any matters arising, please do not hesitate to contact the undersigned.

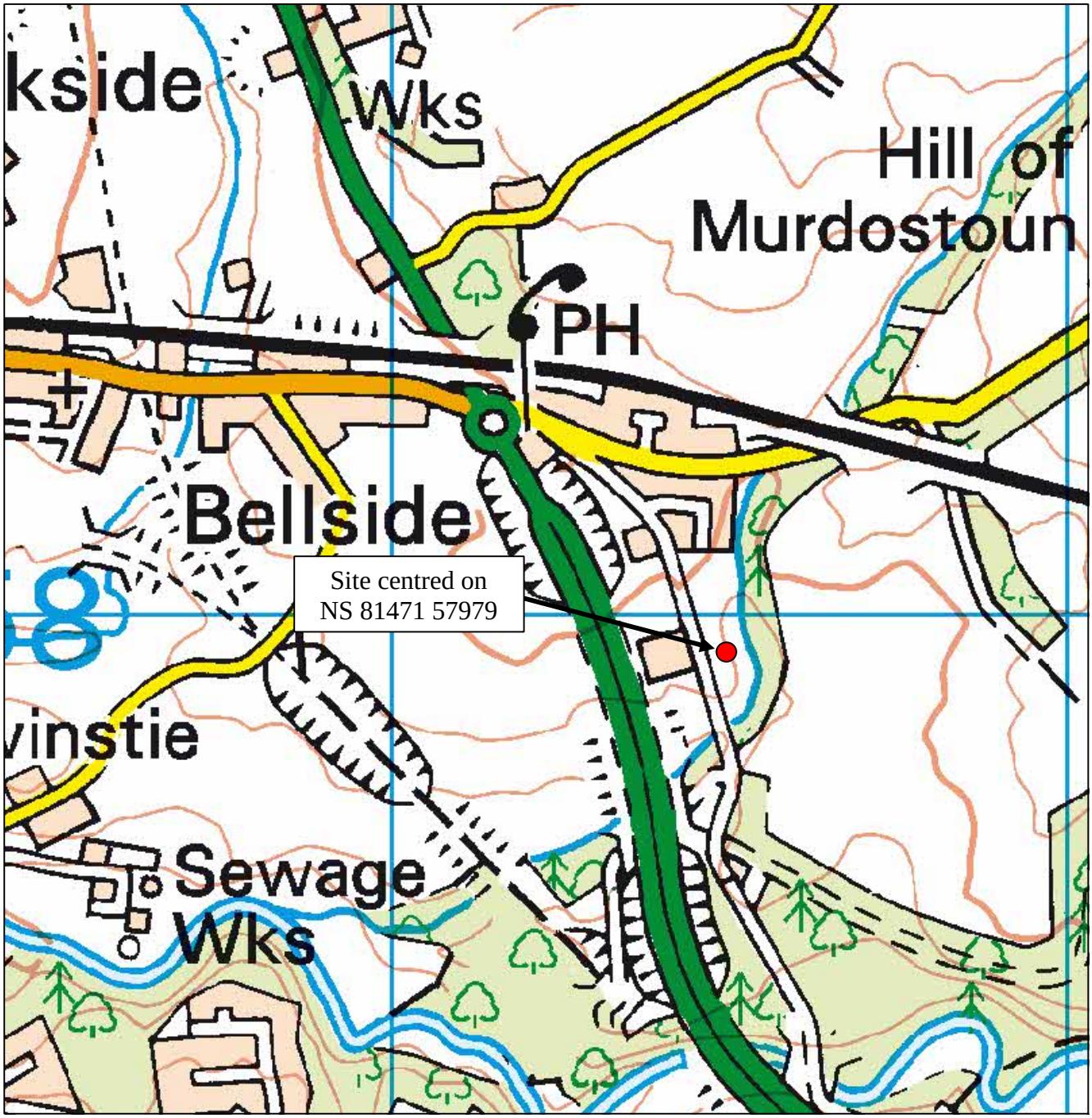
Yours faithfully

[redacted]

Encl

Appendix

Figures & Drawings



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Client: Taylor Homes (Scotland) Ltd	Drawing Title: Site Location Plan	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside, Cleland		
Date:25/1/2019	Figure 1	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

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Client: Taylor Homes (Scotland) Ltd	Figure Title: Historic Bore Locations	International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk	terrenus land&water
Project: Bellside Road, Cleland			
Date: 25/1/2019	Figure 2		
Grid Ref:			
SCALE: N.T.S.		DO NOT SCALE	

Client: Taylor Homes (Scotland) Ltd	Drawing Title: Site Boundary	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside, Cleland		
Date:25/1/2019	Figure 3	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

Client: Taylor Homes (Scotland) Ltd	Drawing Title: Rotary Bore Locations	terrenus land&water International House, Hamilton International Park, Stanley Boulevard, Hamilton, G72 0BN www.terrenus.co.uk
Project: Bellside, Cleland		
Date 12/3/2019	Figure 4	
Grid Ref: NS 81471 57979		
SCALE: N.T.S.		DO NOT SCALE

Borehole Logs

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
7/3 2019							0.10	# Grass over SOIL.				
								# Sandy mottled CLAY.				0.50
							1.40	# Sandy BOULDER CLAY.				
							5.70					5.70
							5.80	# COAL.				
								# SANDSTONE.				
							6.60					
							6.65	# COAL.				
								# MUDSTONE.				
							7.10					
							7.30	# SILTSTONE.				
								# SANDSTONE with mudstone bands.				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	5.70										139	5.70	5.70
100%	Water	35.00										115	35.00	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 35.00m

Borehole No:
R1

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 1 of 4

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Printed: 14/03/2019 10:23:20

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
							10.20					
								# MUDSTONE.				
							10.65					
								# SANDSTONE.				
							18.60					
							18.80	# COAL.				
								# SANDSTONE.				
							19.90					

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	5.70										139	5.70	5.70
100%	Water	35.00										115	35.00	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 35.00m

Borehole No:
R1

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 2 of 4

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
								# Dark MUDSTONE.				
							23.30					
								# COAL.				
							23.80					
								# MUDSTONE.				
							24.80					
								# SANDSTONE.				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	5.70										139	5.70	5.70
100%	Water	35.00										115	35.00	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 35.00m

Borehole No:
R1

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 3 of 4

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
							34.10	# MUDSTONE.				
7/3							35.00	END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	5.70										139	5.70	5.70
100%	Water	35.00										115	35.00	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 35.00m

Borehole No:
R1

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 4 of 4

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
7/3 2019							0.10	# Grass over SOIL.				0.20
								# Sandy mottled CLAY.				1.00
							1.30	# Sandy BOULDER CLAY.				4.00
							4.30	# SILTSTONE.				4.50
							5.20	# SANDSTONE.				
7/3							7.70	# MUDSTONE.				
							8.40					
							8.55	# COAL.				
								# SILTSTONE.				
							9.70	# SANDSTONE.				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	4.50										139	4.50	4.50
100%	Water	42.70										115	42.70	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 18.70m
Rotary Core Drilling to 42.70m

Borehole No:
R2

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 1 of 5

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
							18.60					
							18.70	# Dark MUDSTONE.				
								# Dark MUDSTONE with sandstone bands.				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	4.50										139	4.50	4.50
100%	Water	42.70										115	42.70	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 18.70m
Rotary Core Drilling to 42.70m

Borehole No:
R2

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 2 of 5

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
							21.00					
							21.40	# COAL.				
							21.80	# SILTSTONE.				
							24.00	# SANDSTONE.				
							27.00	# SANDSTONE with mudstone bands.				
								# SANDSTONE.				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	4.50										139	4.50	4.50
100%	Water	42.70										115	42.70	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 18.70m
Rotary Core Drilling to 42.70m

Borehole No:
R2

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 3 of 5

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
							33.65					
								# Dark MUDSTONE with sandstone bands.				
							35.70					
								# Dark MUDSTONE.				
							37.50					
								# Dark shaley MUDSTONE.				
							38.60					
								# SILTSTONE with sandstone bands.				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	4.50										139	4.50	4.50
100%	Water	42.70										115	42.70	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 18.70m
Rotary Core Drilling to 42.70m

Borehole No:
R2

Contract No: 3093

Driller	Originator
RB	SE
Chk & App	Status
IL	**Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 4 of 5

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (m)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
							41.50					
							42.00	# Dark shaley MUDSTONE.				
8/3							42.70	# SANDSTONE.				
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
100%	Air	4.50										139	4.50	4.50
100%	Water	42.70										115	42.70	

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Fraste XL

Method:
Inspection Pit to 1.20m
Rotary Open Hole to 18.70m
Rotary Core Drilling to 42.70m

Borehole No:
R2

Contract No: 3093

Driller: RB

Originator: SE

Chk & App: IL

Status: **Final**

BOREHOLE RECORD

Scale 1:50

BELLSIDE CLELAND

Part

Fig. No.

Sheet 5 of 5

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British Geological Survey British Geological Survey British Geological Survey

SECTION OF Bellside, Newmains Bore 1

439

NS.81445 58140

JWH Ross & Co.

FOSSILS BE 8951-60 Surface Level O.D.

British Geological Survey British Geological Survey British Geological Survey

Communicated 6.6.1982 by K.I.G. Lawrie

Date of boring or sinking 18.5.1982 Borer Hydracrat

One-inch Map Six-inch Map NS 85 NW

958116 4M 2/75 J.F.&S. 275

British Geological Survey British Geological Survey British Geological Survey

	Thickness Metres		Depth from Surface Metres	
Clay, sandy) driller's log	2	50	2	50
Boulder clay, sandy) driller's log	9	00	11	50
Sandstone, off-white, fine grained		20	11	70
Seatclay, grey, poorly bedded, some silt, rooty; broken with irony staining		37	12	07
Sandstone, buff, medium grained with mica; siderite-rich		40	12	47
Sandstone, off-white, bedded, with numerous thin silty bands and laminae increasing to base; vertical and sub-vertical fissuring	4	63	17	10
Mudstone, grey, silty; fractured with strong irony staining; no recovery from 18.00 - 19.05m	1	95	19	05
Ironstone, fawn, sandy, hard		25	19	30
Mudstone, grey, broken with core loss; dip increasing slightly to base dip : 5°	1	20	20	50
Ironstone, MUSSELHAND; broken in pieces		10	20	60
Mudstone, grey; crushed and broken		20	20	80
Mudstone, pale grey with blocky fracture; SHELL fragments; crushed to base		40	21	20
COAL, bright broken		50	21	70
Sandstone, off-white, massive bedded, with siltstone bands; vertical & sub-vertical fissuring with irony staining	3	10	24	80
Mudstone, d.grey, fissile, lipy(steeply inclined): SHELLS broken - recovery - 60cm	2	20	27	00
Mudstone, CARBONACEOUS, d.grey pieces only		20	27	20
Sandstone, off-white/grey, with rootlets at top		40	27	60
Mudstone, grey, silty with I.S. nodules at base; rooty; irony staining on fractures	1	00	28	60
Sandstone, off-white, massive bedded with occasional silty bands and laminae		90	29	50
Mudstone, grey, silty with sandy band at base; strong irony staining in sandy band at base		50	30	00
Bore complete	30	00	30	00

British Geological Survey British Geological Survey British Geological Survey

British Geological Survey

SECTION OF Bellside, Newmains Bore 2

440

NS.81452 58104

JWH Ross & Co

FOSSILS 8E 8961-85 Surface Level O.D.

Communicated 6.6.1982 by K.I.G. Lawrie

Date of boring or sinking 21.5.1982 Borer Hydracrat

One-inch Map Six-inch Map NS 85 NW

958116 4M 2/75 J.F.&S. 275

	Thickness Metres		Depth from Surface Metres	
Clay, sandy) driller's log	3	50	3	50
Boulder clay, sandy)	5	50	9	00
Sandstone, off-white, thin poorly bedded and laminated, fine grained with silty-micaceous laminae; one or two massive bedded bands becoming more massive bedded from 13.00m; poor core recovery with core badly broken at top; some irony staining	8	10	17	10
Mudstone, silty, grey with sandy bands and laminae throughout; MUSSELS(naiadites) from 18.00m and non-marine SHELLS becoming more abundant from 19.00m to base	3	35	20	45
Ironstone, MUSSELBAND		20	20	65
Mudstone, d.grey, slightly CARBONACEOUS and micaceous; numerous SHELLS		25	20	90
Ironstone, fawn, hard		10	21	00
Mudstone, pale grey with blocky fracture; occasional SHELLS; broken with crushed bands dip : 5°	1	70	22	70
COAL, bright at top with dull base intact		50	23	20
Seatearth, grey, poorly bedded, silty-sandy, rooty		42	23	62
Sandstone, off-white, massive bedded at top becoming silty to base with occasional silty bands and laminae	6	38	30	00
Bore complete	30	00	30	00

Coal Authority Report

The Coal Authority Property Search Services
200 Lichfield Lane, Berry Hill,
Mansfield, Nottinghamshire, NG18 4RG
Phone: 0845 762 6848
DX 716176 MANSFIELD 5

Groundsure Reference:	51001040874001
Our Reference:	51001040874001
Your Reference:	Captains Walk, Bellside
RRUID:	000000000507012009
Report Date	30 Nov 2015

Commercial Enviro All-in-One

Address: NORTH AND SOUTH ROAD, CLELAND, ML1 5NX

Thank you for placing your order with the Coal Authority Property Search Services.

Please find enclosed the Groundsure Screening and Coal Authority CON29M Coal Mining report.

This table summarises whether the Coal Authority consider that the following conditions may affect the ground stability at the location above. A fuller explanation of the condition and its potential to result in ground movement are given in Appendix 1 at the back of the report.

Coal Mining	yes

If you need any further assistance, please do not hesitate to contact our helpline on 0845 762 6848 quoting the above report reference number.

Enc.
Groundsure Screening and the Coal Authority CON29M Coal Mining Report

Appendix 1
The Coal Authority CON29M Coal Mining report

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848 DX 716176 MANSFIELD 5

TAYLOR HOMES (SCOTLAND) LIMITED
25 WOODHALL ROAD
WISHAW
ML2 8PY

Our reference:	51001040874001
Your reference:	Captains Walk, Bellside
Date of your enquiry:	30 November 2015
Date we received your enquiry:	30 November 2015
Date of issue:	02 December 2015

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

Non-Residential Enviro All-in-One - On Coalfield

NORTH AND SOUTH ROAD, CLELAND, ML1 5NX

This report is based on and limited to the records held by the Coal Authority, at the time we answer the search.

Coal mining	See comments below

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 6 seams of coal at shallow to 120m depth, and last worked in 1921.

The property is in the likely zone of influence from workings in 1 seam of ironstone at 50m to 60m depth, and last worked in 1900.

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.

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Mine entries

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

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

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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Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Additional Remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority's Terms and Conditions applicable at the time the report was produced.

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Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	30 November 2015
Issued to:	TAYLOR HOMES (SCOTLAND) LIMITED 25 WOODHALL ROAD WISHAW ML2 8PY
Property Search for:	NORTH AND SOUTH ROAD, CLELAND, ML1 5NX
Reference Number:	51001040874001
Date of Issue:	02 December 2015
Cost:	£198.00
VAT @ 20%:	£39.60
Total Received:	£237.60
VAT Registration	598 5850 68

Location map

Approximate position of property

Enquiry boundary

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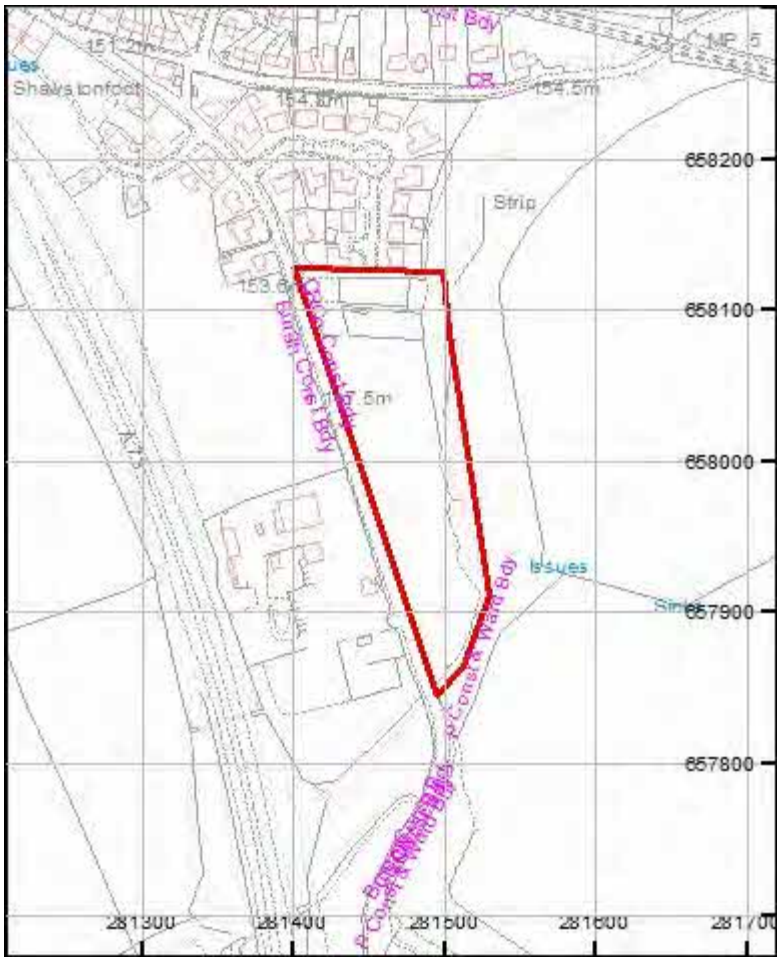

Key

Approximate position of enquiry boundary shown

Mapping sourced from Ordnance Survey

BELLSIDE ROAD, CLELAND
STAGE 2 SITE INVESTIGATION
FOR
TAYLOR HOMES (SCOTLAND) LTD

CONTAMINATED LAND RISK ASSESSMENT
SUPPORTING INFORMATION

BELLSIDE ROAD, CLELAND

STAGE 2 SITE INVESTIGATION

FOR

TAYLOR HOMES (SCOTLAND) LTD

CONTAMINATED LAND RISK ASSESSMENT

Regulatory Background

Contaminated land is addressed in statute by the Contaminated Land (Scotland) Regulations 2000, which implement Part IIA of the Environmental Protection Act 1990. These Regulations deal specifically with land contamination which is causing or has the potential to cause significant harm or pollution for any current land use. For proposed development sites, however, contaminated land issues are dealt with under Planning Advice Note PAN33[6]. The stated objectives of PAN33 are to provide advice on:

The implications of the Contaminated Land (Scotland) Regulations for the planning system;

The development of contaminated land;

The approach to contaminated land in development plans;

The determination of planning applications where a site is or may be contaminated; and

Where further information or advice can be found.

PAN33 states that the Scottish Executive considers the "suitable for use" approach is the most appropriate to deal with contaminated land. This approach focuses on the risks presented by contaminated land, recognising that the risks will vary dependent on the nature and level of contamination, the proposed site end-use and the means by which ground contamination can cause harm or pollution. The assessment of risk must, therefore, be assessed on a site-specific basis.

Qualitative Assessment Methodology

In order to provide an evaluation of the risks presented by ground contamination, a Conceptual Site Model (CSM) is built using the information obtained from the desk study and site inspection. The development and evolution of an appropriate, site specific CSM comprises an integral part of the risk assessment process. The CSM is created on an iterative basis and enables the risk assessor to identify likely areas that require investigation to characterise the nature and presence or otherwise of potential pollutant linkages.

A CSM is a means of representing the characteristics of the site, allowing pollutant linkages to be clearly reviewed for their rationality. The model may be expressed in textual, tabular, matrix or pictorial format[7,8] and should identify and assess the following elements which must be in place before contamination can lead to harm or pollution:

Source – The location, nature, severity and extent of contamination on any given site.

Pathway – The routes by which receptors could be harmed or polluted by the contamination.

Receptor – Target which could be damaged by exposure to contamination.

The presence of a source-pathway-receptor linkage (Pollutant Linkage) is indicative that there is a potential risk of harm or pollution arising from ground contamination at the site. For the purposes of the Qualitative Risk Assessment, the severity of the risk is assessed as follows:

[6] PAN33 – Development of Contaminated Land, Scottish Executive, October 2000.
[7] CIRIA C552 – Contaminated Land Risk Assessment – A Guide to Good Practice - 2001
[8] Chapter 3.2, BS10175:2001

		CONSEQUENCE			
		Severe	**Medium**	**Mild**	**Minor**
PROBABILITY	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Insignificant Risk

Adapted from CIRIA Report C552 – Contaminated Land Risk Assessment – A Guide to Good Practice.

In this respect, the CSM sets out the potential pollutant linkages identified for each receptor, based on the descriptions of Significant Harm and the Significant Possibility of Significant Harm provided in Tables A and B in Annex 3, Chapter A of Statutory Guidance: Edition 2, May 2006:Paper SE/2006/44.

The assessed risks are based on the worst case scenario in terms of exposure probability and consequence for each potential Pollutant Linkage.

Quantitative Assessment Methodology

The quantitative assessment also adopts the "Suitable for Use" approach in accordance with Scottish Executive objectives and policy. In this regard, the assessment considers the risks at a site, given the particular source – pathway – receptor linkages (Pollutant Linkages) identified at the site by the qualitative assessment. The risk assessment considers the pathways identified in the CSM and quantifies them by reference to approved risk assessment models. For the purpose of the risk assessment it is assumed that no remedial measures will be implemented for development.

The quantitative assessment is of a tiered nature, with the first level including a comparison of measured chemical concentrations in soil and groundwater against conservative "Tier 1" Generic Assessment Criteria[9] (GAC), including published either Soil Guideline Values[10] (SGV). Contaminants whose concentrations fall below the Tier 1 levels need not be considered further, as they are deemed not to present a significant risk of significant harm. Contaminant concentrations that exceed the Tier 1 GAC require further consideration in a more detailed and site specific "Tier 2" risk assessment that takes into consideration additional site specific data in an attempt to reduce the uncertainty inherent within the conservative Tier 1 GAC. If Site specific assessment criteria (SSAC) developed under Tier 2 are exceeded, remedial works may be necessary to break any associated Pollutant Linkage.

The choice of suitable Tier 1 GAC is largely dependent on the precise requirements of the risk assessment and the suitability of a particular risk assessment tool to the specific site circumstances and receptor under study.

Modelling tools are available for the assessment of risk to human health and the built environment that comply with the requirements of site-specific risk assessment. However, at present, no modelling techniques are available for the assessment of phytotoxic hazards. The Human Health GAC developed for the phytotoxic compounds of copper and zinc are more conservative than the values within ICRCL 70/90 and are therefore adopted for the protection of this receptor.

[9] Developed using risk assessment modelling tools.

[10] Soil Guideline Values can only be published by the Environment Agency in the SGV Science Reports.

Human Health risk assessments are carried out using the updated CLEA approach and the following methodology:

CLEA v.1.06 software; and

Published Soil Guideline Values.

Statistical analysis[11] of the soil and leachate results is undertaken to determine whether the measured determinant values present a significant possibility of significant harm to Type 1 (Human Health), as defined in Annex 3 of Scottish Executive Circular 1/2000.

Risks to plants from phytotoxic contaminants were assessed under available guidance. At present this comprises ICRCL 70/90.

Controlled waters have been screened using appropriate GAC derived from the following sources:

Water Supply (Water Quality) (Scotland) Regulations 2001;

Surface Water (abstractions for drinking water) (Classification) (Scotland) 1996;

Environmental Quality Standards (EQS);

World Health Organisation Drinking water standards (WHO-DWS); and

Resource Protection Values (RPV) – SEPA WAT-PS-10-01, March 2010.

Potential risks to buildings & structures were assessed against the following references:

Building Research Establishment Special Digest 1 (2005); and

UKWIR Guidance for the Selection of Water Supply Pipes to be Used in Brownfield Sites 10/WM/03/21

-oo0oo-

[11] In accordance with "Guidance on Comparing Soil Contamination Data with a Critical Concentration". CLAIRE and the Chartered Institute of Environmental Health, May 2008.