

Email: frank\_unsworth@yahoo.co.uk

Date: 28<sup>th</sup> March 2017  
Our Reference: LKC 15 1072

320180183P

Dear Frank,

**RE: LAND TO REAR OF ST.PAUL'S TERRACE, CLITHEROE - GEO-ENVIRONMENTAL INVESTIGATION AND RISK ASSESSMENT**

**1.0 Introduction**

Thank you for inviting LK Consult (LKC) to provide a fee proposal for the required geo-environmental work at the above site. It is understood that the work is required to provide information on ground conditions to validate contaminated land planning conditions. It is understood that the development will be for residential use with car parking and gardens.

A Desk Study (Preliminary Risk Assessment) has been undertaken at the site by LKC in March 2015 (reference CL-602-LKC 15 1072-01 [R0]). A summary of site settings is presented in Table 1-1:

<b>Location</b>	Northwest of St Paul's Terrace and southwest of St Paul's Street, Clitheroe. Centred at approximate National Grid Reference 373070E 441630N.
<b>Area</b>	1,100m <sup>2</sup> .
<b>Topography</b>	Approximately 66 metres above ordnance datum (AOD) and approximately level.
<b>Current Land Use</b>	<u>Site</u> Currently used for maintenance, spray painting and the repair of vehicles (wagons). Comprising garages, fuel tanks and a fuel pump. The west of the site is currently occupied with allotments with associated sheds. <u>Surrounding Area</u> North & East: Residential properties. South: Playing fields. West: Recreational area associated with the social club.
<b>Proposed Development</b>	Residential properties with associated car parking and gardens.

Table 1-1: Summary of site settings

Historical mapping indicates the site was unoccupied until 1932 mapping, after which unreferenced buildings were present which were confirmed as the current garage structures during the site walkover. BGS records indicate the geology beneath the site to be glacial till underlain by limestone and mudstone bedrock. No BGS logs are present close to the site.

The site walkover identified several potential sources of ground contamination from bulk and small scale storage of hydrocarbon (tanks, drums, oil pans, etc), asbestos containing materials on buildings and likely presence of made ground.

A contamination conceptual model was produced by LKC as part of the desk study. This has identified the following risks summarised in Table 1-2.

Pollutant Linkage	Risk	Further Action Required
1 Non-volatile contaminants posing a risk to site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables).	High (ACM)	<ul style="list-style-type: none"> <li>-Made ground likely onsite.</li> <li>-Current garage buildings may contain ACM.</li> <li>-Onsite vehicle repair garages, fuel tanks and oil containers.</li> <li>-Evidence fuel spillages / leakages.</li> <li>-Investigation work required.</li> </ul>
	Moderate (PAHs, metals, hydrocarbons, pesticides)	
	Low (pesticides / herbicides)	
2 Volatile contaminants posing a risk to site users via the inhalation of vapours.	Moderate	<ul style="list-style-type: none"> <li>-Vehicles repair garages, fuel tanks and evidence of significant leakages / spillages of volatile contamination identified on site.</li> <li>-Investigation work required.</li> </ul>
3 Gas posing a risk to buildings and site users via the migration of gas into building causing explosion and asphyxiation.	Low	<ul style="list-style-type: none"> <li>-Limited source of gas identified, given the distance, age and date of infilling of features.</li> <li>-No further action required.</li> </ul>
4 Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	Moderate	<ul style="list-style-type: none"> <li>-Vehicle repair garages, fuel tanks and evidence of significant leakages / spillages of mobile contamination onsite.</li> <li>-Investigation work required.</li> </ul>
5 Sulphate posing a risk to building via direct contact (sulphate attack).	Moderate	<ul style="list-style-type: none"> <li>-Made ground observed onsite.</li> <li>-Investigation work required.</li> </ul>
6 Organic contaminants posing a risk to water pipes.	Moderate	<ul style="list-style-type: none"> <li>-Organic contaminants anticipated and made ground observed onsite.</li> <li>-Investigation work required.</li> </ul>
7 Phytotoxic metals posing a risk to flora via root uptake.	Low	<ul style="list-style-type: none"> <li>-Made ground observed onsite.</li> <li>-Investigation work required as part of PL1.</li> </ul>

Table 1-2: Summary risk table

## 2.0 Proposed Scope of Works

The scope for the recommended works is presented in Table 2-1. Potential additional works are presented in Table 2-2.

	Proposed Work	Justification
<b>Site Walkover</b>	- Site reconnaissance.	- Site walkover to assess current site conditions and any constraints to site investigation.
<b>SI Brief</b>	- Preparation of site investigation brief for regulator approval.	- Agree the scope of the investigation with the regulators before mobilisation to site.
<b>Utility Search</b>	- Obtain service plans.	- Up to date service plans are required before any intrusive works commence.
<b>Intrusive Investigation</b>	- 8no. window sample boreholes with installations to allow for groundwater sampling.	<ul style="list-style-type: none"> <li>- For 'main investigation' a non-targeted sampling rate of 10-25m square centres is recommended in BS10175<sup>1</sup>. This work will be at a sampling density of 10-12m square centres which is considered appropriate given the history of the site.</li> <li>- A number of exploratory locations will be used to target potential onsite contamination sources such as tanks, pump and inspection pit.</li> <li>- All soils logged to BS14688-1<sup>2</sup>.</li> <li>- Window sample boreholes will be drilled to 5mbgl or bedrock (if shallower).</li> </ul>
<b>Geo-technical</b>	- SPTs, shear vanes and	- Information to aid a structural engineer in designing

<sup>1</sup> British Standard (2011). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2011.

<sup>2</sup> British Standards (2002) Geotechnical investigation and testing – Identification and Classification of Soil. Part 1: Identification and description. BS EN ISO 14688-1:2002.

#### 4.0 Fee Estimate

Costs are presented below in Table 4-1. Potential additional extra overs are presented in Table 4-2. The final scope of works may alter depending upon the requirements of the Local Authority.

	Description	Cost
1	Provision of RAMs and up to date service plans.	£175
2	Site walkover	£120
3	Site Investigation Brief and reasonable Regulator liaison.	£50
4	8no. window sample boreholes to max. 5mbgl. Costs include installation of 8no. wells, SPTs, hire of breaker, hand shear vanes, collection of samples, soil logging and LKC supervision (1 ½ days).	£2,700
5	Laboratory analysis of soils and groundwater for contamination and geotechnical testing. -Soils (up to 12no. samples for comprehensive contamination suites and confirmatory testing). -Groundwater (up to 5 samples for comprehensive suite). -Geotechnical testing.	£1,400 £900 £300
6	Groundwater monitoring and sampling visit.	£250
7	Phase 2 Geo-environmental Site Investigation and Risk Assessment Report, including reasonable regulatory liaison.	£1,100
	<b>Total (exc VAT)</b>	<b>£6,995</b>

Table 4-1: Proposed costs.

	Potential Additional Items	
8	Waste Acceptance Criteria testing (per test).	£195
9	Ground gas and vapour monitoring (6 visits over 3 months).	£900
10	Separate detailed Remediation Strategy and reasonable Regulatory liaison (if gross contamination identified).	£750

Table 4-2: Potential additional costs.

#### 5.0 Timescales

Although we recommend getting the scope of the investigation agreed with the Local Authority you may wish to begin the site investigation at your own risk, if timescales are not favourable. We can usually mobilise to site within 7 working days of instruction dependent on the availability of service plans. Profile logs with SPT data can be provided in 48 hours, if required.

#### 6.0 Payment Schedule

Should our proposals be acceptable a project commencement form (PCF) will be forwarded with a copy of our terms and conditions. This form needs to be completed and signed by the person or company to whom all invoices are to be addressed and returned to LKC before work can commence on site.

It is our standard practice to carry out credit checking procedures and other checks before commencing work on new projects. Depending upon the results of such checks, we reserve the right to vary our payment arrangements with the client. Our terms allow for the issue of reports in draft with the final versions issued on receipt of payment.

I trust that our proposals are of interest and we look forward to hearing from you in due course.  
Yours Sincerely



**PETER DUNN**  
**SENIOR GEOENVIRONMENTAL CONSULTANT**