



Your Environment

STAGE 1: DESKTOP STUDY AND RISK ASSESSMENT REPORT AT

MILLBROOK MANOR,
KNOWLEY LANE,
KNOWSLEY VILLAGE,
LIVERPOOL,
L34 0JN

Cain and Clark Developments

Your Environment

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Report Number: YE2863 (Revision 1), January 2017

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For and on behalf of YourEnvironment				

Issue	Date	Description	Prepared	Reviewed	Approved
00	25.01.17	Final Report	KB	TLB	CH
01	01.02.17	Amendment to proposed scope of investigative works pursuant further being undertaken.	KB	TLB	CH

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1.0 Introduction

YourEnvironment (YE) was instructed by Cain and Clark Developments (Quote No: Q2085, Dated: November 10th 2016) to produce a Stage 1: Desktop Study and Risk Assessment for a site known as Millbrook Manor which is located at Knowsley Lane, Knowsley Village, Liverpool, L34 0JN.

We understand current plans for the redevelopment of the site include;

- Partial demolition, change of use and erection of first floor extension to create one (1no.) residential dwelling.
- Creation of vehicular access, car parking areas and incorporation of soft landscaping.

The purpose of the report is to satisfy a planning condition attached to the redevelopment through The Metropolitan Borough of Knowsley Council under reference 16/00328/FUL, namely condition 6.

The proposed redevelopment plans for the site, at the time of issuing this report can be reviewed within **Appendix A**.

Objectives

The objectives of this Stage 1 report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors;
- Review historical and recent uses to assess the potential for contamination to be present from past and current land-use;
- Assess by qualitative means the potential nature and extent of contamination from those uses and the environmental risk and liabilities that which may affected the site redevelopment;
- Identify the prevalent source-pathway-receptor linkages present on site by means of a Tier 1 contamination risk assessment which incorporates the formulation of a Conceptual Site Model.

Information Sources

During the production of this report the following information sources have been utilised:

- A review of Historical Ordnance Survey Maps, EnviroInsight and GeoInsight information obtained from Groundsure (4C Group Ltd).

2.0 Site Location

The following table outlines the details of the site:

Site address	Millbrook Manor, Knowsley Lane, Knowsley Village, Liverpool, L34 0JN
Grid reference	343484, 395977
Total area	0.35ha
Topography	The site is flat situated at approximately 33mAOD
Site Layout	The site is an irregular shaped plot of land

Table 1: Site Details

3.0 Site Geology & Geological Hazards

Superficial Ground and Drift Deposits

Within 50m of the site there are two records of superficial geology. The on-site superficial geology is recorded as Shirdley Hill Sand Formation (Sand) with 5m northeast of site, there is a record of Till, Devensian- Diamicton rock.

Bedrock Geology

The bedrock comprises of Sherwood Sandstone Group - Sandstone (Mudstone, Siltstone and Sandstone).

Artificial/Made Ground

There are no records of artificial/Made Ground within 500m of the site.

Natural Hazards

On site, there is a low risk from running sand hazards, a very low risk from shrink-swell hazards, landslides and collapsible rocks and a negligible risk from soluble rocks and compressible ground hazards.

Coal Mining

There are no records of coal mining within 75m.

Non-Coal Mining

There are no non-coal mining areas within 50m of the study site.

Landslip

There are no records of landslips within 500m.

Faults

There are no records of faults within 500m.

Radon

The study site is not located within a Radon Affected Area, as less than 1% of properties are above the Action Level. Therefore, no radon protective measures are necessary for new properties or extensions to existing ones.

Borehole Records

There are eight records within 250m of the study site, the closest of which is 170m north which was drilled to a depth of 10 metres, the remaining boreholes are over 180m from the site.

4.0 Site Hydrogeology and Hydrology

Aquifer within Superficial Drift Deposits

The aquifer within the superficial geology on site is designated as being a Secondary A. This is described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The aquifer within the superficial geology 5m northeast of the site the material is designated as being a Secondary (undifferentiated). This is assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been

designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Permeability of Superficial Drift Deposits

On site the maximum permeability is high and the minimum permeability is described as high. 5m north-east of the site the maximum permeability is high and low minimum permeability is considered to be low.

Aquifer within Bedrock Geology

On site, the aquifer within bedrock geology has been designated as a Principal Aquifer. This is geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.

Permeability of Bedrock Ground

The minimum permeability is recorded as being high with the maximum permeability recorded as being high.

Groundwater Abstraction Licences

There are no active groundwater abstraction licences within 2000m.

Surface Water Abstraction Licences

There are no active surface water abstraction licences within 2000m.

Potable Water Abstraction Licences

There are two active recorded potable abstraction licences within 2000m, the closest of which is 1192m north-east of the site for a well, borehole and wells and boreholes x2 at Knowsley. The second entry is 1637m south for boreholes, wells, adits and headings at Knowsley, Randles Bridge.

Groundwater Vulnerability and Soil Leaching Potential

There are three records on site, each of differing soil vulnerability categories, 'L', 'HU' and 'H1'. They are all classified as a Major Aquifer/Low Leaching Potential. 'L' is described soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants. 'HU' describes soil for urban areas and restored mineral workings as soils which are therefore assumed to be highly permeable in the absence of site-specific information. 'H1' is for soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.

Source Protection Zone

The site is located upon a source protection zone 3 (Total Catchment).

Detailed River Network

There are nine records of rivers within 500m of the study site, the closest of which is 8m north-east of the site for a Primary River. There are two records located 14m east for a culvert and a primary river. The remaining records are over 330m from the study site.

Surface Water Features

There are six records within 250m of the study site. The closest of these is 7m north-east of the site and 9m north of the site, both for a stream. The remaining records are over 60m from the study site.

Records of Licensed Discharge Consents

There are five records within 500m of the study area, all of which are revoked consents 111m northwest. Two are for miscellaneous discharges - surface water and three are for sewage discharges - final/treated effluent.

5.0 Site Flood Information

The study site is not within 250m of either an Environment Agency Zone 2 or Zone 3 floodplain. With this in mind, the risk from flooding from rivers and sea (RoFRaS) is recorded as very low. There are no areas benefitting from flood defences, flood defences or areas benefitting from flood storage within 250m of the study site.

There are British Geological Survey (BGS) groundwater flooding susceptibility areas within 50m of the boundary of the study site related to Clearwater Flooding. Therefore, the highest susceptibility to groundwater flooding is considered to be limited potential based on the underlying geological conditions.

The BGS confidence rating in respect of this result is low.

6.0 Site Environmental and Industrial Setting

Environmental Permits, Incidents and Registers

Sites Determined as Contaminated Land under Part IIA EPA 1990

There are no records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 within 500m.

Records of National Incidents Recording System, List 2

There are two records within 500m of the study site. The closest of these is 355m west for an inert materials and wastes incident in May 2001 that had a Category 3 (minor) impact on land and Category 4 (no impact) on water and air. There was a household waste incident 480m west in October 2001 that had a Category 3 impact on land.

National Grid High Voltage Underground Electricity Transmission Cables

There are eight records of active high voltage underground electricity transmission cables within 500m of the site and one decommissioned cable. The closest active record is for an A/C cable 9m west. There are two records of a pilot cable 54m north and a decommissioned cable 54m north. The remaining active entries are over 170m from the study site.

Landfill and Other Waste Sites

Potentially Infilled Land

There are thirty seven records of potentially infilled land within 500m, the closest two of which are 43m west for a grave yard. The next closest records are 136-141m east for ponds and 138m south-east for ponds. The remaining records are over 370m from the study site.

Records of Environment Agency Licensed Waste Sites

There are two records within 1500m of the study area, both located 499m northwest for a materials recycling facility.

Workings/Tunnels and Railway Features

Historical Surface Ground Working Features

There are nine ground working features within 250m, the closest two of which are 43m west for a grave yard. The remaining entries are 136-141m east for ponds and 138m southeast for ponds.

Historical/Current Land Uses

Potentially Contaminative Uses

There are nineteen records of sites with a potentially contaminative past land use within 500m, none are on site. Off site, there are two records of a grave yard 43m west and a smithy located 66m north. There is an unspecified pit 373m east and unspecified ground workings 286m north. The remaining records are over 405m from the study area.

Historical Tank Database

There are fourteen records of historical tanks within 500m of the site. Two of these are on site for an unspecified tank. The remaining entries are for unspecified tanks located over 390m from the study area.

Historical Energy Features

There are four records of sites within 500m, the closest of which are 31m and 32m south west for an electricity substation. The remaining two entries are 214m and 215m southeast from the study area and both for electricity substations.

Records of Potentially Contaminative Industrial Sites

There are six records within 250m of the site, none are on site. The closest is 35m south west for an electricity sub station. The next closest is 177m south east for a colours, chemicals and water softeners and supplies site. There is an electrical equipment repair and servicing site 195m north and the remaining entries are over 210m from the site.

Designated Environmentally Sensitive Sites

The study site is located upon a Nitrate Vulnerable Zone and Green Belt Land.

Information on the environmental and geological setting of the site is presented in a Groundsure EnvironInsight and GeolInsight Report prepared for the site, a copy of this report is reproduced in **Appendix B**.

7.0 Historical Mapping Study

The object of this search was to report on the evidence of site history and redevelopment of the site and its environs from available County Series and Ordnance Survey Maps dating from the mid to late 19th Century to the present day as downloaded from Groundsure.

Maps only represent a “snap shot” of the site and its environs at the date of the survey. Changes that had occurred either to the site and/or the environs may well not have been recorded on the maps and could represent a hazard to the site.

The information reported might not represent all pertinent information that could be obtained.

The interpretation of the maps and/or other data commented on in this report is subjective.

Year	Information
1850	The mapping is incomplete and therefore it is not possible to identify site details or any information for the immediate surrounding environs.
1892	The site is of irregular shape and has been partially developed. The southwest portion of site is comprised of a structure labelled 'School', with the remainder of the site located within a large field. The site is bound by a road, 'Mill Lane' to the north and another road to the west of site. Off site, 'Dumbrees Wood' is located immediately northeast and 200m east there is 'Vicarage Plantation'. 400m north there is 'Kitling Pits Plantation' in addition to 'Penrhyn Pits' 400m northwest and 500m east is 'Blaking Pits'.
1893	The northern section of site is largely covered by trees and is part of 'Dumbrees Wood'. The site has been labelled 'May Pole Farm'. Off site, there have been no discernible changes.
1908	The site remains unchanged. Off site, there is a grave yard located 50m south.
1925	There have been no discernible changes to the site. Off site, there appears to be a water feature/stream immediately north of site flowing in an east to west direction.
1927	The site remains unchanged. Off site, there has been increasing development 100m west of the study site.
1937	There have been no discernible changes to the site or immediate surrounding environs.
1938	There have been no discernible changes to the site or immediate surrounding environs.
1956	The site remains unchanged. There has been extensive development of structures of unknown usage located 250-700m north and northwest of site.
1959	The mapping is incomplete and therefore it is not possible to ascertain if any changes have occurred on site or in the immediate surrounding environs.
1960	The site remains unchanged. The mapping is incomplete and therefore it is not possible to ascertain if any changes have occurred in the immediate surrounding environs.
1966	The site remains unchanged. Off site, it would appear that the development 250m north of site is for residential dwellings.
1977	The structure on site has been labelled 'Knowsley C of E Primary School' and there is an unspecified tank located in the centre of the site. There has been what appears to be extensive residential development immediately east and southeast of site. The mapping is incomplete and therefore it is not possible to ascertain if any changes have occurred immediately north of site.
1978	The site remains unchanged. Off site, all development 200-700m north and northwest of site has been cleared and the land left undeveloped. There has been further, extensive structural development southeast of site and there is a grave yard 50m southwest.
1989	The site remains unchanged. There has been structural development of unknown usage 350m northwest of site.
1993	There have been no discernible changes to the site or immediate surrounding environs.
1995	The mapping is incomplete and therefore it is not possible to ascertain if any changes have occurred to the site or immediate surrounding environs.
2002	There have been no discernible changes to the site or immediate surrounding environs.
2010	There have been no discernible changes to the site or immediate surrounding environs.
2014	There have been no discernible changes to the site or immediate surrounding environs.

Table 2: *Historical Mapping Review*

Therefore, from the historical maps we can consider the following:

On site sources of possible contamination:

- Various structures of unknown usage;
- Made Ground (as a result of historic development);
- Tank of unknown contents.

Off-site sources of possible contamination:

- Pits (400m northwest and 500m east).

The Historical Ordnance Survey Maps were obtained from Groundsure and are available for review within **Appendix C**.

8.0 Walkover Survey

The site was visited by YE on 16th January 2017. The weather was overcast with slight drizzle.

Access

The site is situated opposite the Maypole green and war memorial and is accessed off Knowsley Lane via Mill Lane.

Topography

The site is flat and it is understood that the site has been developed c.200 years ago, as a former school constructed of sandstone and was recently a restaurant, latterly with a car park adjacent to the east side of the building. The site has evidence of former landscaping but with evidence of some tree felling and stockpiles of demolition material.

Vegetation

The northern section of the site was covered in grass and rough surfacing associated with a construction site.

Buildings and Structures / Floor Covering

The property comprises of a single storey sandstone building with a sloping tiled roof which has been extended (possibly in the 1960's) to the rear by way of a brick built extension and garages with a flat above, both have tiled roofs. At either side of the building at the front of the building (west side) are two small brick built structures which originally housed the gas supplies (it is understood that these have now been disconnected).

Flooring to the old-school building was stone but has now been removed for renovation and the extension is in concrete

Surface Permeability / Ground Covering

At the time of inspection, it is estimated that approximately 75% of the land surrounding the build are a mixture of hardcore, paving and concrete.

There is evidence of former soft landscaping around the boundaries and a central portion in the middle of the car park

Drainage Features

There were drainage features noted on the site itself.

Other Services

The site has access to all services.

Surrounds

The site is in a predominantly rural area with a stately home and parkland to the north of the site.

Direction	Description of Site boundary
North	Mature Trees and Mill Lane.
East	Shrubs and Fences
South	Shrubs and Fences Tithe Barn Lane
West	Knowsley Lane

Table 3: Summary of site boundaries

Direction	Description of Surrounding Land Use
North	Agricultural Fields
East	Residential Housing
South	Residential Housing and Church
West	Agricultural Fields and Housing

Table 4: Summary of Surrounding Land Uses

Potentially Contaminative Land Uses

On site sources:

- Made Ground associated with various stages of development.

Off site sources:

- None observed.

Photographs taken during the walkover of the site and surrounds, can be reviewed within [Appendix D](#).

9.0 Framework for Assessment of Contamination

Environmental risks are assessed within the risk management framework established in Part IIA of the Environmental Protection Act (EPA) 1990 introduced by Section 57 of the Environment Act 1995 which provides a statutory definition of contaminated land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such that:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused;

or

(b) Pollution of controlled water is being, or is likely to be caused.

Risk from contamination is assessed by consideration of possible linkages between contaminant sources and potential receptors which could be harmed or polluted.

The key aspect of the framework is the development of a Conceptual Site Model (CSM) which illustrates the spatial interaction between the potential sources and receptors on site.

The information presented in this report was collated and evaluated to develop an initial CSM to assess ground contamination issues at the site.

For a risk of pollution or environmental harm to occur as a result of ground contamination, **all** of the following elements must be present:

- A source, i.e., a substance that is capable of causing pollution or harm;
- A receptor, i.e., something which could be adversely affected by the contaminant;
- A pathway, i.e., a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

Potential sources, pathways and receptors are identified in the sections below and the risks associated with possible pollutant linkages outlined.

10.0 Contaminant Sources

On-Site Sources

The following potential on site sources have been identified from the historical study and site walkover:

- Various structures of unknown usage;
- Made Ground (as a result of historic development);
- Tank of unknown contents, which we understand from our client is now longer present on site and was likely used for the purposes of heating the former school building.

The following contaminants are potentially associated with these sources:

- Metals - particularly lead and arsenic;
- TPH;
- PAH;
- Asbestos.

In practice, a broad contaminant screen would be required in any investigation to ensure that potential contaminants are not omitted. Whilst there is a wide range of contaminants potentially present, it needs to be recognised that the potentially contaminative activities carried out on the site were generally relatively small scale and therefore any impact is likely to be relatively small scale and localised.

The groundwater beneath the site is considered unlikely to be a secondary contaminant source.

Off-Site Sources

The following off site sources have been identified from the historical study and site walkover:

- None identified within immediate proximity to the study site.

11.0 Receptors

The proposed redevelopment is to comprise of a residential usage and therefore will introduce the following receptors to the site:

- Construction workers and future maintenance workers;

- Future site users and site visitors;
- Building materials used in the existing and new construction;
- Infrastructure, including water supply pipework.

In addition, controlled waters receptors (surface water and groundwater) also require consideration. There are no sensitive off-site receptors likely to be affected by contaminant migration.

12.0 Pathways

In order for contaminants to reach potential receptors, there has to be a viable pathway for the contaminant. Potential pathways that may affect the migration of contaminants are listed below:

- Direct contact - between sources and receptors, by ingestion, inhalation or skin contact;
- Inhalation of fibres in airborne dust;
- Permeation of water supply pipes by hydrocarbons.

13.0 Preliminary Conceptual Site Model

Contaminant Source	Pathways	Receptor	Potential Severity	Probability of Risk	Level of Risk	Justification
On Site: Various structures of unknown usage, tank and Made Ground as a result of historic development possibly containing elevated metals, TPH and PAH.	Ingestion, dermal contact, inhalation of dusts/vapours	Future end users and site visitors	Medium	Low Likelihood	Moderate/Low	A moderate/low level of risk is assessed and it is likely that any made ground is of limited thickness across much of the site.
		Construction Workers	Medium	Likely	Moderate	Construction workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk from contact with soils and shallow/perched groundwater.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Mild	Low Likelihood	Moderate	A moderate risk is considered given the presence of a Secondary A Aquifer is identified in the superficial drift deposits which overlies a Principal Aquifer in the bedrock. There is no groundwater or surface water abstractions within 2000m, in respect of potable water abstraction points the nearest is located 1192m with a surface water feature located 8m northeast.
	Permeation of water pipes	Construction materials, future end users and site visitors	Medium	Low Likelihood	Moderate/Low	Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary “barrier pipe” materials (eg polyethylene-aluminium-polyethylene) may be required by the water supply company for new connections if investigation identifies hydrocarbons at shallow depth.
	Uptake	Plant and Wildlife	Mild	Low Likelihood	Low/Moderate	Is considered as a result of historic/current use of the site and immediate surrounding environs combined with the fact that areas of soft landscaping are to be incorporated within the proposed redevelopment.
On Site: Asbestos at/near ground surface and other made ground soils.	Inhalation of fibres in airborne dust	Future end users and site visitors	High	Low Likelihood	Moderate	Likelihood is considered to be low on the site itself, any Asbestos present on site is likely to be cement bound roofing material. Appropriate mitigation measures such as removal of asbestos containing materials, in accordance with current Control of Asbestos Regulations, should be implemented.
		Construction Workers	High	Low Likelihood	Moderate	Likelihood is considered to be low on the site itself, any Asbestos present on site is likely to be cement bound roofing material. Safe working practices should be implemented and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk from asbestos in soils.

On Site: Ground Gases (CH ₄ , CO ₂) from made ground.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	High	Low Likelihood	Low	No landfilling of waste is recorded within the boundary of the Site, however potential made ground may have deleterious components. Current guidance indicates that made ground is generally classified as being low risk in terms of potential for gas generation. The made ground is likely to be of limited thickness on the site.
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Table 5: *Preliminary Conceptual Site Model*

The risk posed to future end users & site visitors, construction workers, controlled waters and plant & wildlife has been estimated as **MODERATE**. The risks posed to the proposed development (from ground gases) is estimated as being **LOW**.

14.0 Proposed Site Investigation

Based on the information obtained for formation of this report, we would recommend that an intrusive contaminated land investigation is undertaken to determine the actual pollution linkages and to quantify the risk to the receptors as outlined with the Preliminary Conceptual Site Model.

The intrusive investigation may reveal on-site sources of contamination that were not established by the Phase I Desk Study and Site Walkover and thus require modification of the conceptual site model.

14.1 Testing Regime

The testing regime has been devised in accordance with BS10175:2015 Guidelines for the Code of Practice for Contaminated Land and CLR Report No. 4 Sampling Strategies. The objective at this stage of the report is to attempt to delineate the extent of any possible contamination that may exist at the site by using intrusive soil sampling and testing techniques.

14.2 Sampling Strategy

A service search should be completed prior to any subsequent investigation to determine the service locations by lifting up any manhole/drain covers, therefore locations may be subject to change depending upon these results.

The SI should incorporate the hand excavation of six (6no.) trial pits, to enable adequate analysis of the underlying soil conditions. These exploratory holes will be completed to a maximum depth of 1.0 metres below ground level (mbgl), positions logged and samples removed in accordance with current protocol, with any visual/olfactory observations noted.

Soil samples will be taken through the soil profile at depths of 0.15mbgl, 0.30mbgl, 0.50mbgl, 0.7mbgl and 1.0mbgl, with the deepest sample to be obtained from the natural strata. The proposed sampling strategy is relative to the intended risk assessment.

The intended depths of investigative positions reflect the particular receptor of concern which is driven by the exposure of scenario of concern, namely human health. Surface samples in top 0.15mbgl for direct ingestion and inhalation, with samples obtained at 0.30mbgl to 0.50mbgl for vegetable uptake. The samples to be obtained at greater depths are to ensure any potential contamination has not impacted natural soils at depth.

The trial pits should be located as to target the most prevalent sources of potential contamination, such as the location of the former tank on site, and areas of proposed soft landscaping as these present the greatest potential risks to the various receptors previously identified.

14.3 Monitoring Regime

Based on the information contained within this report we do not anticipate the need for completing any gas and/or groundwater monitoring for this site. The historical, current and proposed use of the site along with the hydrological setting indicates that there is no significant risk. It is appreciated that there may be a potential risk from volatilisation of hydrocarbons from the contents of the former tank, however, the proposed trial pits would

be a pragmatic approach in determining whether further exploratory works would be required.

14.4 Laboratory Analysis

An appropriate and consistent analytical suite of contaminants should be applied to any soil samples retrieved from the site.

Based on the findings contained within this report, we would recommend that a comprehensive range of testing should be undertaken to comprise of heavy metals, speciated Total Petroleum Hydrocarbons (TPH CWG Aromatic/aliphatic split) and speciated Polycyclic Aromatic Hydrocarbons (PAH) including the more carcinogenic benzo(a)pyrene (BaP) and naphthalene, soil organic matter (SOM) content, pH and sulphates.

In addition, selected samples retrieved from the Made Ground, if encountered, will also be submitted for a screen to determine the presence, or otherwise, of asbestos.

It should be noted that not all samples retrieved from the proposed investigative works will be laboratory analysed and a UKAS and MCERTS accredited laboratory testing organisation should carry out all analysis.

14.5 Guidance

The results from the proposed SI shall be compared against standards, such as, against revised LQM/CIEH S4UL criteria¹ where available. These GAC have been designed for use under planning, using Health Criteria Values based on minimal risk, and updated exposure parameters. The S4UL are intended to replace the previous LQM/CIEH GAC. Or alternatively criteria such as, Soil Guideline Values (SGVs) and LQM 'CIEH' Generic Assessment Criteria for the land use classification appropriate to the end use, namely; 'residential with homegrown produce'.

15.0 Recommendations

15.1 Consultees

We would recommend that this report be forwarded to the relevant Local Authority Environmental Health and Planning Department prior to the proposed site investigation works commencing to seek their comments and subsequent approval.

15.2 Groundworks Watching Brief

During construction works visual and olfactory appraisal of the underlying soils should be made. If during construction works any material is noted to show visual and/or olfactory signs of contamination an environmental consultant should be contacted to supervise/guide further works. This material should be stockpiled separately and tested prior to its appropriate removal off site or re-use as necessary.

¹ Nathanail et al. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, 2015. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3495

If any landscaping materials are to be imported on site they should be tested to check that they are suitable for the intended use. Clean, uncontaminated rock, subsoil brick rubble, crushed concrete, ceramics and topsoil only should be permitted as infill material.

15.3 Soakaways

Soakaways are for the disposal of clean uncontaminated surface water only and must not be constructed in contaminated land, or land suspected of having contamination present.

15.4 Flood Risk Assessment

This report does not replace a full hydrogeological survey and specialist studies may need to be undertaken to ascertain the risks posed from flooding.

15.5 Services

If new services are to be installed as part of redevelopment works, we would recommend the local water board be contacted to determine their specification for the type of pipework which should be used on this site.

All services and in particular potable water supply pipework should comprise of material that is resistant to attack and degradation to chemical attack.

Further information can be found within the published guidance for the '*Selection of Water Supply Pipes to be used in Brownfield Sites*', issued in January 2011 by the UK Water Industry Research (UKWIR), this supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note - '*Laying Pipes in Contaminated Land*' which has been withdrawn.

16.0 Limitations and Uncertainties

This report has been prepared by YE with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources, together with a site walkover inspection of the site.

The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned.

Information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, YE reserves the right to review such information and, if warranted, to alter the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site. This report is an environmental stage 1 report and does not consider the geotechnical implications for the site, its redevelopment and proposed future use. Further advice should be sought on geotechnical investigation requirements for the proposed development.

The ‘vicinity’ of the site for the purposes of the report, is defined as locations situated within an approximate 250m radius of the site, although certain source of contamination and/or sensitive targets further than 250m of site have also been included.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and as such are not guarantee that the sites are free of hazardous, or potentially hazardous materials, or conditions.

This report has been prepared solely for the use of the named client, and may not be relied upon by other parties without written consent from YE. YE disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.