Track Environmental Consultancy Ltd

Date: 19 Nov 2014

Test Report Ref. STR: 125622

LABORATORY TEST REPORT

Test Requirements: To determine the Chemical Analysis of a Sample as per clients request.

SAMPLE DETAILS:

Certificate of sampling received:	**52122 - 263831**
Laboratory Ref. No:	**CLO (125622)**
Date Received:	**13/11/2014**
Sampling Location:	**Stockpile**
Name of Source:	**Lawrence Landfill**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Compost Like Material**

COMMENTS / DEPARTURE FROM SPECIFIED PROCEDURE:

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS:

See attached

Jonathan Young - Director

CONTAMINATION STATUS ASSESSMENT Background:

1. INTRODUCTION

Assessment of samples with regards to potential deleterious impact on human health, flora and the built environment follows the UK adopted risk assessment process utilised to assess contaminated land. The concentration of Chemicals of Concern (COCs) depend on the end use of the material. The suite of contaminant parameters selected for analysis should be based on the history of the source(s) of the material, and the intended use where the material is to be used. Where this information is not available, as in the case here, an appropriate conservative assumption has been made resulting in the broad suite of parameters selected for analysis.

In line with UK practice, parameter concentrations were utilised to estimate the significance of risk to human health, flora, and the built environment, following contemporary UK Risk Assessment guidance.

To estimate the significance of risk, Quantitative Risk Assessment (QRA) is used. The first stage in QRA is to undertake a Generic QRA (GQRA) to determine whether contaminant concentrations are above target levels for soil set by the UK government within either statutory or non-statutory policies.

2. HUMAN HEALTH RISK ASSESSMENT (HHRA)

The contemporary non-statutory guidance published by DEFRA and the Environment Agency (SC050021/SR3 (the CLEA Report) and SC050021/SR2 (the TOX report)) in 2008 replaces the old Contaminated Land Report series, CLR 7-10; updated versions of SGV and TOX reports are ongoing.

Risk assessment here includes a Tier 1 Risk Screening GQRA using integrated Generic Assessment Criteria (GACs) calculated using alternative models, e.g. CLEA, RBCA. Initial assessment of the soil data by comparing with GACs indicates the determined Chemicals of Concern (COCs) to be significant hazards. Where the GAC is exceeded, the source parameter is identified.

This exercise forms the basis of GQRA for the soil sample considered in this report.

1. PHYTOTOXICITY ASSESSMENT AND INTERPRETATION

Parameters known to be harmful to flora include the metals copper, nickel, and zinc.

Guidelines for phytotoxicity assessment are documented in the British Standard Specification BS 3882 : 2007, Topsoil and Requirements for use. The cited limits for heavy metals are a function of soil pH for all topsoil classes; the guidelines are summarised below (Table 1).

Table 1 : Phytotoxic Contaminant Limits for Topsoils

Phytotoxic Contaminant	**Multipurpose and Specific Purpose Topsoils**		
Soil pH range	***pH <6.0***	***pH 6.0-7.0***	***pH >7***
Copper (mg/kg)	**<100**	**<135**	**<200**
Nickel (mg/kg)	**<60**	**<75**	**<110**
Zinc (mg/kg)	**<200**	**<200**	**<300**

Several species of flora can tolerate a broad pH range (typically 3.5-9.0), although the range of 'acid-loving' plants is more limited (3.5-5.5).

2. BUILT ENVIRONMENT ASSESSMENT AND INTERPRETATION

Parameters known to be harmful to the built environment include pH, sulphate and sulphide.

Guidelines for the pH and aqueous sulphate parameter assessments are documented in the BRE Special Digest 1 (SD1 : 2005), 3rd Edition : 17 June 2005. Also, guidelines for the aqueous and acid-soluble sulphate and sulphide parameter assessments are documented in the TRL Report TRL447 "Sulphate specification for structural backfills" Limits. The guidelines are summarised in the appended tables.

Results: DECLARATION OF SOIL ANALYSIS TO BS 3882 : 2007

CHEMICAL ANALYSIS - **Sample Ref: 125622 CLO**

Parameter	Component	Units	Result	COMPLIANCE ASSESSMENT (Y/N)			
				Multi-Purpose	Specific Purpose		
					Acidic	Low-fertility	Calcareous
Texture	Clay	% w/w	**10**	Y	Y	Y	Y
	Silt	% w/w	**14**	Y	Y	Y	Y
	Sand	% w/w	**76**	Y	Y	Y	Y
Textural Class	**Organic Sand Loam**						
Coarse Fragments Contents	>2 mm <20 mm	% w/w	**36.2**	N	N	N	N
	>20 mm <50 mm	% w/w	**0**	Y	Y	Y	Y
	>50 mm	% w/w	**0**	Y	Y	Y	Y
Soil pH	pH units		**7.1**	Y	Y	N	N
ALL INCLUSIVE COMPLIANCY				N	N	N	N

Comment: **The analysed characteristics of the soil referenced:**

125622 CLO

therefore fails to comply with the BS3882 topsoil characteristics for all grades, due to the following reasons: Elevated Stone Content (>2mm <20mm fraction) (All Grades)

Caveats: The British Standard BS 3882 : 2007 specifies requirements for topsoils that are moved or traded. The standard is not intended (or appropriate) for the grading, classification or standardization of topsoil or subsoil that remains in situ. The grades of topsoil considered are **Multipurpose,** which is fit for the majority of needs, and also **Specific Purpose** topsoils, that have low fertility or are acidic or calcareous for the particular specialist needs where such topsoils are required.

Results: TOTAL INORGANIC CONTAMINANT ANALYSIS - 124622

Parameter	125622 CLO
pH	**7.1**

Results: TOTAL ORGANIC CONTAMINANT ANALYSIS - 125622

Parameter	125622 CLO
EXTRACTABLE TPH (mg/kg)	**202**

Interpretation:

SAMPLE REF : 12562 CLO

HHRA :
A Tier 1 Human Health Risk Assessment of the results of analysis of Extractable Petroleum Hydrocarbons indicates that the parameter is present at a concentration lower than the most stringent recommended levels for all standard land uses, including residential with gardens, and allotments. Recommended levels include published CLEA Soil Guidance Values (SGVs). Where CLEA SGVs have not been published, in-house Generic Assessment Criteria (GAC) have been calculated and utilised; the results of analysis indicate soil parameters to be present at either typically low concentrations or found at levels below the limits of analytical detection.

PHYTOTOXICITY ASSESSMENT :
The pH of the material is slightly alkaline and considered to be suitable for most plants other than acid-loving flora.

BUILT ENVIRONMENT ASSESSMENT:
A Built Environment Risk Assessment of the results of analysis of salient parameters indicates that all are present at concentrations lower than guidance limits.

Detailed comments: The pH is considered suitable for all other than acid-loving plants.

Extractable hydrocarbons are present below analytical detection.

Conclusions: This section of the report considers the contamination status of the soil sampled to demonstrate the potential risk of harm to human health, flora, and the built environment.

Sample Ref : 125622 CLO

With respect to human health, **t**he results of hydrocarbon analysis of the soil sample Ref 125622 CLO demonstrate compliance with existing guidelines.

With respect to phytotoxicity, the pH is at a level considered to be suitable for most flora, other than acid-loving species.

Summary: **SUMMARY OF CONTAMINATION ASSESSMENT**

The summary of assessment of analytical data of the soil sample referenced 125622 CLO with regards to contamination status is tabulated in Table 2 below.

Table 2 : Summary of Contamination Assessment of Soil Sample ref 125622

Sample Reference	Contamination Status
125622 CLO	
	NO RISK OF HARM TO HUMAN HEALTH [Note 1]**;**
	NO RISK OF PHYTOTOXICITY [Note 1]**;**
	NO RISK OF HARM TO THE BUILT ENVIRONMENT [Note 1]

Note 1 : With respect to the contamination parameters assessed.

Summary: The results of soil analysis to determine contamination status and suitability for use as a growing medium in accordance with BS 3882 : 2007 demonstrate that:

Sample Reference	BS 3882 compliance	Contamination Status
125622 CLO	**Fails All Grades**	**Not contaminated ***

*** regarding the contamination parameter assessed**

Recommendations: The following recommendations are proposed:

Sample Reference	Recommendations
125622 CLO	**Use as uncontaminated sandy loam for, such as, a clay soil texture amender, subsoil drainage improver, etc.**

UK CLEA SOIL GUIDANCE VALUES (current SGVs - *as of report date)*

	Species / Type	LAND-USE		
		Residential	Allotments	Commercial
ARSENIC SGV (mg.kg^{-1} dry weight soil)		**32**	**43**	**640**
CADMIUM SGV (mg.kg^{-1} dry weight soil)		**10**	**1.8**	**230**
MERCURY SGV (mg.kg^{-1} dry weight soil)	***Elemental***	**1.0**	**26**	**26**
	Inorganic	**170**	**80**	**3600**
	Methyl mercury	**11**	**8**	**410**
NICKEL SGV (mg.kg^{-1} dry weight soil)		**130**	**230**	**1800**
SELENIUM SGV (mg.kg^{-1} dry weight soil)		**350**	**120**	**13000**
BENZENE SGV (mg.kg^{-1} dry weight soil)		**0.33**	**0.07**	**95**
TOLUENE SGV (mg.kg^{-1} dry weight soil)		**610**	**120**	**4400**
ETHYLBENZENE SGV (mg.kg^{-1} dry weight soil)		**350**	**90**	**2800**
XYLENE SGV (mg.kg^{-1} dry weight soil)	***o-Xylene***	**250**	**160**	**2600**
	m-Xylene	**240**	**180**	**3500**
	p-Xylene	**230**	**160**	**3200**
PHENOL SGV (mg.kg^{-1} dry weight soil)		**420**	**280**	**3200**
Sum of PCDDs, PCDFs and dioxin-like PCBs SGV (mg.kg^{-1} dry weight soil)		**0.008**	**0.008**	**0.240**

UK CLEA SOIL "OLD" GUIDANCE VALUES (as a guide only)

	STANDARD LAND-USE			
	Residential with plant uptake	Residential without plant uptake	Allotments	Commercial/industrial
CHROMIUM SGV (mg.kg^{-1} dry weight soil)	**130**	**200**	**130**	**5000**
LEAD SGV (mg.kg^{-1} dry weight soil)	**450**	**450**	**450**	**750**

UK SULPHATE CLASSIFICATIONS AND LIMITS BRE Special Digest 1 (SD1 : 2005), 3rg Edition : 17 June 2005

SULPHATE CLASS	LIMITS *
DS-1	<500 (mg/l SO_4)
DS-2	500 - 1500 (mg/l SO_4)
DS-3	1600 - 3000 (mg/l SO_4)
DS-4	3100 - 6000 (mg/l SO_4)
DS-5	>6000 (mg/l SO_4)

**** The limits for sulphate classes are based on 2:1 water/soil extraction test.*** **UK SULPHATE**

CLASSIFICATIONS AND LIMITS TRL Report TRL447 "Sulphate specification for structural backfills" Limits

TRL447	WS	OS	TPS
recommended limits	1500 mg/l SO_4	0.3 %SO4	0.6 %SO4

WS - Water-soluble Sulphate, mg/l SO_4
OS - Oxidisable Sulphides, % SO_4 TPS - Total Potential Sulphate, % SO_4