



**Castledine
Environmental**

LAND CONTAMINATION SURVEYS

Phase 2 Land Contamination Risk Assessment

for

**The Erection of a Four-Storey
Building to Provide 10 No. Self-
Contained Apartments Together
with Car-Parking, Associated
Landscaping and Boundary
Treatments**

on the site of

**No.2 Wilbraham Road,
Manchester M14 6GF**

Date: November 2023

Status:

Final Report

Reference:

3637D P2 OG Estates - Manchester

Date:

13/11/2023

Executive Summary

Environmental sampling has identified exceedance of both lead and further, significant exceedances of PAH's within shallow made ground deposits on site, which were ubiquitous across the site.

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a **MODERATE** level of risk with respect to the proposed development.

It is recommended that remediation in-line with section 16.0 is planned and carried out on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be written.

A watching brief inline with Appendix F should be had during the course of any permitted demolition, site clearance, or construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material) development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

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1.0 QUALITY ASSURANCE

Castledine Environmental can confirm that all reasonable efforts have been made to ensure that the information outlined within this report is accurate.

Castledine Environmental would further confirm that due care, attention and technical skill were used in the creation of this report.

For and on behalf of Castledine Environmental.

Kevin Castledine

(Director)

2.0 LIMITATIONS

The conclusions and recommendations made in this report are limited to those based on the findings of the investigation. Where comments are made based on information obtained from third parties, Castledine Environmental assumes that all third-party information is true and correct. No independent action has been undertaken to validate the findings of third parties. The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at the time.

This survey has not included asbestos within existing structures, invasive plant species, geotechnical considerations or any elements unconnected with potential ground contamination at the site. If required, such surveys should be undertaken by suitably accredited organisations.

There may be other conditions prevailing at the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

3.0 INTRODUCTION

Castledine Environmental have been appointed by Mr. K. Din to undertake a Phase 2 investigation of a site at No.2 Wilbraham Road, Manchester M14 6GF.

A Phase 1 report was carried out by Castledine Environmental:

- Phase 1 Land Contamination Risk Assessment for site at No.2 Wilbraham Road, Manchester – Produced by Castledine Environmental in October of 2023 and referenced: 3618D

The report is attached as Appendix A

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Mr. K. Din and appointees for the purpose of ensuring compliance with:

- Paragraph(s) 174, 179, 183 & 184 of the National Planning Policy Framework 2021
- part C1 of the building regulations.
- Condition No.18 of the Manchester City Council planning approval reference 126743/FO/2020

This report should be read in conjunction with the reports listed in section 3.0

This report may not be used or relied upon by any unauthorised third party, or for any other proposed use than that specified above, without the explicit written agreement of Castledine Environmental.

The report consists of a risk assessment in accordance with BS10175:2011+A2:2017, LCRM “Land Contamination Risk Management” (replacing CLR11 “Model Procedures for the Management of Land Contamination”) and BS:5930:2015+A1:2020.

The objectives of the report are:-

- To assess historical activities at the site with respect to their potential impact on the site environment.
- To characterise the environmental setting of the site, identify migration pathways and vulnerable receptors for contamination originating at the site, focusing on potential soil and groundwater liabilities.
- To assess historical and current surrounding land use in relation to known or potential off site contamination issues that may impact on the subject site and
- To develop a preliminary conceptual site model (CSM).

5.0 SITE DESCRIPTION

The site is located in Fallowfield, Manchester at National Grid Reference: 385467,394046 and is approximately 0.12ha in area.

The site is square in shape and is orientated north to south, east to west. The site is located in a predominantly urban area, being directly bounded by a car-park to the north, being associated with a church directly east, Wilbraham Road to the south and a residential apartment block to the west. The surrounding areas beyond this are predominantly residential, with parkland to the north west of site, beyond housing and a university campus to the north east.

The site interior comprises a vacant plot of land, occupied by gravelled made ground deposits, fly-tipped debris and overgrown northern, western and southern site boundaries.

Access to site was provided through herras fencing located on the eastern boundary of site, leading west and onto site. The ground conditions across the site can be broadly described as a gravelled made ground medium, formed by rolled stone, tarmac gravels and rubbles with some areas of intact concrete noted. Standing water and overgrown vegetation were noted across the site, with areas in the west of site noted to be occupied by a green, slimy matter underfoot – this may potentially be Nostoc, a form of cyanobacteria which forms in areas high in phosphorus, is it not poisonous

nor harmful to plants, animals or humans, save for trip and slip hazards underfoot. The intact concrete on site along with 2 No. standing stanchions in the east of site were marked as evidence of a former building located on site, having been removed. The scattered fly-tipped debris on site comprised carpets, linoleum, pottery and plastics in the north east of site, furniture including reclining sofas in the west of site, and scattered debris and refuse such as take-away containers, generic wastes and plastics across the remainder of site.

Potential sources of contamination noted on the walkover include the gravelled made ground medium on site, evidence of a demolished building formerly located on site and scattered refuse and fly-tipping across the site. Topographically, the site and surrounding areas are level.

Photos of the site are present in **Error! Reference source not found.** of the previous report for the site.

6.0 CHEMICAL ASSESSMENT CRITERIA

On establishing the presence of pollutant linkages, it is then necessary to assess whether or not any of the linkages are significant, whereby significant harm is being caused or there is significant possibility of significant harm being caused to human health or the environment. In the absence of any evidence of 'significant harm', the risks will be assessed on the basis of a 'significant possibility of significant harm' being caused. In order to initially assess the risks, appropriate Tier 1 assessment criteria are derived which represent benchmark contamination concentrations with respect to relevant receptors. Concentrations recorded in excess of these levels **may** represent a significant risk to a specific receptor when considered as part of a pollutant linkage.

6.1 HUMAN HEALTH

The Environment Agency, through its Contaminated Land Exposure Assessment (CLEA) framework, published toxicological reports (TOX) and soil guideline values (SGVs).

SGVs are science-based generic assessment criteria that indicate human health risks from long-term exposure to soil contaminants. They are set at levels where there are 'no appreciable' or 'minimal' risks to human health. For each substance, different SGVs are applicable according to land use, for example, whether residential, allotment or commercial. They have been widely seen as over precautionary and offering councils a very weak indication of whether sites represent a "significant possibility of significant harm" (SPOSH) requiring determination under the contaminated land regime.

Following publication of the revised Part IIa Statutory Guidance DEFRA has commissioned the creation of Category 4 Screening levels (C4SL's) They are set at levels where there is a "Low" risk to Human Health (i.e. higher than that of SGV's but still sufficiently low to defiantly not be "Contaminated Land" as defined by section 78A of the Environmental Protection Act 1990 as amended). The C4SL's are calculated using the CLEA model using less conservative exposure and toxicological assumptions than the SGV's. C4SL's have also been calculated for Open Space land use.

LQM in association with the CIEH have produced S4UL's are reproduced with permission; Publication Number S4UL3693

The pathways considered for the standard land uses include:

- Ingestion of soils;
- Ingestion of household dust;
- Ingestion of contaminated vegetables (residential with plant uptake only);
- Ingestion of soil attached to vegetables (residential with plant uptake only);
- Dermal contact with soils;
- Dermal contact with household dust;
- Inhalation of fugitive dusts from soils;
- Inhalation of fugitive household dust;
- Inhalation of vapours in outdoor air; and
- Inhalation of vapours in buildings.

These exposure routes have been evaluated independently of one another to identify the most sensitive exposure route. The SSV adopted for a given land use scenario is the most stringent screening value of all those relevant to the site.

The current proposals are to redevelop the site for a residential use with gardens. It is considered appropriate to compare the chemical testing results to those SGVs/SSVs with the appropriate 'residential with plant uptake' settings. Selected Tier 1 Human Health Assessment Criteria Values are detailed in the following table.

7.0 PREVIOUS INVESTIGATIONS

7.1.1 SUMMARY OF PREVIOUS REPORTING

The previous report for the site found that, historically, the site remained unoccupied field from at least circa.1848/49 through until circa.1893, when a rectory was erected on site. The site then sees little change on historical mapping until circa.1980/83, when the structure on site is demolished. Following this, the site remained unoccupied and overgrown until at least circa.2000, when the site is shown as such via satellite imagery. Between the dates of circa.2013-2021 the site was variously in use as a construction compound for the storage of construction materials, wastes and debris and vehicle storage.

7.1.2 SUMMARY POTENTIAL SOIL CONTAMINATION

The historical usage of the site (erection and demolition of a structure and outbuilding on site, made ground deposits, construction compound usage and vehicle storages) and the development of the immediate surrounding areas (various erections and demolitions, usage of a car-park directly adjacent to site) are considered to have the potential to have impacted site with various contaminants.

7.1.3 SUMMARY OF POTENTIAL GROUND GAS HAZARDS

No significant potential sources of ground gas generation have been identified on or in proximity to site. A number of infilled ponds have been

identified on historical mapping within the local area, however these features are all removed by circa.1905 and as such, are likely well outside their gas generational window. Additionally, a series of former railway cuttings located to the south of site (also being recorded as artificial 'void') have been identified, however this has also been discounted as a potential source of ground gas, as the feature has never been infilled and remains as a public footpath / cycleway.

7.1.4 SUMMARY OF POTENTIAL VAPOUR HAZARDS

The usage of the site as a construction compound (with noted storage of vehicles and likely construction associated materials and fuels) and the adjacent car-parking usage (since at least circa.1966) are considered potential sources of hazardous vapour generation, should significant spillages have occurred.

8.0 SITE WORKS AND FINDINGS

8.1 FIELDWORK 30TH OF OCTOBER 2023

Castledine Environmental attended site on the 30th of October 2023 with the intention of forming trial pit locations across the site. The purpose of the trial pit formation was to facilitate the assessment of ground conditions on site (i.e. made ground, natural or reworked natural deposits, their nature, extent and depth), the taking of environmental samples for laboratory analysis.

8.1.1 TP HP OR WS LOCATIONS

A total of 4 No. trial pit locations were formed, to depths of 0.90m (TP01) and 0.80m (TP02, TP03 and TP04). The purposes of the locations were to assess the ground conditions on site, following repeated construction yard usages and being particularly targeted at areas of proposed soft-landscaping.

The locations of all exploratory holes formed during the investigation were laid out by Castledine Environmental and a location plan of the exploratory hole locations can be found as Appendix B.

8.2 GROUND CONDITIONS ENCOUNTERED

The ground conditions on site can be broadly summarised as made ground overlying natural deposits.

All soil descriptions, logging and sampling were carried out in accordance with BS:5930:2015+A1:2020.

8.2.1 MADE GROUND

Made ground was encountered at all 4 No. locations and comprised various strata and compositions across the site. At surface level at all locations, a dark brown, sandy, gravelly Clay Made Ground was noted to depths of 0.40m, 0.15m, 0.05m and 0.10m. The gravel inclusions comprised angular to subrounded, fine to coarse fragments of brick, concrete, glass, plastic, metal, wood and rootlets at all locations, with additional tarmac (including cobble sized fragments) at TP01, metal canisters at TP02, ceramic at TP03 and hardcore at TP04. This thin soil horizon is considered to be the broken-down remains of organic material including mosses, leaf litter and grasses within which anthropogenic inclusions have been fly-tipped atop. At TP02, TP03 and TP04, beneath the surface level made ground deposits, a grey, Gravel Made Ground comprised of hardcore was noted to depths of 0.30m (TP02 and TP03) and 0.25m, respectively. This stratum is considered to be a subbase to the previous hardstanding on site. Beneath this, at TP02 and TP04, a black, gravelly Sand Made Ground comprised of fragments of brick, glass, slag, clinker and ceramic were noted, held within an ashy matrix. This stratum is considered to be residual site soils from the construction and usage of the rectory, following circa.1893 (ash usage at this time prevalent) and extended to depths of 0.50m, being atop natural deposits.

8.2.2 NATURAL DEPOSITS

Natural deposits were encountered at all 4 No. locations and comprised a brown, sandy Clay at TP01 from 0.40m to a confirmed depth of 0.90m and at TP02 between 0.50m and 0.80m depth. At TP03 and TP04, the natural clay was seen to be gravellier, with additional fragments of coarse-grained, subangular to subrounded sandstone noted within the clays. There is a

slight topographical difference from the north of site to the south, adjacent to the roadside and this may account for the difference in clays. The clays encountered in the north of site may be associated with superficial glacial till deposits mapped in the area, with the additional gravels in the south of site within the clays potentially being regarded as weathered bedrock of the Chester Formation (coarse-grained sandstone).

8.2.3 GROUNDWATER

Groundwater was not encountered during the site investigation.

8.3 SAMPLE RESULTS

Sample results have been compared with generic screening criteria (GAC).
Sample results are attached as Appendix E.

Metals and Semi Metals - Residential with Plant Uptake (1% SOM):

Determinant	Units	Accreditation	S4UL	Highest Value	Location of Highest value	Exceedance? Y/N
Arsenic	(mg/kg)	MCERTS	37	29.0	TP02 0.45m	N
Cadmium	(mg/kg)	MCERTS	11	<2	All	N
Chromium (total)	(mg/kg)	UKAS	910	145.4	TP01 0.10m	N
Copper	(mg/kg)	MCERTS	2400	90.3	TP01 0.10m	N
Lead	(mg/kg)	MCERTS	200	237.8, 403.0	TP01 0.10m, TP02 0.10m	Y
Mercury	(mg/kg)	UKAS	1.2	<2	All	N
Nickel	(mg/kg)	MCERTS	180	69.1	TP01 0.10m	N
Zinc	(mg/kg)	MCERTS	3700	271.3	TP01 0.10m	N
Selenium	(mg./kg)	MCERTS	250	<3	All	N
Total Phenols	(mg/kg)	MCERTS	280	1.8	TP01 0.10m	N
Chromium (Hexavalent)	(mg/kg)	U	6	<0.04	All	N
pH	pH units	MCERTS	-	7.7 – 8.4	TP01 0.60m – TP04 0.05m	-
Asbestos	-	-	-	NAD	All Tested	N

Non-Metals - Residential with Plant Uptake (1% SOM):

Determinant	Units	Accreditation	S4UL	Highest Value	Location of Highest value	Exceedance? Y/N
Acenaphthene	(mg/kg)	UKAS	210	0.30	TP04 0.05m	N
Acenaphthylene	(mg/kg)	UKAS	170	0.24	TP04 0.05m	N
Anthracene	(mg/kg)	MCERTS	2400	3.04	TP04 0.05m	N
Benzo(a)anthracene	(mg/kg)	MCERTS	7.2	19.38	TP04 0.05m	Y
Benzo(a)pyrene	(mg/kg)	MCERTS	2.2	27.84, 4.60	TP04 0.05m & 0.30m	Y
Benzo(b)fluoranthene	(mg/kg)	MCERTS	2.6	22.92, 3.85	TP04 0.05m & 0.30m	Y
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	320	23.75	TP04 0.05m	N
Benzo (k) fluoranthene	(mg/kg)	MCERTS	77	9.87	TP04 0.05m	N
Chrysene	(mg/kg)	MCERTS	15	19.27	TP04 0.05m	Y
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	0.24	4.36, 0.88	TP04 0.05m & 0.30m	Y
Fluoranthene	(mg/kg)	MCERTS	280	37.48	TP04 0.05m	N
Fluorene	(mg/kg)	MCERTS	170	0.19	TP01 0.60m	N
Indeno (1, 2, 3-cd) pyrene	(mg/kg)	MCERTS	27	28.06	TP04 0.05m	Y
Naphthalene	(mg/kg)	MCERTS	2.3	0.51	TP04 0.05m	N
Phenanthrene	(mg/kg)	MCERTS	95	2.31	TP04 0.05m	N
Pyrene	(mg/kg)	MCERTS	620	36.79	TP04 0.05m	N
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	NC	236	TP04 0.05m	-

Petroleum Hydrocarbons Ali-Aro Split with Residential Plant Uptake (1% SOM):

Determinant	S4UL (mg/kg)	Highest Value (mg/kg)	Location of Highest value	Exceedance? Y/N
Aliphatic				
EC 5-6	42	<0.01	All	N
EC >6-8	100	<0.01	All	N
EC >8-10	27	<0.01	All	N
EC >10-12	130	31	TP04 0.05m	N
EC >12-16	1100	48	TP04 0.05m	N
EC >16-35	65000	2648	TP04 0.05m	N
EC >35-44	65000	797	TP04 0.05m	N
Aromatic				
EC 5-7 (Benzene)	70	<0.1	All	N
EC >7-8 (Toluene)	130	<0.1	All	N
EC >8-10	34	<0.1	All	N
EC >10-12	74	4	TP04 0.05m	N
EC >12-16	140	7	TP04 0.05m	N
EC >16-35	260	67	TP04 0.05m	N
EC >35-44	1100	37	TP04 0.05m	N

8.4 ANALYSIS OF RESULTS

Laboratory analysis has identified exceedances of:

- Lead GAC of 200mg/kg by readings of 237.8mg/kg and 403mg/kg at the locations of TP01 at 01.10m depth and TP02 at 0.20m depth, respectively; and significant exceedances of PAH's:
- Benzo(a)anthracene GAC of 7.2mg/kg by a reading of 19.38mg/kg at the location of TP04 at 0.05m depth;
- Benzo(a)pyrene GAC of 2.2mg/kg by readings of 27.84mg/kg and 4.60mg/kg at TP04 at both 0.05m and 0.30m depth, respectively;
- Benzo(b)fluoranthene GAC of 2.6mg/kg by readings of 22.92mg/kg and 3.95mg/kg at TP04 at both 0.05m and 0.30m depth, respectively;
- Chrysene GAC of 15mg/kg by a reading of 19.27mg/kg at TP04 at 0.05m depth;
- Dibenzo(a,h)anthracene GAC of 0.24mg/kg by readings of 4.36mg/kg and 0.88mg/kg at TP04 at both 0.05m and 0.30m depth, respectively;
- Indeno(1,2,3-cd)pyrene GAC of 27mg/kg by a reading of 28.06mg/kg at the location of TP04 at 0.05m depth.

No further exceedances of metals, metalloids, PAH's nor TPH CWG have been identified nor has elevated phenol nor the presence of asbestos been detected. TPH CWG sampling has identified the presence of hydrocarbons, however these are below relevant thresholds.

TABLE 1 SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Conseq.	Risk	Possible Mitigation
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Direct Ingestion & Direct Contact	Site Workers (<i>during site works, excavations, eating and drinking</i>)	Lw	Md	M/L	Contamination identified on site sufficiently mitigated by considered usage of PPE and hygiene practises alongside adherence to relevant HSE guidance during site works. A Watching Brief (inline with Appendix F) should be carried out during site clearance, remediation and development.
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Inhalation of Dust, Dry Arisings	Site Workers (<i>during site works, excavations, eating and drinking</i>)	Lw	Md	M/L	
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Crop Uptake & Direct Ingestion, Direct Contact	End Users (<i>residents / tenants, children, visitors, service personnel</i>)	Li	Md	M	
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Inhalation of Dust, Dry Arisings	End Users (<i>residents / tenants, children, visitors, service personnel</i>)	Li	Md	M	Site investigation environmental sampling has identified 2 No. exceedances of lead at TP01 and TP02 within surface-level deposits; and further, significant exceedances of PAH's at TP04 at 0.05m and 0.30m depth. Similar deposits as at TP04 were noted elsewhere on site, as such, it is recommended that all areas of proposed soft-landscaping be remediated by way of civil engineering methods. This should involve the excavation of soft-landscaping areas sufficiently to allow a <i>minimum</i> of 600mm of <i>pre-certified, clean materials</i> to be imported in place. Areas of hard-surfacing should be laid atop a <i>minimum</i> of 200mm of crushed stone, MOT Type 1 or a similar, inert material. Provision should also be made for site worker safety, as above and the local water company should be contacted regarding new potable piping barrier specification, due to the identified PAH exceedances and presence of hydrocarbons on site. Upon agreement with your Local Authority, a Phase 3 Remediation Strategy and Verification Plan will be required.
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Crop Uptake & Direct Ingestion, Direct Contact	Flora and Fauna (<i>on and offsite</i>)	Li	Md	M	
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Vertical and lateral migration (<i>Superficial potentially low in permeability, bedrock predominantly high to moderate</i>)	Controlled Waters (<i>Secondary A Superficial Aquifer, Principal Bedrock Aquifer, nearby watercourse</i>)	Lw	Md	M/L	
Contaminated Soils (<i>lead and PAH exceedances between surface-level and 0.30m depth, presence of hydrocarbons – relevant below thresholds</i>)	Direct contact (<i>pipe degradation and leaching</i>)	Services (<i>impacted new potable supply piping</i>)	Li	Md	M	
Ground Gases (Methane and CO ₂) (<i>Previous reporting identified no significant potential sources of ground gas generation</i>)	Vertical and lateral migration (<i>Superficial potentially low in permeability, bedrock predominantly high to moderate</i>)	Site Workers & Excavations, End Users & Building Envelope (<i>ingress and build-up</i>)	UI	Md	L	
Volatile and Semi-volatile Organic Compounds (<i>presence of hydrocarbons identified however no exceedances noted, potential for further hydrocarbon contamination on site in areas not sampled</i>)	Vertical and lateral migration (<i>Superficial potentially low in permeability, bedrock predominantly high to moderate</i>)	Site Workers & Excavations, End Users & Building Envelope (<i>ingress and build-up</i>)	Lw	Md	M/L	Environmental sampling has identified the presence of hydrocarbons, however the readings are below relevant thresholds – as such, it is considered prudent to install VOC protection measure's inline with BS8485:2015:A1+2019
Radon	Vertical and lateral migration	End Users & Building Envelope	UI	Md	L	Site is not located in a Radon Affected Area.

KEY: Probability of pollutant linkage Hi = Highly likely, Li = Likely, Lw = Low Likelihood, UI = Unlikely
Consequence Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor,
Overall Risk VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low

Based on the preliminary CSM for the site, an environmental risk assessment has been undertaken. A simple matrix can provide a consistent basis for decision making. It should be used with caution, recognising the over-simplification that it will normally represent. The probability and consequences are defined according to parameters relevant to the situation; the boundaries of risk acceptability (and tolerability, where relevant) indicated on the matrix provided in Table 2, can be tailored to the factors influencing the significance of the risk. Individual situations are mapped onto the matrix to provide a ready and consistent indication of their acceptability or tolerability.

TABLE 2 RISK CLASSIFICATION MATRIX

		Consequence			
		Severe (Sv)	Medium (Md)	Mild (Mi)	Minor (Mr)
Probability	High (Hi)	Very high risk	High risk	Moderate Risk	Moderate/ Low Risk
	Likely (Li)	High risk	Moderate Risk	Moderate/ Low Risk	Low Risk
	Low Likelihood (Lw)	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely (UI)	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

Source: CIRIA Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, 2001

These attributes are evaluated qualitatively against individual hazard assessments to determine the likelihood of a given hazard occurring. The risk evaluations for each plausible pollutant linkage are given in the last three columns of Table 1.

TABLE 3 CLASSIFICATION OF RISK

Very high risk (Vh)	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk (Hi)	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer term.
Moderate risk (Md)	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low risk (Lw)	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk (VI)	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Source: CIRIA Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, 2001

9.0 REVISED ENVIRONMENTAL RISK ASSESSMENT

Environmental sampling has identified exceedance of both lead and further, significant exceedances of PAH's within shallow made ground deposits on site, which were ubiquitous across the site.

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a **MODERATE** level of risk with respect to the proposed development.

It is recommended that remediation in-line with section 16.0 is planned and carried out on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be written.

A watching brief inline with Appendix F should be had during the course of any permitted demolition, site clearance, or construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material) development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

10.0 SUMMARY OF RISKS**11.0 HUMAN HEALTH****11.1.1 RESIDENTS / END-USERS**

The risks to end-users of the site are considered to be moderate when assessed against the sensitive, residential end-usage of the site and the identified exceedances of both lead and significant exceedances of PAH's within shallow made ground deposits on site. No suitable material has been identified on site during the site works nor from the following laboratory analysis that is considered suitable for areas of proposed soft-landscaping (exceedances of lead, significant exceedances of PAH's, material is largely ubiquitous across site and sharps such as glass and broken ceramics were noted in the deposits). As such, should onsite soils be used to form soft-landscaping areas, there exists credible pathways for contamination to impact end-users of site (inhalation of dusts, direct contact with soils, direct and indirect ingestion, cuts from sharps). Furthermore, whilst no exceedances of hydrocarbons have been identified on site, the presence of hydrocarbons has been identified and – due to the sites history, the ground conditions encountered and the residential end-usage – it is recommended that a VOC-resistant membrane is installed within the proposed development, as a matter of prudence and inline with BS8485:2015:A1_2019. Additionally, the likely potential for hydrocarbon / PAH impact to new potable supply piping is considered a hazard to end-users of the stie via impacted potable supplies.

11.1.2 SITE WORKERS

Contamination identified on site can be sufficiently mitigated by the considered usage of PPE and good hygienic practises during the site works alongside adherence to relevant HSE guidance during development. A Watching Brief (inline with Appendix F) should be carried out during site clearance, remediation and development.

12.0 CONTROLLED WATERS

The risks to controlled waters are considered to be low to moderate, due to the largely impermeable superficial geology in the area inhibiting significant offsite or vertical migration (ground conditions seen to be largely clayey and pooled-water noted to be contained at surface); however, there exists a potential risk to the onsite superficial Secondary A Aquifer from onsite made ground deposits – identified to be contaminated with lead and PAH's – with these deposits potentially being in direct contact with the underlying superficial deposits. As such, it is recommended that all made ground deposits are excavated from site and removed to a suitably accredited waste facility.

13.0 STRUCTURES**13.1.1 GROUND GASES**

Previous reporting identified no significant or potential sources of ground gas generation on or in proximity to site. A number of infilled ponds were identified on historical mapping within the local area, however these features were all removed by circa.1905 and as such, are likely well outside their gas generational window. Additionally, a series of former railway cuttings located to the south of site (also being recorded as artificial 'void') have been identified, however this has also been discounted as a potential source of ground gas, as the feature has never been infilled and remains as a public footpath / cycleway.

13.1.2 HAZARDOUS VAPOURS

Whilst environmental sampling has identified no exceedances of hydrocarbons / TPH CWG, the presence of hydrocarbons has been confirmed on site (elevated readings at TP03 and slightly elevated at remaining locations tested). As such, due to the history of the site, the nature of environmental sampling carried out on site and the sensitive, proposed residential end-usage of the site, it is considered prudent to install a VOC-resistant membrane and protection measure's within the proposed development, inline with BS8485:20014+A1:2019.

13.1.3 POTABLE SUPPLY PIPING

Due to the identified PAH exceedances (made ground deposits within which slag, clinker, tarmac etc were noted within an ashy matrix) and the limited presence of hydrocarbon contamination (whilst no exceedances noted, the presence of hydrocarbons has been proven) on site, there exists the potential for new potable piping to be impacted by residual site soils. PAH and Hydrocarbon degradation and leaching can impact potable supply piping and thus impact potable supplies themselves, offering a potential risk to end-users via impacted water supplies. As such, it is recommended that the local water supplier be contacted regarding barrier piping specification. It is likely that the laboratory testing results appended to this report will require forwarding to the water supplier, for assessment.

14.0 RECOMMENDATIONS

Due to the identified exceedances of lead and PAH's within shallow made ground deposits on site, the extent of said deposits across site and the proposed, sensitive residential end-usage of the site, it is recommended that remediation by way of civil engineering methods is planned and carried out on site.

This should involve the excavation of areas of proposed soft-landscaping areas sufficiently to allow a *minimum of 600mm of pre-certified, clean materials* to be imported in place. Areas of hard-surfacing should be laid atop a *minimum of 200mm of crushed stone, MOT Type 1 or a similar, inert material*. Provision should also be made for site worker safety, inline with the CSM in Table No.1 Additionally, the local water supplier should be contacted regarding new potable piping barrier specification, due to the identified PAH exceedances and presence of hydrocarbons on site (likely, the test results found in Appendix E should be provided to the company). Upon agreement with your Local Authority, a Phase 3 Remediation Strategy and Verification Plan will be required.

A watching brief (as outlined in Appendix F) should be carried out by the site supervisor during the course of demolition, site clearance and construction works for any obvious contamination (e.g. oil spillage in

ground, buried waste, possible asbestos containing material). Should previously unreported or undiscovered contamination be identified, then development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

15.0 REMEDIATION STRATEGY AND VERIFICATION PLAN

When this report has been agreed with your Local Planning Authority, a Phase 3 Remediation Strategy and Verification Plan would need to be produced.

16.0 REFERENCES**16.1 LEGISLATION AND REGULATIONS****16.1.1 ACTS**

- [1]. Environmental Protection Act 1990, Part IIA: inserted by Environment Act 1995, Section 57. See Environment Act 1995 for text of Part IIA.

16.1.2 PLANNING REGULATIONS

- [2]. The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 SI1999/No.293
- [3]. The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2000 SI2000/No.2867

16.1.3 CONTAMINATED LAND REGULATIONS

- [4]. The Contaminated Land (England) Regulations 2000. SI2000/No.227
- [5]. The Contaminated Land (England) (Amendment) Regulations 2001 SI2001/No.663
- [6]. The Contaminated Land (England) Regulations 2006 SI2006/No.1380

16.2 STATUTORY GUIDANCE

- [7]. Department of Environment, Food and Rural Affairs. 2012. *Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*. Department of Environment, Food and Rural Affairs
- [8]. Communities and local Government, 2012: National Planning Policy Framework.

16.3 BRITISH STANDARDS

- [9]. BS 5930:2015 Code of practice for site investigations

[10]. BS 10175:2011+A2:2017 Investigation of potentially contaminated sites - Code of practice

[11]. BS 8485:2015+A1:2019 BS 8485 - 2015 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

[12]. BS 8576:2013 Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)

16.4 NON STATUTORY TECHNICAL GUIDANCE

16.4.1 ENVIRONMENT AGENCY

[13]. Cassella Stranger, 2002. Model Procedures for the Management of Contaminated Land, Contaminated Land Report (CLR) 11, Department for Environment, Food, and Rural Affairs.

16.4.2 CIRIA PUBLICATIONS

[14]. Wilson, S., Oliver, S., Mallett, H., Hutchings, H., and Card, G.. 2007, *C 665 Assessing risks posed by hazardous ground gases to buildings* London: Construction Industry Research and Information Association

16.4.3 CL:AIRE

[15]. Card G, Wilson S, Mortimer S. 2012. *A Pragmatic Approach to Ground Gas Risk Assessment*. CL:AIRE Research Bulletin RB17. CL:AIRE, London, UK. ISSN 2047- 6450 (Online)

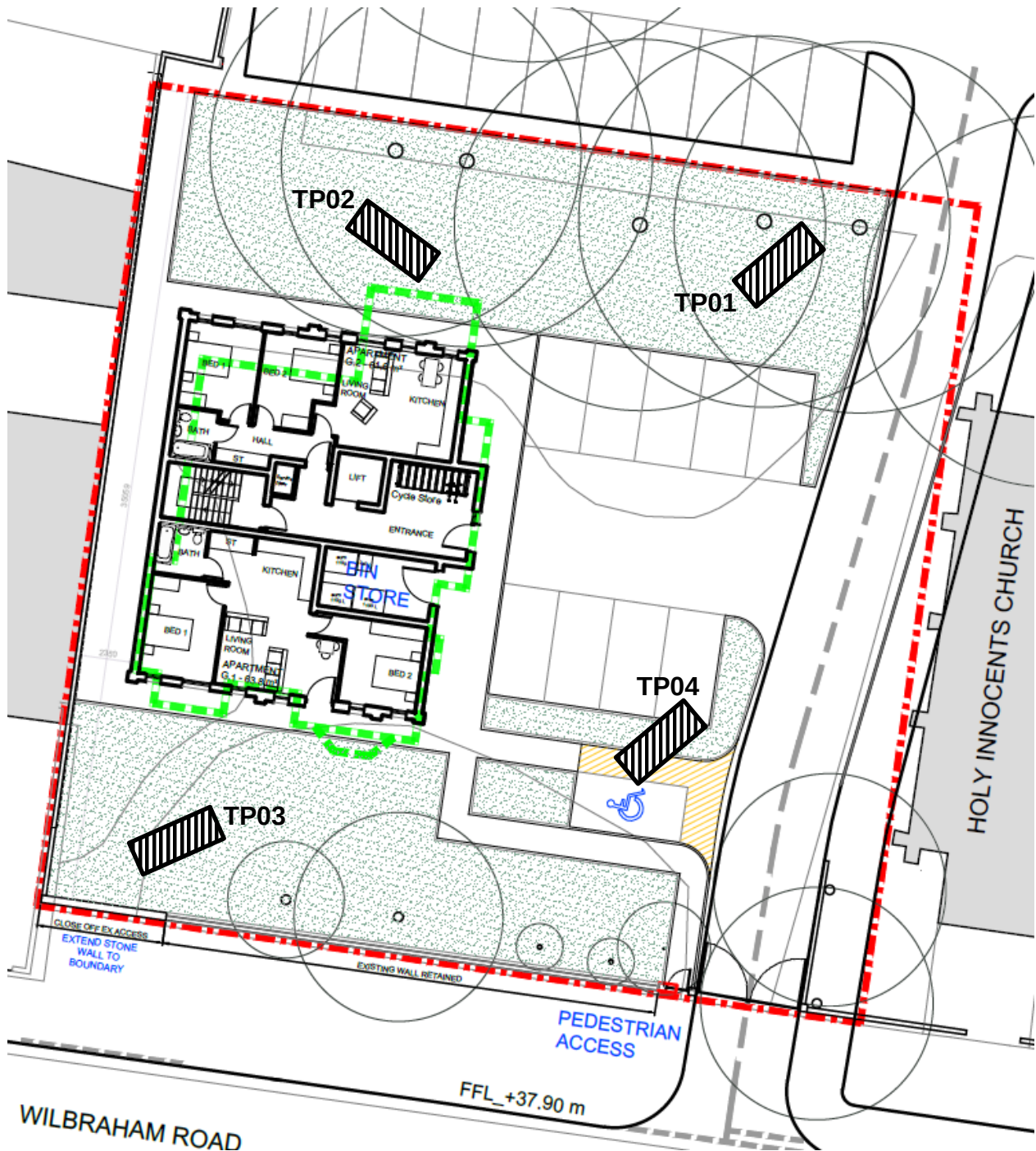
17.0 APPENDICES

APPENDIX A PHASE 1 REPORT

- Found as separate PDF

APPENDIX B

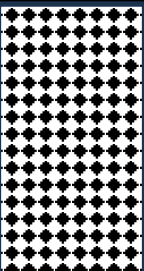
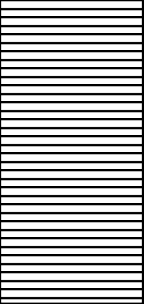
SITE PLAN INCLUDING TRIAL PIT LOCATIONS



APPENDIX C

TRIAL PIT LOGS

Project.	Wilbraham Road, Fallowfield, Manchester		Trial Pit	
			TP01	
Client.	OG Estates Ltd		Date	
			30/10/23	
Method.			Project Reference.	
Machine-excavated			3637D	

Groundwater	Depth (m)	Description of Strata	Legend	Samples		
				Type	Depth (m)	
					From	To
No GW encountered	0.40	Dark brown very clayey, sandy, gravelly, occasionally cobbly MADE GROUND with gravel sized fragments of angular to subrounded, fine to coarse of tarmac cobbles, tarmac fragments, concrete, brick, glass, plastic, glass bottle and abundant roots.		ES01	0.10	0.15
	0.90	Brown sandy CLAY .		ES02	0.60	0.65

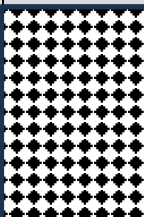
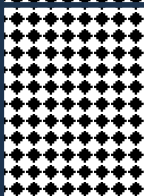
Remarks	Key		
	Logged By	Scale	Sheet
	DW	Not to Scale	1 of 1


Castledine Environmental
LAND CONTAMINATION SURVEYS

Project.	Wilbraham Road, Fallowfield, Manchester		Trial Pit TP02	
Client.	OG Estates Ltd		Date 30/10/23	
Method.			Project Reference.	
Machine-excavated			3637D	

Groundwater	Depth (m)	Description of Strata	Legend	Samples		
				Type	Depth (m)	
					From	To
No GW encountered	0.15	Dark brown very clayey, sandy, gravelly MADE GROUND with gravel sized fragments of angular to subrounded, fine to coarse of brick, concrete, plastic, metal canisters, wood and rootlets.		ES01	0.10	0.15
	0.30	Grey very gravelly MADE GROUND with gravel sized fragments of angular, fine to medium of hardcore.				
	0.50	Black very gravelly, sandy, slightly clayey MADE GROUND with gravel sized fragments of angular to subangular, fine to medium of ash, slag, glass, brick, clinker, bottle, ceramic and rootlets.		ES02	0.45	0.50
	0.80	Brown sandy CLAY .				

Remarks	Key			Castledine Environmental LAND CONTAMINATION SURVEYS
	Logged By	Scale	Sheet	
	DW	Not to Scale	1 of 1	

Project.	Wilbraham Road, Fallowfield, Manchester			Trial Pit		
				TP03		
Client.	OG Estates Ltd			Date		
				30/10/23		
Method.				Project Reference.		
Machine-excavated				3637D		
Groundwater	Depth (m)	Description of Strata	Legend	Samples		
				Type	Depth (m)	
					From	To
No GW encountered	0.05	Dark brown very clayey, sandy, gravelly MADE GROUND with gravel sized fragments of angular to subrounded, fine to coarse of brick, sandstone, metal, ceramic, plastic, wood and rootlets.				
	0.30	Grey very gravelly MADE GROUND with gravel sized fragments of angular, fine to medium of hardcore.		ES01	0.10	0.15
	0.80	Brown very sandy, gravelly CLAY , gravel is subangular to subrounded, fine to medium of coarse-grained sandstone and roots.		ES02	0.40	0.45
Remarks		Key			 Castledine Environmental LAND CONTAMINATION SURVEYS	
		Logged By	Scale	Sheet		
		DW	Not to Scale	1 of 1		

Project.	Wilbraham Road, Fallowfield, Manchester		Trial Pit TP04	
Client.	OG Estates Ltd		Date 30/10/23	
Method.			Project Reference.	
Machine-excavated		3637D		

Groundwater	Depth (m)	Description of Strata	Legend	Samples		
				Type	Depth (m)	
					From	To
No GW encountered	0.10	Dark brown very clayey, sandy, gravelly MADE GROUND with gravel sized fragments of angular to subangular, fine to coarse of hardcore, tarmac and brick fragments.		ES01	0.05	0.10
	0.25	Grey very gravelly MADE GROUND with gravel sized fragments of angular, fine to medium of hardcore.				
	0.50	Black very gravelly, very sandy MADE GROUND with gravel sized fragments of angular to subangular, fine to medium of ash, brick, hardcore, concrete, slag, clinker and metal.		ES02	0.30	0.35
	0.80	Brown very sandy, gravelly CLAY , gravel is subangular to subrounded, fine to medium of coarse-grained sandstone, quartzite.				

Remarks	Key		
	Logged By	Scale	Sheet
	DW	Not to Scale	1 of 1


Castledine Environmental
LAND CONTAMINATION SURVEYS

APPENDIX D

TRIAL PIT PHOTOGRAPHS



Trial Pit Photographs

Photo No.1: TP01 located in the NE extent of site



Address: Land off Wilbraham Rd, Manchester
Client: Mr. K. Din

Photo No.2: TP02 located in the NW extent of site





Trial Pit Photographs

Photo No.3: TP03 located in the SW extent of site



Address: Land off Wilbraham Rd, Manchester
Client: Mr. K. Din

Photo No.4: TP04 located in the SE extent of site



APPENDIX E

TEST RESULTS

- Found as separate PDF

APPENDIX F**WATCHING BRIEF**

It remains possible that previously unexpected soil conditions may be encountered during the construction process. Examples may include oily pockets within the soil, potential for asbestos containing materials, black ashy materials, soils exhibiting strong odours, brightly coloured materials, and former demolition materials.

Should previously undiscovered contamination be encountered during the demolition/construction of the new buildings the following course of action should be adhered to:

1. The ground workers should report any suspected contamination immediately to the Client's site supervisor. The supervisor should contact the Client or their appointed agent who will in turn contact Castledine Environmental to request an engineer to visit the site to assess the extent of the 'contamination'.
2. Castledine Environmental shall make records of their inspection, and pass details of these to the Local Authority.
3. Where the conditions revealed differ from those previously anticipated, the Castledine Environmental shall take samples as deemed appropriate to be dispatched for appropriate chemical testing.
4. Depending on the results of the testing either:
 - a. no further work will be required;
 - b. a further detailed risk assessment will be required; and/or
 - c. Localised specific remedial measures will be necessary.Appraisal criteria will vary depending on the nature of the assessment.
5. The results of any such testing will be sent to the Local Authority Pollution Control Section, Local Authority development control section, and the appointed building inspector. If remediation is required, the LA/Building inspector will be informed of the date and time of the proposed works.

6. Remediation will be undertaken in accordance with a method statement submitted for approval. The works shall be supervised where necessary by Castledine Environmental who shall provide a Verification Report for the Local Authorities.
7. A copy of the discovery strategy should be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.

