Castledine Environmental

LAND CONTAMINATION SURVEYS

Phase 1 Land Contamination Risk Assessment

for

Proposed Residential Development

on the site of

No.1 High Street, Leiston, Suffolk IP16 4EJ

Date: September 2022

Status:	Final Report
Reference:	3363D P1 Western House - Leiston
Date:	06/09/2022

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EXECUTIVE SUMMARY

The site is currently occupied by site cabins, a parking area and scattered debris, refuse and demolition materials. Historically, the site was part of a vicarage garden from circa.1881 through until circa.1938 when an unknown usage structure was erected in the primary site area. This was then removed by circa.1946-47 and a new, centrally located structure was erected by circa.1952-53 and subsequently removed by circa.1970-71. At the same time the unspecified feature was removed from the primary area, the clubhouse was erected in the secondary area in the south east of site. The site then changes little on mapping until the present-day, save for the addition of the summerhouse seen on the walkover in the north of site by circa.1987.

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 inline with Section 11.0 is planned and carried out on site.

It is recommended that the remaining clubhouse structure on site be subject to an asbestos survey and subsequent removal (if required) by appropriately qualified personnel, 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.

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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

(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 Western House Developments to undertake a Phase 1 Desk study on a site at No.1 High Street, Leiston, Suffolk IP16 4EJ.

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Western House Developments and their 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
- Support of a Planning Application

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, CLR11 “Model Procedures for the Management of Land Contamination” and LCRM “Land Contamination Risk Management”.

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 Leiston, Suffolk at National Grid Reference: 644457,262718 and is approximately 0.17ha in area.

The site comprises a larger, open area and an adjacent former clubhouse site, forming 2 No. rectangles adjoined at the south eastern and north western corners, respectively. The site is located in a town centre setting and is directly bounded by a vacant commercial property and Valley Road to the south, a bank and neighbouring businesses to the west and east, respectively and residential dwellings and their gardens to north west, north and north east of site.

The site interior comprises a primary area seen to be under development activities and an immediately adjacent former clubhouse to the east and south east of this, forming the secondary area of site. The southern extent of this area was seen to comprise a gravelled parking and staging area, with a number of vehicles, a site-cabin, toilets and heaped construction materials noted here. A large heap of timber and refuse was noted centrally on site from this point, with further heaps of topsoil, gravels and cut vegetation located east of this. The northern extent of site was seen to be slightly raised above the southern extent and comprised a scraped back area, which appeared to be a former garden. A small former pond or seating area was noted to contain ashy residues, from a previous burn here. A summerhouse was noted located in the far north of site, inside the central area of the northern boundary with a second, much larger heap of topsoil noted in the north east of site. Further scattered debris and refuse were noted across this area including rubble, timber, wood chippings, metal and tiling.

The secondary area on site comprise a single-storey, extremely dilapidated former clubhouse. Access to this building was provided via the frontage of the building, which is located on Valley Road. The building possessed signage indicating a former usage as an e-bike store. The interior of the building comprised a large front-room with miscellaneous

storage such as furniture, bikes and household items; and a rear, larger room comprising a former dancehall. The ceiling and roofing in this rear room were noted to be a in poor state of repair, with areas of the roof being open to the elements. Evidence noted beneath the former dancefloor indicating a concrete base to run through the entirety of the building. This building is proposed to be demolished to provide a more suitable access route into site that than the present gravelled track.

Potential sources of contamination noted on the walkover include the heaps and scattered refuse noted around the primary site area. Client information gained on the walker also indicated the frontage of the clubhouse to have previously been in use for commercial reasons and a strong hydrocarbon odour was noted within the building, which is also considered a potential source of contamination. Topographically, the southern extent of the primary site area and the clubhouse itself are level with the surrounding areas, with the northern extent of the primary area raised slightly above the southern extent.

Photos of the site are present in Appendix D

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 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
2	82	NW	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 non-aquifer in different locations due to the variable characteristics of the rock type

6.1.1.2 BEDROCK GEOLOGY

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	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

6.1.2 ABSTRACTIONS AND PRIVATE WATER SUPPLIES

None recorded within 250m of site.

6.1.3 SOURCE PROTECTION ZONE

The site is located in a Type 3 'Total Catchment' Source Protection Zone (SPZ). Source protection zones define the sensitivity of an area around a potable abstraction site to contamination.

6.1.4 GROUNDWATER VULNERABILITY AND SOIL LEACHING POTENTIAL

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one-kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

ID	Location	Summary	Soil / Surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: High Aquifer type: Secondary Thickness: >10m Patchiness value: >90% Recharge potential: High	Vulnerability: Low Aquifer type: Principal Flow mechanism: Intergranular
2	On site	Summary Classification: Principal bedrock aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: >10m Patchiness value: >90% Recharge potential: High	Vulnerability: Low Aquifer type: Principal Flow mechanism: Intergranular

6.1.5 POTENTIAL SURFACE WATER

The Groundsure report records no hydrological features located within 250m of site.

6.1.6 DISCHARGE CONSENTS

None recorded within 250m of site.

6.2 PERMITTED PROCESSES

None recorded within 250m of site; the nearest record beyond this is a revoked Part A2 Permit concerning timber manufacture located 292m west of site.

6.3 POLLUTION INCIDENTS

The Groundsure report records an incident located 230m west of site and dated 29/10/2002. The incident concerned construction and demolition wastes (inert) with no impact to land, air or water qualities.

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; the nearest record beyond this is Skipaway Yard, a waste transfer station which is located 264m west of site.

6.5.2 LANDFILL SITES

The Groundsure report records a historical landfill located 220m north of site and dealing in inert and industrial waste types. The site was first recorded in December of 1976 and last recorded in December of 1987.

6.6 HAZARDOUS SUBSTANCES

None recorded within 250m of site.

6.7 ECOLOGICAL RECEPTORS

The Groundsure report records the site as being located with both the Leiston Beck surface waters nitrate vulnerable zone (NVZ) and the Sandlings and Chelmsford groundwaters NVZ.

6.8 SOILS AND GEOLOGY

"Contains British Geological Survey materials © NERC 2022" obtained from http://www.bgs.ac.uk/data/mapViewers/home.html under the Open Government Licence

6.8.1 SUPERFICIAL DEPOSITS

Both BGS geological mapping and the Groundsure report record superficial geological deposits of the Lowestoft Formation located on site, comprising an extensive sheet of chalky till together with outwash sands and gravels, silts and clays – the till is characterised by its chalk and flint content.

6.8.2 SUPERFICIAL DEPOSITS PERMEABILTY

The Groundsure report records the site as being within an area where the maximum permeability of superficial deposits is recorded as ‘very high’ and the minimum permeability as ‘high’, facilitated by intragranular flow mechanisms.

6.8.3 BEDROCK DEPOSITS

Both BGS geological mapping Groundsure report record bedrock geology of the Crag Group underlying site, comprising sands, gravels, silts and clays. The sands are characteristically dark green from glauconite but weather bright orange with haematite 'iron pans'. The gravels in the lower part of the group are almost entirely composed of flint. Those higher in the group include up to 10% of quartzite from the Midlands, igneous rocks from Wales, and chert from the Upper Greensand of south-eastern England.

6.8.4 BEDROCK PERMEABILITY

The Groundsure report records the site as being within an area where the maximum permeability of bedrock geology is recorded as ‘high’ and the minimum permeability as ‘high’ and facilitated by intergranular flow mechanisms.

This is a qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

6.8.5 ARTIFICIAL GROUND

BGS geological mapping records an area of artificial ground described as ‘infilled ground’ located 219m north of site. No further artificial deposits are located on or within 250m of site.

6.8.6 NATURAL HAZARDS

The Groundsure report records a negligible risk from ground dissolution of soluble rocks, compressible deposits and shrink-swell clays; a very low risk from landslides and collapsible deposits and a low risk from running sands. .

6.8.7 BGS ESTIMATED BACKGROUND SOIL CHEMISTRY

The Groundsure report records BGS background soil chemistry for the site. This is estimated values providing the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km2. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km2; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

The Groundsure report records arsenic, lead & bioaccessible lead, cadmium, chromium and nickel at background concentrations of 15mg/kg, 100mg/kg & 60mg/kg, 1.8mg/kg,20-40mg/kg and 15-30mg/kg, respectively.

Assuming a worst-case generic acceptance threshold (GAC) of 1% soil organic matter (SOM), none of the recordings are above the generic acceptance thresholds of 37mg/kg, 200mg/kg (both lead and bioaccessible lead), 11mg/kg, 910mg/kg and 180mg/kg, respectively.

6.8.8 COAL MINING

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

6.8.9 NON-COAL MINING

The Groundsure report records no non-coal mining operations or areas located within 250m of site.

6.8.10 SURFACE WORKINGS

ID	Distance [m]	Direction	Land Usage	Year of Mapping
1	29	NE	Ponds	1883
2	130	N	Brick field	1883
A	130	W	Unspecified pit	1938
A	132	W	Unspecified pit	1952
A	133	W	Unspecified pit	1946
A	133	W	Unspecified pit	1946
A	157	W	Ponds	1946
B	227	N	Unspecified ground workings	1946
B	227	N	Unspecified ground workings	1946
B	229	N	Unspecified pit	1938
B	232	N	Unspecified pit	1952
B	242	N	Unspecified disused	1975

6.8.11 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 GOOGLE MAPS

The primary site area is shown as occupied by a gravelled parking and vehicle turning area occupying the western half of the site with the eastern half occupied by bare earth, resembling a former garden area. A shed or similar structure is located in the south eastern corner of this area. The secondary site area is shown as occupied by the clubhouse structure, with the flat-roofing noted to be in a poor-state of repair, as seen on the site walkover.

6.9.2 GOOGLE EARTH

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

Date	Description
May 2020	The primary site area is shown as a lawned garden are with a heap of undiscernible debris located in the central area of the lawn and a shed structure in the SE corner of the gardened area. The secondary clubhouse area of site is shown as occupied by the flat-roofed, dilapidated single-storey building as seen on the site walkover.
March 2021	Imagery is indistinct; however, there appears no discernible change on site.
April 2021	Imagery is indistinct; however, there appears no discernible change on site.
March 2022	The primary site area is now shown as split into a gravelled parking and vehicle turning area occupying the western half of site and bare earth areas in the eastern half of site.

6.10 GOOGLE STREET VIEW

Google Street View imagery is dated June of 2022 with the secondary site area viewed off Valley Road and facing north. The frontage of the former E-bike shop can be seen and appears disused, as seen on the site walkover. The primary site area cannot be viewed from the roadside due to a vacant, former commercial property on the roadside.

6.11 HISTORIC MAPPING

The following historic maps have been reviewed as part of this assessment, found in the appendices.

Map	Onsite	Offsite
OS County Series: 1881-1883, 1:2,500	The site is shown as occupied be the gardened areas of a vicarage (located just SW of site). The present-day clubhouse area on site is shown as largely unoccupied save for a single structure adj, to the roadside.	A glasshouse bounds the centre of the western boundary. An orchard is located north with a windmill located approx.100m north and a railway line just beyond this, with a brick field located approx.130m north of site. Railway sidings are then located approx.62m west of site. Areas to the east, west and south of site are urbanised and comprise the town of Leiston. A smithy is marked approx.37m south of site. 2 No. large ponds are located approx.34m NE and 60m NE of site. Leiston iron Works is located approx.131m SW / S of site.
OS County Series: 1888, 1:10,560	No discernible change on site.	The surrounding areas see little site relevant change.
OS County Series: 1903, 1:2,500 & 1:10,560	Garden markings are no longer marked on site; however, this is likely a mapping style as opposed to a change of use as the site outline and vicarage remain static.	The pond located approx.35m NE of site has been removed. The orchard north of site with the windmill here has also been removed in lieu of housing, with the area north of site and south of the railway being entirely occupied by housing at this time. The brick field to the north of site is no longer marked on mapping. Leiston Iron Works to the south of site now marked as an engineering works.
OS County Series: 1926, 1:10,560	No discernible change on site.	The Leiston Gas Works is now located approx.125m SW of site. The smithy to the south of site is no longer marked on mapping. The gas works to the SW of site no long appear marked on mapping.

Map	Onsite	Offsite
OS County Series: 1927, 1:2,500	The site now appears entirely unoccupied save for a small structure in the far SE of site (present-day roadside area).	Further housing infill to the east and SE of site, replacing the pond located approx.60m NE of site. A large industrial unit has been erected approx.135m west of site with a chimney and large, unspecified tanks located adj. to the feature and an unspecified pit adjacent to this. The new industrial building is served by a new siding. Further tanks are marked approx.163m north of site (on opposite side of mainline railway) and a large, unspecified pit is now located approx.150m north of site.
OS County Series: 1938, 1:10,560	A structure is now marked on site and extending west offsite in the primary site area.	The surrounding areas see little site relevant change,
OS County Series: 1946-1947, 1:10,560	The previously noted structure has been removed from site.	Surrounding areas see little site relevant change.
Provisional: 1952-1953, 1:10,560	A structure is now marked centrally on site in the primary site area.	Further residential infill in the surrounding areas.
National Grid: 1970-1971, 1:2,500	The primary site area is once again cleared of structures and is shown as unoccupied. The secondary site area is now occupied by the clubhouse seen in the present-day.	The glasshouse formerly bounding the west of the primary site area has now been removed. A garage is now marked approx.45m south of site. The tanks located approx.130m north on the opposite side of the mainline railway have been removed and replaced with a builders yard. The industrial area and unit to the west has had the sidings, tanks and unspecified pit removed. Railway sidings located approx.250m NW of site and north of the industrial unit have also been removed along with a number of railway features and buildings, leaving only the mainline railway at this time. A coal yard is now marked approx.250m NE of site beyond the mainline railway here.
National Grid: 1975, 1:2,500 & 1:10,000	No discernible change on site.	The large-scale Leiston works approx.130m south and SW of site (formerly Leiston Iron Works) has had a number of the larger buildings demolished, leaving only a small number of buildings remaining and a large, open area. The unspecified pit located approx.242m north of site is now marked as a ‘disused unspecified pit’ however the area is also recorded as a landfill, with this feature being the likely location of the landfill.
National Grid: 1977, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.

Map	Onsite	Offsite
National Grid: 1987, 1:2,500	The summerhouse located centrally inside the northern boundary of the primary site area (seen on the site walkover) is now present on site.	Further housing infill to the north and NE of site beyond the mainline railway. The builders yard north of site has been removed. The open area which formerly was occupied by Leiston Works is now shown as under residential development. The garage located approx.45m south of site has been removed and is no longer marked on mapping. A depot is now located approx.70m SE of site.
National Grid: 1988, 1:2,500	No discernible change on site.	The residential development atop the former engineering works are south of site has been completed.
National Grid: 1986-1989, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1995, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2001, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
Landline: 2003, 1;1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2010, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2022, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.

6.12 CURRENT LAND USE DATA

ID	Distance [m]	Direction	Company	Activity	Category
1	67	E	C Bridgeman & Son Ltd	Fireplaces and mantelpieces	Consumer products
2	82	NE	Electricity substation	Electrical features	Infrastructure and facilities
3	115	SE	Electricity substation	Electrical features	Infrastructure and facilities
4	164	S	Leiston Sound & Vision	Electrical equipment repair and servicing	Repair and servicing
A	177	W	Qdex	Stationary, stamps, tags and labels	Industrial products
B	190	NW	Leiston Tyre & Exhaust Centre Ltd	Vehicle parts and accessories	Motoring
B	205	NW	Leiston Press	Published goods	Industrial products

ID	Distance [m]	Direction	Company	Activity	Category
A	214	W	Robert Cassidy Precision Engineering	Precision engineers	Engineering services
A	215	W	Electricity substation	Electrical features	Infrastructure and facilities
5	229	SE	J Lear	Signs	Industrial products
6	230	S	Screwbolt Fixings	General construction supplies	Industrial products
7	239	SE	Electricity substation	Electrical features	Infrastructure and facilities
A	245	W	George East Housewares	Distribution and haulage	Transport, storage and delivery
C	246	N	Electricity substation	Electrical features	Infrastructure and facilities

6.13 PETROL AND FUEL SITES

The Groundsure report records an obsolete Murco fuel station located 213m north 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

ID	Distance [m]	Direction	Use	Date
A	35	SW	Unspecified works	1952-1975
B	37	S	Smithy	1883
A	38	SW	Iron works	1883
A	38	SW	Unspecified commercial / industrial	1903
A	38	SW	Unspecified commercial / industrial	1938
A	41	SW	Unspecified commercial / industrial	1946
1	54	SW	Unspecified tank	1952
C	62	W	Railway sidings	1938
D	64	W	Railway sidings	1883
A	64	SW	Railway sidings	1952
D	65	W	Railway sidings	1903
A	75	SW	Railway sidings	1946

ID	Distance [m]	Direction	Use	Date
D	114	N	Railway sidings	1946
3	115	NW	Railway buildings	1883
A	125	S	Gas works	1903
A	129	S	Unspecified works	1938-1947
F	130	N	Brick field	1883
G	130	W	Unspecified works	1938
H	130	W	Unspecified pit	1938
A	131	S	Iron works	1882
G	131	W	Unspecified works	1975
G	132	W	Unspecified works	1952
H	132	W	Unspecified pit	1952
G	133	W	Unspecified works	1946
H	133	W	Unspecified pit	1946
I	136	N	Unspecified tanks	1938
A	138	S	Railway sidings	1938-1947
A	140	SW	Railway sidings	1903
D	140	NW	Railway buildings	1883
4	141	W	Railway sidings	1952
A	144	S	Railway sidings	1882
I	148	N	Unspecified tanks	1945-1952
J	152	SW	Railway sidings	1903
F	153	NE	Railway building	1946-1952
F	154	NE	Unspecified tanks	1938
K	155	NE	Railway sidings	1938
K	156	NE	Railway sidings	1952-1975
J	157	SW	Unspecified tanks	1903
L	159	NW	Tramway sidings	1883
D	165	NW	Police station	1883
D	174	NW	Railway building	1946
K	176	NE	Corn windmill	1883
K	176	NE	Windmill	1903
F	176	NE	Unspecified kiln	1883
D	189	NW	Railway building	1952
D	190	NW	Railway building	1938
D	190	NW	Railway building	1903
J	203	SW	Gasometer	1882
D	205	NW	Police station	1952
D	208	NW	Railway station	1938-1946
D	208	NW	Railway buildings	1975
D	209	NW	Railway station	1952
D	209	NW	Railway station	1883
D	212	NW	Railway station	1903
D	212	NW	Police station	1938-1946

ID	Distance [m]	Direction	Use	Date
L	227	N	Unspecified ground workings	1946
L	229	N	Unspecified pit	1938
D	232	NW	Unspecified tank	1975
L	232	N	Unspecified pit	1952
O	233	SW	Unspecified works	1903
D	235	NW	Railway building	1938
D	237	NW	Railway building	1952
D	238	NW	Railway building	1903
L	242	N	Unspecified disused pit	1975
P	243	NE	Unspecified works	1975
P	246	NE	Unspecified commercial / industrial	1946-1952
C	249	NW	Railway sidings	1975

6.16 HISTORICAL TANK DATABASE

ID	Distance(m)	Direction	Use	Date
J	159	SW	Gas works	1903
J	165	SW	Unspecified tank	1883
J	165	SW	Gasometer	1903
5	184	S	Unspecified tank	1881-1903
J	203	SW	Unspecified tank	1903
J	203	SW	Gasometer	1881
D	234	NW	Unspecified tank	1970-1988

6.17 HISTORICAL ENERGY FACILITIES

ID	Distance(m)	Direction	Use	Date
2	79	NE	Electricity substation	1985-1988
E	100	SE	Electricity substation	1970-1985
E	102	SE	Electricity substation	1987-1988
J	159	SW	Gas works	1903
J	165	SW	Gasometer	1903
J	203	SW	Gasometer	1881
N	214	W	Electricity substation	1987-1988

6.18 HISTORICAL GARAGE DATABASE

ID	Distance(m)	Direction	Use	Date
B	42	SE	Garage	1970
M	194	N	Garage	1970-1985
L	221	N	Garage	1987-1988

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

- Erection & demolition of building on site (circa.1938-46)
- Erection & demolition of building on site (circa.1952-70)
- Heap of undiscernible debris (circa.2020-22)
- Scattered refuse, debris, demolition materials and made ground (present-day)

7.1.2 OFFSITE

- Immediately adjacent glasshouse (W, circa.1881-1970)
- Smithy (approx.37m S, circa.1881-1926)
- Historical ponds (approx.34m & 60m NE of site, removed by circa.1903 & 1927)
- Historical iron and engineering works (approx.40m-131m SW, circa.1881-1987)
- Historical brick-field (approx.130m N, circa.1881-1903)
- Unspecified pit (approx.220m N – becomes landfill by circa.191976 to 1987 and subsequently marked as ‘infilled ground’.

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 site cabins, a parking area and scattered debris, refuse and demolition materials. Historically, the site was part of a vicarage garden from circa.1881 through until circa.1938 when an unknown usage structure was erected in the primary site area. This was then removed by circa.1946-47 and a new, centrally located structure was erected by circa.1952-53 and subsequently removed by circa.1970-71. At the same time the unspecified feature was removed from the primary area, the clubhouse was erected in the secondary area in the south east of site. The site then changes little on mapping until the present-day, save for the addition of the summerhouse seen on the walkover in the north of site by circa.1987. The various erections and demolitions of structures on site and their unknown usage; noted made ground and scattered debris seen on the walkover; a partially on site and adjacent historical glasshouse and the erection of the clubhouse (and noted subsequent commercial usage of the structure) are considered potential sources of contamination, capable of adversely impacting site with various substances including:

- Metals and metalloids (demolition rubbles, made ground, debris)
- Polycyclic aromatic hydrocarbons (PAH’s) (noted ashy deposits, made ground)
- Hydrocarbons (usage of former clubhouse for vehicle works – odour noted)
- Asbestos (demolition rubbles, made ground, scattered debris)
- pesticides (glasshouse and garden usage)

8.1.2 HAZARDOUS GROUND GAS AND VAPOURS

No significant sources of potential ground gas generation have been identified considered capable of adversely impacting site. A number of historical ponds noted within 60m east and north east of site are not considered significant risks, due to their age since infill (prior to circa.1945 – gas generational peak likely passed); nor is a historical brick-field located approximately 130m north for similar reasons (removed by circa.1903) and a historical, unspecified pit which was subsequently a landfill (located approximately 220m north and beyond a mainline railway) is not considered a risk, most pertinently due to its topographical location above site and due to its distance, small-scale, short time in service and time passed since operations (circa.1987) and largely inert and industrial waste acceptances. A potential sources of hazardous vapour generation has been identified on site in the form of olfactory evidence of hydrocarbons in the former clubhouse building (likely associated with a previous usage for vehicle maintenance).

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Consequence	Risk	Possible Mitigation
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Direct Ingestion & Direct Contact	Site Workers	Li	Md	M	Site workers to wear appropriate PPE for health and safety reasons, considered usage and adherence to relevant HSE guidance would mitigate this risk to LOW.
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Inhalation of Dust	Site Workers	Li	Md	M	
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Direct Ingestion & Direct Contact	End Users	Li	Md	M	Potential sources of soil contamination noted on site and is proximity to site, both contemporarily and historically. Potential sources include made ground deposits, scattered heaps and refuse (both present and past), a glasshouse and a number of erections and demolitions of unknown usage structures on site, along with the proposed demolition of the clubhouse present on site – recommend this is investigated further as part of a Phase 2 Intrusive Site Investigation.
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Inhalation of Dust	End Users	Li	Md	M	
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Direct Ingestion	Flora and Fauna	Li	Md	M	
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Vertical and lateral migration	Controlled Waters	Ul	Md	L	
Contaminated Soils *(made ground, various demolitions on site, rubbles and scattered debris, ashy deposits, heap)*	Direct contact *(pipe degradation and leaching)*	Services *(potable service piping)*	Lw	Md	M/L	
Ground Gases (Methane and CO_2) *(no significant and proximate sources noted)*	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	No significant or proximate sources of potential ground gas generation identified.
Volatile and Semi-volatile Organic Compounds *(hydrocarbon odour noted in former clubhouse building – vehicle maintainence)*	Vertical and lateral migration	End Users & Building Envelope	Li	Md	M	Hydrocarbon odour noted in former clubhouse building and information indicates this unit to be previous in use for vehicle maintenance – recommend further investigation.
Radon	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	Site is not located in a Radon Affected Area.

KEY: Probability of pollutant linkage Hi = Highly likely, Li = Likely, Lw = Low Likelihood, Ul = 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 (Ul)	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 (Vl)	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 inline with Section 11.0 is planned and carried out on site.

It is recommended that the remaining clubhouse structure on site be subject to an asbestos survey and subsequent removal (if required) by appropriately qualified personnel, 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.

10.0 SUMMARY OF RISKS

10.1.1 SOIL CONTAMINATION

The site is currently occupied by site cabins, a parking area and scattered debris, refuse and demolition materials. Historically, the site was part of a vicarage garden from circa.1881 through until circa.1938 when an unknown usage structure was erected in the primary site area. This was then removed by circa.1946-47 and a new, centrally located structure was erected by circa.1952-53 and subsequently removed by circa.1970-71. At the same time the unspecified feature was removed from the primary area, the clubhouse was erected in the secondary area in the south east of site. The site then changes little on mapping until the present-day, save for the addition of the summerhouse seen on the walkover in the north of site by circa.1987. The various erections and demolitions of structures on site and their unknown usage; noted made ground and scattered debris seen on the walkover; a partially on site and adjacent historical glasshouse and the erection of the clubhouse (and noted subsequent commercial usage of the structure) are considered potential sources of contamination. Due to the age of the buildings, there is a high likelihood that asbestos was used in their construction and the potential for this to have impacted the site, along with made ground deposits from both historical and present-day activities on site is considered a factor in the further investigation of the site.

10.1.2 GROUND GASSES AND VAPOURS

No significant sources of potential ground gas generation have been identified considered capable of adversely impacting site. A number of historical ponds noted within 60m east and north east of site are not considered significant risks, due to their age since infill (prior to circa.1945 – gas generational peak likely passed); nor is a historical brick-field located approximately 130m north for similar reasons (removed by circa.1903) and a historical, unspecified pit which was subsequently a landfill (located approximately 220m north and beyond a mainline railway) is not considered a risk, most pertinently due to its topographical location above site and due to its distance, small-scale, short time in service and time passed since operations (circa.1987) and largely inert and industrial

waste acceptances. A potential sources of hazardous vapour generation has been identified on site in the form of olfactory evidence of hydrocarbons in the former clubhouse building (likely associated with a previous usage for vehicle maintenance).

11.0 RECOMMENDATIONS

It is recommended that a Phase 2 Intrusive Site Investigation be planned and carried out on site. This should involve the formation of trial pits across the site, to facilitate the assessment of ground conditions (i.e. made ground, natural or reworked natural deposits – their depth, extent and nature) and the taking of environmental samples for laboratory analysis. These works should take place following site clearance and the demolition of the clubhouse. An asbestos survey should be carried out prior to the demolition of the clubhouse, to avoid further potential contamination of the site. Provision for usage of a PID (photon-ionisation detector) should be made during the site investigation of the former clubhouse area 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**

Separate Groundsure Report

APPENDIX B **HISTORICAL MAPPING**

Separate Map Packs (2 No. files)

APPENDIX C PROPOSED AND CURRENT SITE PLANS

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

This document references the following files:

Reference Name	Status	Revision
PC XXXX-MS Designer XXXx_0702		P0x.x

Revisions	Date	Drawn / Client
P01 First issue	04/08/22	TK / SE
P02 Revised layout	09/08/22	TK / SE
P03 Unit size revision	12/08/22	TK / SE
P04 Client amendments	19/08/22	TK

Client
Western House Developments

Project
Proposed Residential Development on the Land Adjacent No. 1 Highstreet, Leiston

Title
Proposed Site Layout Plan

Project N°	Drawing N°	Revision
5760 - 0102		P04

Scale unless otherwise stated | Issued For
1 : 200 @ A2 PRELIMINARY

BS 1192 Ref. | Status
PC-Designer-0102

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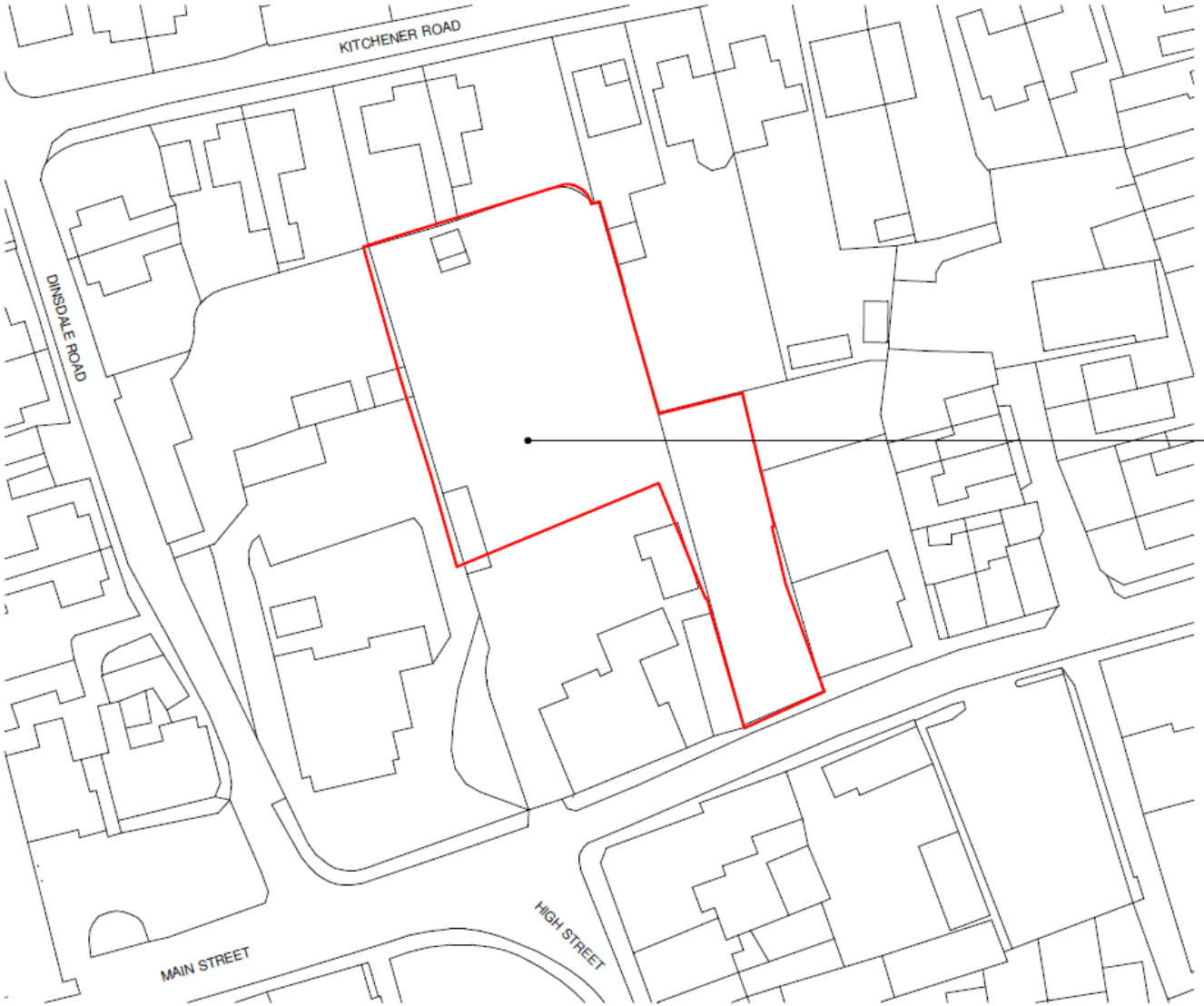

Site Location Plan

0 25 50
Meters
1 : 500

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

This document references the following file:

Reference Name	Status	Revision
PC-XX-XX-M3-Designer-0001_5760		P01.1

Revisions	Date	Drawn / Chk'd

Client
Western House Developments

Project
Proposed Residential Development on the Land Adjacent No. 1 Hightsetreet, Leiston

Title
Site Location Plan

Project N° 5760 - 0100
Drawing N°
Revision

Scale - unless otherwise stated
1 : 500 @ A3
Issued For

BS 1192 Ref.
PC-Designer-0100
Status

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APPENDIX D SITE PHOTOS AND LOCATIONS

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: No.1 High Street, Leiston, Suffolk

Client: Western House Developments

Photo No.1: Facing south from the southern boundary of site showing site access leading north off Valley Road

Photo No.2: Facing north from the southern site boundary showing parking and staging area for site works

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: No.1 High Street, Leiston, Suffolk

Client: Western House Developments

Photo No.3: Facing east from the parking area towards adj. onsite former clubhouse building and storage area on site

Photo No.4: Facing slightly NW showing timber and refuse heap located centrally on site

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: No.1 High Street, Leiston, Suffolk

Client: Western House Developments

Photo No.5: Facing west from the NE corner of site showing former garden area and summerhouse in northern extent of site

Photo No.6: Facing south from the far northern boundary

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: No.1 High Street, Leiston, Suffolk

Client: Western House Developments

Photo No.7: Facing south from the far northern boundary of site showing topsoil heap located in the NE extent of site

Photo No.8: Facing north in adj. onsite former clubhouse showing dilapidated state of building (dancefloor area)

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: No.1 High Street, Leiston, Suffolk

Client: Western House Developments

Photo No.9: Facing south from inside the dancefloor room of the adjacent structure with front (southern) rooms in background

Photo No.10: Facing south in the front (southern) rooms of the former clubhouse toward Valley Rd and showing storage

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APPENDIX E 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 F DISCOVERY STRATEGY