



**Castledine
Environmental**

LAND CONTAMINATION SURVEYS

**Phase 1 Land Contamination
Risk Assessment**

for

**Change of Use of Agricultural
Buildings to Dwellings (C3) with
Associated Site Works**

on the site of

**Hill Farm, Markfield Lane,
Botches ton LE9 9FH**

Date: December 2020

Status:

Final Report

Reference:

3073D P1 Gill

Date:

07/12/2020

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EXECUTIVE SUMMARY

The site is currently occupied by a series of barns in various states of repair and disrepair, a heavy-duty access track and external areas.

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 further investigation be planned and undertaken inline with Section 11.0.

It is recommended that the Buildings on site should be subject to an asbestos survey and removal by appropriately qualified personal prior to any demolition or redevelopment occurring in order to ensure site works do not cause future contamination of the site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 2 intrusive testing to be undertaken. Phase 3 Remediation Strategy and Verification Plan to be written.

A watching brief (as outlined in Appendix F) should be had 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) 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 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

(Proprietor)

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. J. Singh and Mr. H.K. Gill to undertake a Phase 1 Desk study on land at Hill Farm, Markfield Lane, Botcheston, Leicestershire LE9 9FH.

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of J. Singh and H.K. Gill and their appointees for the purpose of ensuring compliance with:

- paragraph 170, 178, & 179 of the National Planning Policy Framework 2018,
- part C1 of the building regulations.
- Condition No.1 of the Hinckley and Bosworth Borough Council planning approval reference 18/00143/CQGDO
<https://pa.hinckley-bosworth.gov.uk/online-applications/simpleSearchResults.do?action=firstPage>

1. No development approved by this permission shall be commenced until a scheme for the investigation of any potential land contamination on the site has been submitted to and agreed in writing by the Local Planning Authority which shall include details of how any contamination shall be dealt with. The approved scheme shall be implemented in accordance with the agreed details and any remediation works so approved shall be carried out prior to the site first being occupied.

Reason: To ensure there are no adverse risks to the health of the occupiers resulting from contamination of the site, to ensure compliance with condition Q.2(1)(c) of Class Q, Part 3 of the Town and County Planning (General Permitted Development) (England) Order 2015.

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 preliminary risk assessment in accordance with BS10175:2011+A2:2017 and CLR11 "Model Procedures for the Management of Land Contamination".

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 the village of Botcheston at National Grid Reference: 448423,305312 and is approximately 0.29ha in area.

The site is an irregular rectangle in shape orientated north east to south west. The site is directly bounded by field to the south east and north east, neighbouring dwellings south and west and scrubland to the north west. The surrounding areas are predominantly agricultural in usage.

The site interior comprises a series of barns orientated in a line running from the south west of site to the north east (see attached site walkover photographs and plan for barn number designations). The remainder of site is occupied by a grassed area, an open area where a barn has been demolished, shipping containers, an access track and an area of rough ground.

The south westernmost barn (Barn No.1) was seen to be in use for the storage of household amenities and miscellaneous furniture. This barn was

seen to be concrete based and constructed of cinderblock and potentially asbestos containing corrugated cladding and roofing materials.

The next series of barns, named and numbered “Adjoined Barns No.2” (see site walkover plan), comprise a series of at least 4 No. red bricked barns extending from Barn No.1 north west to an open area. These barns were seen to be in a poor state of repair and comprised former piggeries, with soil, concrete and brick-based flooring and potentially asbestos containing corrugated roofing materials. Some broken corrugated material was noted within the barns. The south westernmost barn in this series is roofless.

Moving north east again from these barns lies an open area, presumably a former barn which has been demolished. The storage of miscellaneous construction materials such as brick pallets, timber, sacking and herras fencing was noted here. Additionally, an area of burning was noted with the remains noted to comprise household refuse including plastics and foodstuffs.

Barn No.3 is located to the north east of the open area and comprises a cinderblock garage type structure adjoined to a red bricked stable-like structure, both of which contained concrete flooring. Both of these structures are roofed with corrugated metal which appears to be relatively new in comparison the other barns and roofing materials. A rubble spoil pile was noted in this area along with a potential former fuel plinth.

The final and north easternmost barn on site also appears to be relatively new in comparison with the other barns and was seen to be constructed of cinderblock with corrugated metal roofing. The flooring appeared to have been infilled with a clayey, stony medium with areas of made ground including rubble, glass and possible ash and tarmac chippings noted at the entrance to the barn.

Shipping containers are located north of this barn and in the northernmost corner of site. Access to the interior of the containers was unavailable on the day of the site walkover. The containers rest atop a paving stone, timber and brick base which itself lies atop an area of made ground comprised of

a gravelled medium, including demolition rubble and tarmacadam chippings. This made ground runs south west for the length of the north western boundary, extending from the shipping containers to the western most corner of site.

The remainder of site is occupied by a heavy-duty concrete access track running the length of site and providing access to the north western faces of the barns and the north eastern extent of site. A grassed area is located between the south eastern face of the barns and the south eastern fenced boundary.

Topographically the site is sloped, with an incline from the north east dropping down to the south west. Potential sources of contamination noted on the site walkover include general agricultural usages; potentially asbestos containing corrugated roofing and cladding materials (noted both on the barns and broken or stored within); areas of made ground comprised of demolition rubble and tarmacadam and glass etc; the area of former burning including burnt plastics, and further made ground deposits located between the access track and the north western boundary, running the length of site.

Photos of the site are present in Appendix C

6.0 REGULATORY AUTHORITY AND OTHER ENVIRONMENTAL DATA

An environmental search listing historical and environmental factors likely to affect the property has been reviewed.

The most pertinent information is summarised in the following sections.

A copy is presented in Appendix A

Additional geological and hydrological data was obtained from the British Geological Survey.

6.1 HYDROLOGICAL**6.1.1 AQUIFER****6.1.1.1 SUPERFICIAL GEOLOGY**

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary (Undifferentiated)	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 nonaquifer in different locations due to the variable characteristics of the rock type
2	92	S	Secondary A	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

6.1.1.2 BEDROCK GEOLOGY

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers
2	11	SW	Secondary A	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

6.1.2 ABSTRACTIONS AND PRIVATE WATER SUPPLIES

The Groundsure report records no potable, surface or groundwater abstraction licences held within 250m of site.

6.1.3 SOURCE PROTECTION ZONE

The site is not in a source protection zone.

6.1.4 GROUNDWATER VULNERABILITY AND SOIL LEACHING POTENTIAL

ID	location	Summary	Soil / Surface	Superficial geology	Bedrock geology
1	On Site	Summary Classification: Secondary superficial aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: 3-10m Patchiness value: <90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On Site	Summary Classification: Secondary bedrock aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: - Aquifer type: - Thickness: 3-10m Patchiness value: <90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures
3	11m SW	Summary Classification: Secondary bedrock aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: - Aquifer type: - Thickness: 3-10m Patchiness value: <90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures
4	40m SW	Summary Classification: Secondary bedrock aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: - Aquifer type: - Thickness: 3-10m Patchiness value: <90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures

6.1.5 POTENTIAL SURFACE WATER

The Groundsure report records an unnamed, surface level watercourse located 67m south west and 118m west of site.

6.1.6 DISCHARGE CONSENTS

ID	Distance (m)	Direction	Details	Description
2	203	NW	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: T/56/02820/S Permit Version: 1 Receiving Water: ROTHLEY BROOK (TRIBUTARY)	Status: PRE NRA-LEGISLATION WHERE ISSUE DATE 01-SEP-89 (HISTORIC ONLY) Issue date: 23/11/1970 Effective Date: 23/11/1970 Revocation Date: -

6.2 PERMITTED PROCESSES

None recorded within 250m of site.

6.3 POLLUTION INCIDENTS

None recorded within 250m of site.

6.4 RADIOACTIVE SUBSTANCES REGISTRATIONS

None recorded within 250m of site.

6.5 WASTE**6.5.1 LICENSED WASTE MANAGEMENT FACILITIES (LOCATIONS)**

None recorded within 250m of site.

6.5.2 LANDFILL SITES

None recorded within 250m of site.

6.6 HAZARDOUS SUBSTANCES

None recorded within 250m of site.

6.7 ECOLOGICAL RECEPTORS

The Groundsure report records the site as being directly within the Soar River Surface Waters Nitrate Vulnerable Zone (NVZ) with an additional record located 622m north of site. The Groundsure report also records a Site of Special Scientific Interest (SSSI) named Botcheston Bog located 511m south of site.

6.8 SOILS AND GEOLOGY

"Contains British Geological Survey materials © NERC 2020" obtained from <http://www.bgs.ac.uk/data/mapViewers/home.html> under the [Open Government Licence](#)

6.8.1 SUPERFICIAL DEPOSITS

The Groundsure report records superficial deposits of Glacial Till on site, comprising poorly sorted sandy, silty clays, gravels and boulders.

BGS geological mapping – which is more specific – indicates superficial geology of the Thrussington Member located on the north eastern extent of site. This member comprises a brown to reddish-brown diamicton (glacial till) derived primarily from Upper Carboniferous and Triassic rocks; with subordinate sands, gravels and stoneless clays and silts. Occasionally with a red pebbly clay and silty clay with rock fragments

6.8.2 BEDROCK

The Groundsure report records bedrock geology of Triassic Rocks (Undifferentiated) underlying site, comprising mudstone, siltstone and sandstone.

BGS geological mapping – which is more specific – indicates bedrock geology of the Edwalton Member underlying the majority of site. This member comprises a red-brown to greenish-grey mudstone and siltstone, with beds of variable dolomitic siltstone and very fine-grained sandstones.

BGS geological mapping also records the Gunthorpe Member potentially underlying the far south western extent of site, comprising a red-brown mudstone with subordinate dolomitic sandstone and greenish-grey sandstone.

6.8.3 ARTIFICIAL GROUND

BGS geological mapping records no artificial deposits located on or within 250m of site.

6.8.4 COAL MINING

The site is not located in a coal mining reporting area.

6.8.5 RADON

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protective measures are necessary as described in publication BR211:2015 by the Building Research Establishment.

6.9 AERIAL PHOTOGRAPHY

Aerial photography shows the following

6.9.1 BING

The site is shown as occupied by the access track and barns as seen on the site walkover. The open area, roofless, red-bricked barn and new metal roofing can be seen from imagery, much as on the site walkover.

6.9.2 GOOGLE MAPS

The site is shown as occupied by the access track and barns as seen on the site walkover. The red-bricked barns still retain their roofing at this time and the north easternmost barns appear in a state of disrepair, with the metal roofing not visible. Storage of unknown materials or pallets can be seen along the north western boundary of site, in the area of the present-day made ground deposits. The south eastern boundary fencing is not present at this time.

6.9.3 GOOGLE EARTH

9 No. images are held in the historic imagery dataset, as follows:

Date	Description
31/12/1999	The site is shown as occupied by a row of barns orientated north east to south west, much like that seen on the site walkover. However, the open area still remains as a barn at this time. The barn here shows vegetations and trees growing through the roof. The barns in the north eastern extent of site show areas of broken roofing. The access track and the ground north west of it appear occupied by storage and refuse.
	
31/12/2000	No discernible change on site.
24/07/2006	The northeaster barns and the barn occupying the present-day open area show further dilapidation and areas of missing roofing (indicating broken corrugated materials on site). Possible grain silos or tanks can be seen immediately north east of the north easternmost barn. Skips, refuse and refuse heaps can be made out adjacent to Barns No.2 and the access track.

Date	Description
	
31/12/2010	No discernible change on site.
28/09/2011	The skips and debris have been moved from the site access track. The refuse pile is likely vegetated at this time.
	

Date	Description
21/04/2015	The dilapidated barn occupying the present-day open area has been demolished at this time and the roofing removed from the north eastern barns. The area north west of the access track formerly occupied by vegetation, refuse and skips has been cleared the present-day fencing installed. The shipping containers can be seen at this time and a large mobile home can be seen parked on the made ground deposits south west of the containers. An amount of debris can be seen immediately north east of site and off-site, assumed associated with demolition of north eastern barns, grain silos etc. A static caravan is now located immediately south west and off-site of the south westernmost barn.
	
20/04/2016	The mobile home in the north of site has been removed. The static caravan has been moved onto the access track, orientated north east to south west, the same as the access track. Possible refuse can still be made out in the scrub north west of site.
05/04/2018	The static caravan has been removed. No other major changes on site.
21/04/2020	The new metal roofing has been installed on the north eastern barns and materials storage can be seen in the cleared open area. One of the red-bricked barns forming Barn No.2 has had its roofing removed. The vegetation adjacent and within the north western boundary of site has been scraped clear, leaving a brown area running the length of the north western boundary. This now leaves the site as seen on the site walkover.



6.9.4 ENVIRONMENTAL SEARCH

Date	Description
11/07/1999	The majority of site is covered in barns at this time with a small patch of grass occupying the south eastern boundary of site. The north eastern barns appear dilapidated and in state of disrepair.
09/10/2011	No major change on site, the buildings immediately north east are in an increased state of disrepair at this time.
07/06/2016	The barn in the location of the open area on site has been demolished. The roofing of the north eastern barns has been removed. The vegetated areas along the north western boundary have been scraped.
20/04/2019	The site now resembles the present-day with the open area containing storage, new metal roofing installed on north eastern barns and remainder of site as seen on the site walkover.

6.10 GOOGLE STREET VIEW

The site cannot be viewed on Google Street View imagery with only the site access being visible from the roadside.

6.11 HISTORIC MAPPING

The following historic maps have been reviewed as part of this assessment. Castledine Environmental do not hold a license for the reproduction and/or distribution of these maps.

Map	Onsite	Offsite
OS County Series: Leicestershire, 1886, 1:2,500	The site is shown as unoccupied agricultural field.	Surrounding areas predominantly agricultural. Notable features include the village of Botcheston approx. 330m south of site and an industrial school approximately 180m north of site.
OS County Series: Leicestershire, 1888-1889, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: Leicestershire, 1903-1904, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: Leicestershire, 1903, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: Leicestershire, 1916, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: Leicestershire, 1930-1931, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: Leicestershire, 1930, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
OS Plan, 1955, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS Plan, 1959, 1:2,500	The site has been developed as part of Hill Farm at this time. Barns are located on site in the area of the present-day dilapidated barns, in the north eastern extent of site.	Surrounding areas see little site relevant change.
OS Plan, 1964-1968, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.

Map	Onsite	Offsite
OS Plan, 1982-1992 1:10,000	The site is now shown as occupied by a row of barns, as seen on historical satellite imagery and as evidenced by the remaining buildings and open areas seen on the site walkover.	Surrounding areas have seen minor extension of residential areas, no site relevant changes noted.

6.12 CURRENT LAND USE DATA

The Groundsure report records an electricity pylon located 135m south east of site. No further current industrial land usages are recorded within 250m of site.

6.13 PETROL AND FUEL SITES

None recorded within 250m of site.

6.14 HISTORICAL PETROL AND FUEL SITE DATABASE

None recorded within 250m of site.

6.15 POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED ON MAPPING

The Groundsure report records an industrial school located 133m north of site between the years of 1885 to 1901. No further potentially contaminative land usages are recorded within 250m of site.

6.16 HISTORICAL TANK DATABASE

The Groundsure report records an unspecified tank located 115m north east of site between the years of 1903 to 1916.

6.17 HISTORICAL ENERGY FACILITIES

None recorded within 250m of site.

7.0 POLLUTANT LINKAGE ASSESSMENT

The risk posed by any contaminants in soil or groundwater will depend on the nature of the hazard, the probability of exposure, the pathway by which exposure occurs, and the likely effects on the receptors. A contaminant is defined as a substance that has the potential to cause harm, while a risk is

considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.

The following sections discuss all the identified potential on and off-site sources, pathways and receptors in the context of the proposed development and plausible pollutant linkages which may represent a risk to identified receptors from the data gained from the desk study. At this stage the assessment is qualitative and aimed to determine all pollutant linkages, irrespective of significance or allowing for uncertainty.

Three impact potentials exist for any given site, these are:

- The site impacting upon itself;
- The site impacting on its surroundings; and
- The surroundings impacting on the site.

All three impacts need to be considered in a risk assessment.

7.1 SOURCES

The following potential sources of contamination have been identified.

7.1.1 ONSITE

- Agricultural use of the site
- Unknown use of the buildings
- Potentially asbestos containing corrugated building materials
- Broken corrugated cladding and roofing materials
- Made ground deposits noted across site
- Potential former fuel plinth
- Area of burnt ground with evidence of plastics and refuse
- Historical refuse heaps, skips and storage along north western boundary of site

7.1.2 OFFSITE

- Made ground (just beyond the north western boundary of site)

7.2 PATHWAYS

A pathway is defined as a mechanism or route by which a contaminant comes into contact with, or otherwise affects a receptor. Pathways by

which the identified receptors may be impacted upon in the context of the proposed development are identified as follows:

- Ingestion;
- Skin contact;
- Inhalation;
- Plant uptake,
- Direct contact by buried structures;
- Leaching of soluble contamination into groundwater

7.3 RECEPTORS

Receptors are defined as people, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by contaminant(s).

- Human Health
 - Current users of the site;
 - Future users of the site;
 - Users of neighbouring sites;
 - Construction workers; and
 - Services personnel working in trenches.
- Construction Materials
- Buried concrete, which may be affected by high concentrations of sulphate and/or low pH, in the soils and groundwater underlying the site; and
- Buried water pipes.
- Controlled Waters
- Ecological Receptors
- Flora and fauna using the proposed development

8.0 CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) is a hypothesis of the nature and sources of contamination, potential receptors that may be the recipient of contamination arising from those sources and any pathways that may exist. It creates a plausible source-pathway-receptor pollutant linkage

(hazard), set within the context of the ground and proposed end use of the site.

8.1 PRELIMINARY CONCEPTUAL SITE MODEL

8.1.1 SOIL CONTAMINATION

The site is currently occupied by a series of barns in various states of repair and disrepair, a heavy-duty access track and external areas.

Historic agricultural practices, unknown uses of the buildings and identified features on site have the potential to have contaminated the site with various substances including

- Metals and metalloids
- Hydrocarbons
- Pesticides
- Asbestos

8.1.2 HAZARDOUS GROUND GAS AND VAPOURS

No significant sources of potential ground gas generation have been identified. A potential former fuel tank plinth noted in the north eastern extent of site at Barn No.3 may have the potential to be producing localised hazardous ground vapours and as such, this area should be investigated.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Consequence	Risk	Possible Mitigation
Contaminated Soils	Direct Ingestion & Direct Contact	Site Workers	Li	Md	M	Site workers to wear appropriate PPE for health and safety reasons
Contaminated Soils	Inhalation of Dust	Site Workers	Li	Md	M	
Contaminated Soils	Direct Ingestion & Direct Contact	End Users	Li	Md	M	A number of potentially contaminative sources have been identified on site, areas of proposed soft-landscaping should be tested for a standard suite of contaminants. A competent asbestos surveyor should also be employed prior to any redevelopment or demolition, to avoid further contamination.
Contaminated Soils	Inhalation of Dust	End Users	Li	Md	M	
Contaminated Soils	Direct Ingestion	Flora and Fauna	Li	Md	M	
Contaminated Soils	Vertical and lateral migration	Controlled Waters	Li	Md	M	
Contaminated Soils	Direct contact	Services	Li	Md	M	
Ground Gases (Methane and CO ₂)	Vertical and lateral migration	End Users & Building Envelope	UI	Md	L	No significant sources of potential ground gas generation have been identified.
Volatile and Semi-volatile Organic Compounds	Vertical and lateral migration	End Users & Building Envelope	Li	Md	M	A potential former fuel tank plinth has been identified. Should spillages or leakages have occurred, there may be a potential for hazardous vapour generation. This should be investigated.
Radon	Vertical and lateral migration	End Users & Building Envelope	UI	Md	L	Site is not in 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 ENVIRONMENTAL RISK ASSESSMENT

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 further investigation be planned and undertake inline with Section 11.0.

It is recommended that the Buildings on site should be subject to an asbestos survey and removal by appropriately qualified personal prior to any demolition or redevelopment occurring in order to ensure site works do not cause future contamination of the site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 2 intrusive testing to be undertaken. Phase 3 Remediation Strategy and Verification Plan to be written.

10.0 SUMMARY OF RISKS**10.1.1 SOIL CONTAMINATION**

A number of potentially contaminative sources have been identified on-site. These include: the general historical agricultural usage of the site over time; the potentially asbestos containing roofing and cladding materials noted on the buildings; broken roofing and cladding materials noted on historical satellite imagery (residual asbestos fibres); broken asbestos sheeting noted within some of the barns; made ground deposits noted in the north eastern extent of site and along and within the north western boundary of site (glass, tarmac, demolition rubble etc); historical skips, refuse heaps and miscellaneous storage noted along and within this boundary; demolition rubble and a potential former fuel tank plinth noted at the location of Barn No.3; and the area of former burning with evidence of melted plastics, household refuse and foodstuffs noted.

10.1.2 GROUND GASSES AND VAPOURS

No significant sources of potential ground gas generation have been identified. A potential former fuel tank plinth noted in the north eastern extent of site at Barn No.3 may have the potential to be producing localised hazardous ground vapours and as such, this area should be investigated.

11.0 FURTHER ENVIRONMENTAL INVESTIGATION

It is recommended that a Phase 2 Intrusive Ground Investigation be planned and undertaken. This should generally characterise the site, however, specific attention should be paid to areas of proposed soft-landscaping. These areas should be tested for a standard suite of contaminants, including the north eastern area of site and the strips of land located along the south eastern and north western boundaries of site.

12.0 REFERENCES**12.1 LEGISLATION AND REGULATIONS****12.1.1 ACTS**

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

12.1.2 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

12.1.3 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

12.2 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, 2018: National Planning Policy Framework.

12.3 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)

12.4 NON STATUTORY TECHNICAL GUIDANCE

12.4.1 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.

12.4.2 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
- [15] Mallett, H., Cox, L., Wilson, S. and ,Corban M... 2014, *C 735 Good practice on the testing and verification of protection systems for buildings against hazardous ground gases* London: Construction Industry Research and Information Association

12.4.3 CL:AIRE

- [16] 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)

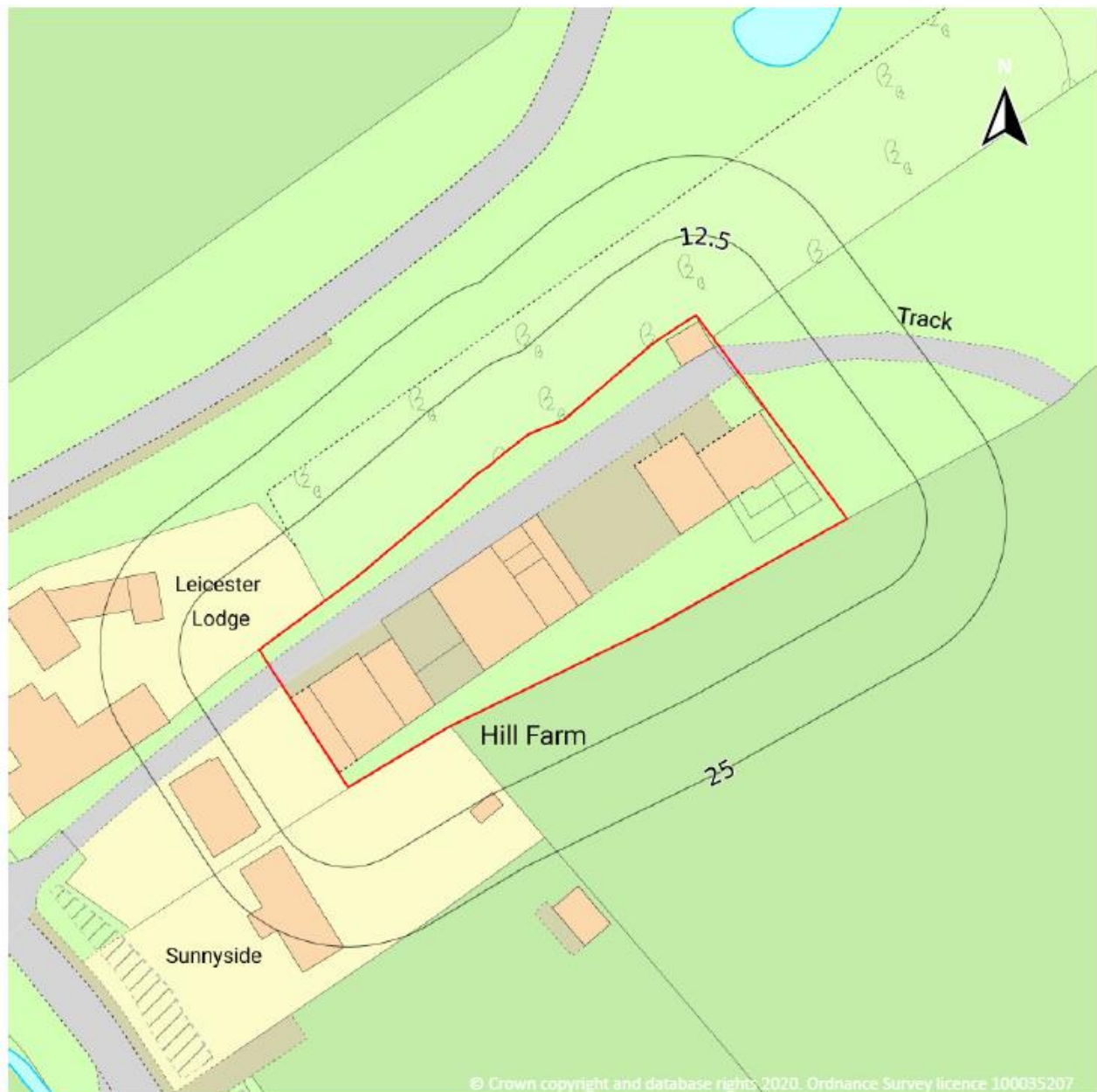
13.0 APPENDICES

APPENDIX A

ENVIRONMENTAL SEARCH

APPENDIX B

CURRENT SITE PLANS



APPENDIX C

SITE PHOTOS AND LOCATIONS AND BARN NUMBER DESIGNATIONS



Site Walkover Photos

Photo No.1: Facing NE from western corner of site showing access track with barns to right



Address: Hill Farm, Markfield Lane, Botcheston
Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.2: South westernmost barn on site (Barn No.1), in use for storage of misc. furniture etc and concrete based





Site Walkover Photos

Photo No.3: Example of concrete base in south westernmost barn on site



Address: Hill Farm, Markfield Lane, Botcheston
Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.4: Facing SE showing concrete base and storage in the rear of Barn No.1





Site Walkover Photos

Photo No.5: Facing SW from northern corner of site



Address: Hill Farm, Markfield Lane, Botcheston
Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.6: Facing SE showing open area and construction storage, located between barns No.2 and No.3





Site Walkover Photos

Photo No.7: Interior of Adjoined Barns No.2, facing south east



Address: Hill Farm, Markfield Lane, Botcheston

Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.8: Interior of Adjoined Barns No.2, facing south east





Site Walkover Photos

Photo No.9: Evidence of burning noted in open area with foodstuffs, household waste, and plastics noted within



Address: Hill Farm, Markfield Lane, Botcheston

Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.10: Potentially asbestos sheeting noted stored and broken in barn No.4





Site Walkover Photos

Photo No.11: Facing SW from easternmost corner showing grassed SE boundary and disused cinderblock barn



Address: Hill Farm, Markfield Lane, Botcheston
Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.12: Facing north east showing grassed area adjacent to the south eastern boundary (right)





Site Walkover Photos

Photo No.13: Facing SE showing Barn No.3 (red brick and cinderblock barns – adjoined) and demolition rubble pile



Address: Hill Farm, Markfield Lane, Botcheston

Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.14: Facing SE showing Barn No.4, the north eastern most barn on site and infilled with made ground base





Site Walkover Photos

Photo No.15: Potential former plinth for unknown contents tank noted at Barn No.3



Address: Hill Farm, Markfield Lane, Botcheston
Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.16: Made ground deposits noted outside of Barn No.4 and within the barn itself





Site Walkover Photos

Photo No.17: Made ground noted around shipping containers noted in the far northern corner of site, facing NW

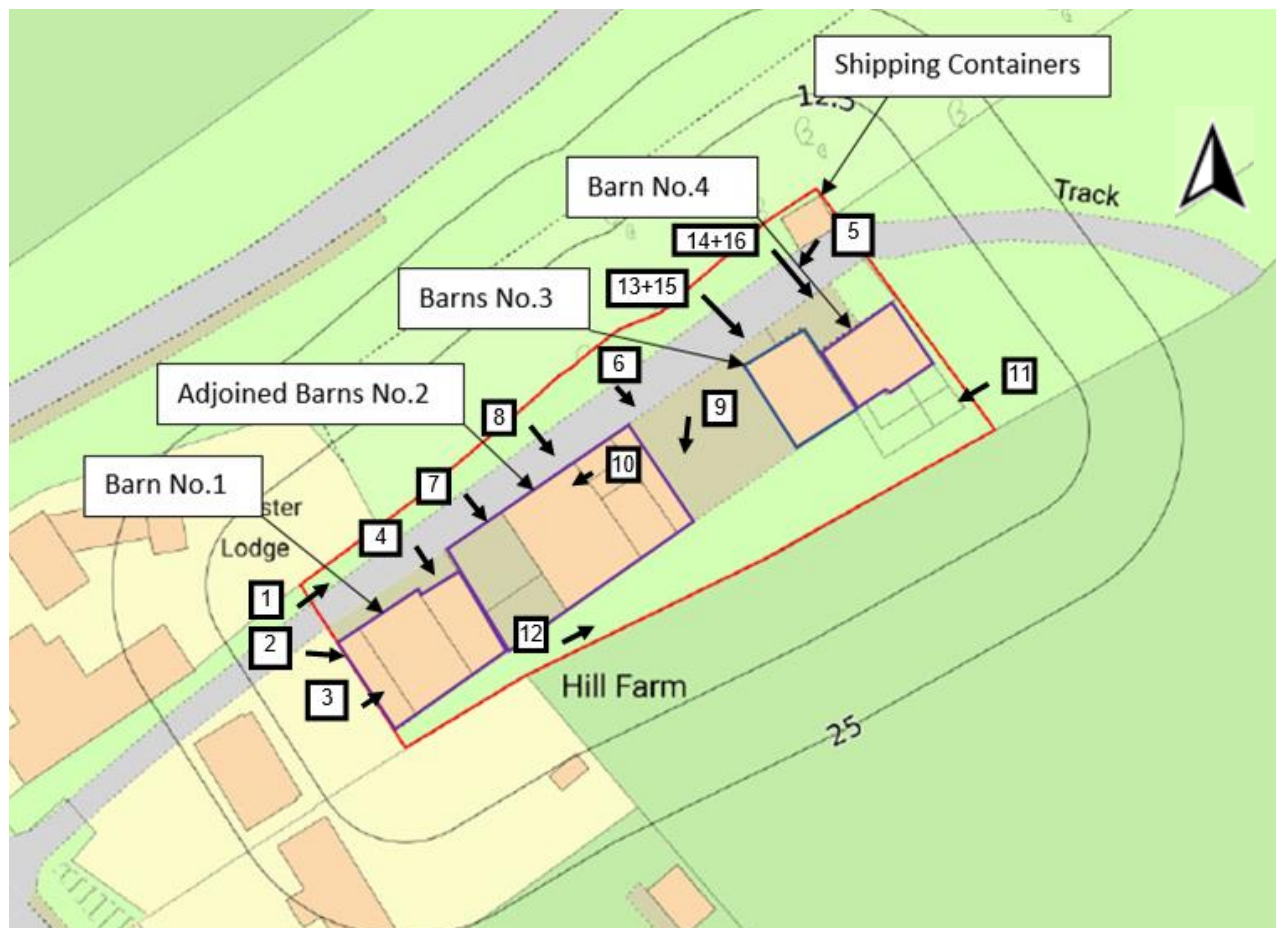


Address: Hill Farm, Markfield Lane, Botcheston
Client: Mr. J. Singh and Mr. H.K. Gill

Photo No.18: Facing SW showing example of made ground noted running the length of the north western boundary

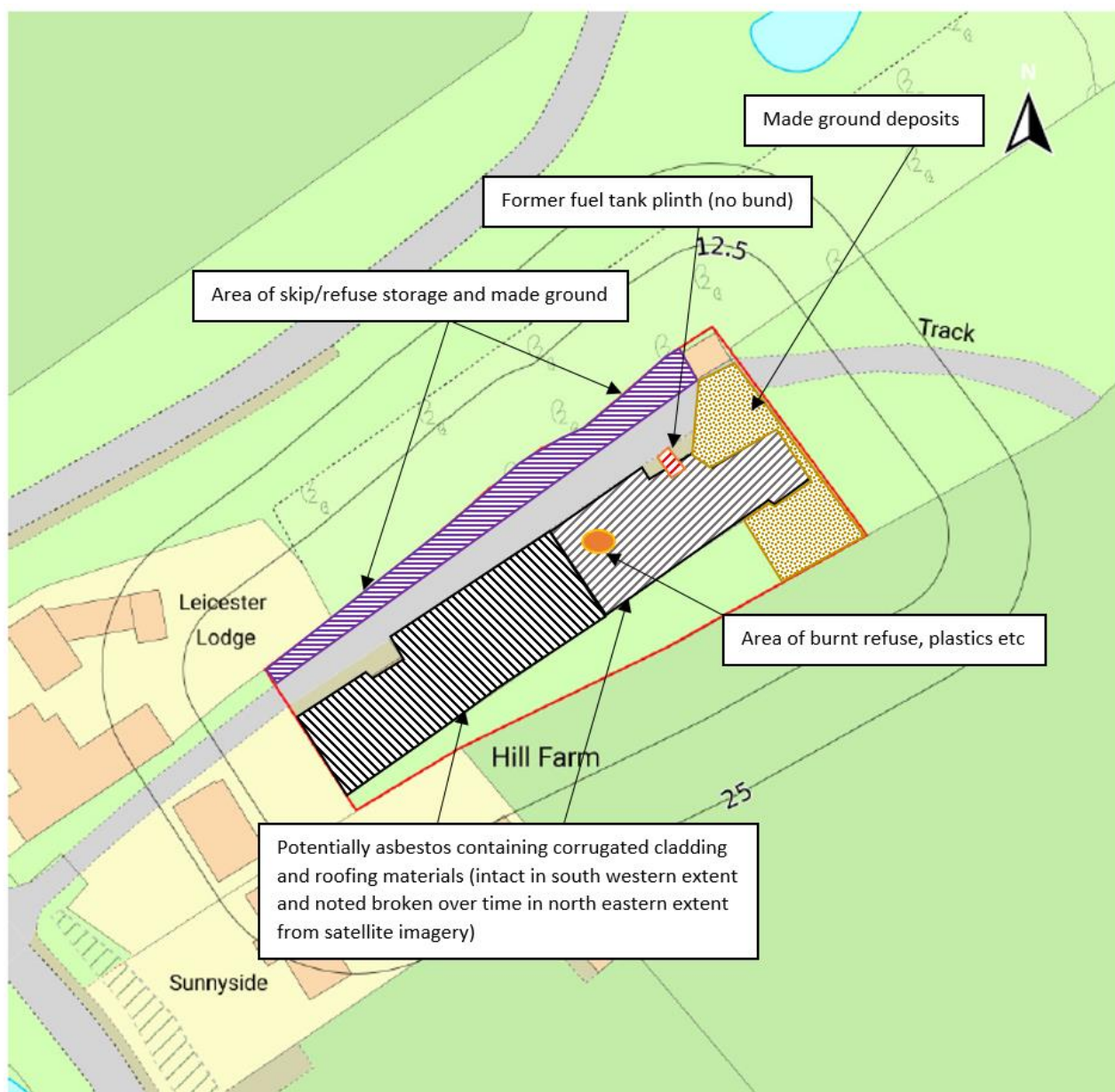


APPENDIX D

SITE PHOTOGRAPH LOCATIONS AND BARN
DESIGNATIONS

APPENDIX E

DIAGRAMATIC CONCEPTUAL SITE MODEL



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.

APPENDIX G

DISCOVERY STRATEGY

