



**Castledine
Environmental**

LAND CONTAMINATION SURVEYS

**Phase 1 Land Contamination
Risk Assessment**

for

**The Proposed Construction of 4 No.
Semi-Detached Dormer Bungalows and
1 No. Detached Dormer Bungalow (For
Occupation by Persons Over the Age of
55 Only) with Associated Parking and
Amenity Space**

on the site of

**Bethel and Bethesda Residential Care
Home, Equity Road East, Earl Shilton,
Leicester LE9 7FY**

Date: May 2025

Status:

Final Report

Reference:

3975D P1 Cooper Residential – Earl Shilton

Date:

30/05/2025

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EXECUTIVE SUMMARY

The site presently comprises a currently redundant and disused access route, small car-parking area and an expanse of recently cleared ground. The ground conditions underfoot comprised sands and gravels with anthropogenic inclusions such as brick, plastics and some scattered wastes and debris (i.e. domestic wastes such as food wrapping and containers). Historically, the site remained unoccupied field from at least circa.1886 through until circa.1914, when the site was developed with a picture theatre, which remained in such usage until circa.1964, when the structure was split into two (northern half being marked as 'works' and the southern half remaining as a cinema), alongside the erection of at least 3 No. garage lock-up units in the south western extent of site. By circa.1969, the works forming the northern extent of the structure was marked as a 'motor body works' and by circa.1979 the southern half of the structure was also marked as 'works'. Such usages remained on site until circa.1983, when the lock-up garage units were demolished, along with the northern half of the structure on site. The remainder of the structure was then fully demolished by circa.1989 and the site left vacant and overgrown following this – as evidenced by the present site conditions and by a review of historical satellite imagery (see Section 6.10.1).

The surrounding areas over time remained initially and predominantly agricultural with scattered dwellings with an orchard located directly north east of site and a gas works approximately 50m south west of site by circa.1886 (with two gasometers), with the orchard being removed by circa.1903 and the gas works being decommissioned by circa.1916. Following this, the surrounding areas see extensive residential development in all compass directions, with the former gas works being redeveloped into a council yard and subsequent industrial estate by circa.1964 and 1983, respectively. Further notable features from the surrounding areas include the formation and demolition of a roller-skating park directly south of site between circa.1964 and 1979 and the erection of a number of lock-up garage units located approximately 20m south east and 60m south of site, which appear to remain until the present-day.

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 15.0 is planned and carried out on site, thus informing a subsequent Phase 3 Remediation Strategy and Verification Plan outlining the pragmatic installation of ground gas protective measures (being upgraded to VOC-resistant measures, should site investigation prove such is necessary).

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

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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.

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 AND SITE PROPOSALS

Castledine Environmental have been appointed by Cooper Residential Homes Ltd to undertake a Phase 1 Desk study on a site at Bethel and Bethesda Residential Care Home, Equity Road East, Earl Shilton, Leicester LE9 7FY.

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Cooper Residential Homes Ltd and associated appointees for the purpose of ensuring compliance with:

- National Planning Policy Framework (NPPF) December 2024.
- Part C1 of the building regulations;
- Support of Planning Application No: 22/00370/FUL

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.

This report is to be regarded as a Preliminary Risk Assessment in accordance with the Environment Agency's Land Contamination Risk Management (LCRM – 2021), which replaces CLR11 "*Model Procedures for the Management of Land Contamination*", carried out in accordance with BS 10175:2011+A2:2017, "*Investigation of Potentially Contaminated Land - Code of Practice*" and relevant sections of BS5930:2015+A1:2020, "*Code of Practice for Ground Investigations*".

The objectives of the report are:-

- To assess historical activities at the site with respect to their potential impact on the site environment;
- 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;

- Review of geological, hydrogeological and hydrological conditions at the site, pertaining to land contamination issues;
- 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; and
- To develop a preliminary conceptual site model (CSM).

This report has been produced in order to discharge any relevant planning conditions outlined by the Local Authority and Environment Agency; however, further requirements may be imposed after the findings of this report that may need to be addressed at a later date.

5.0 SITE DESCRIPTION

The site is located in Earl Shilton, Leicester at National Grid Reference: 446481,297649 and is approximately 0.19ha in area.

The site is irregular in shape and is orientated north to south. The site is located in a predominantly residential area and is directly bounded by dwellings and their associated garden spaces to the west, north and east with an associated residential care home directly south of site.

The site interior comprises a currently redundant and disused access route, small car-parking area and an expanse of recently cleared ground. Access to site was provided via the care home access route, leading north off Equity Road East before terminating at the car-park on site. The secondary access, currently disused and overgrown, extends west from the car-parking area to the nearby Station Road. The car-parking area was seen to be formed by gravelled hardstanding. The remainder of site then comprises a vacant plot of land which had recently been cleared of overgrown vegetation. The ground conditions underfoot largely comprised sands and gravels with anthropogenic inclusions such as brick, plastics and some scattered wastes and debris (i.e. domestic wastes such as food wrapping and containers).

No significant potential sources of contamination were noted on the site walkover beyond the made ground deposits noted underfoot.

Topographically, the main site area was hummocky with the car-parking area level; whilst the surrounding areas dropped off from the north and north west to the south and south east.

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

ID	Distance (m)	Direction	Designation	Description
2	165	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
3	196	W	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	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	156	NW	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 active abstraction sites located within 1000m of the site under review.

6.1.3 SOURCE PROTECTION ZONE

Site is not in a source protection zone (SPZ).

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: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: High Aquifer type: Secondary Thickness: 3-10m Patchiness value: <90% Recharge potential: High	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: 3-10m Patchiness value: <90% Recharge potential: High	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures

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 500m of site.

6.2 PERMITTED PROCESSES

The Groundsure report records a mothballed Part B Permit relating to the unloading of petrol formerly located 258m south west of site and an active Part B Permit relating to a waste oil burner currently located 492m west of site.

6.3 POLLUTION INCIDENTS

The Groundsure report records no pollution incidents located within 250m of site and no significant impact incidents located within 500m of site.

6.4 RADIOACTIVE SUBSTANCES REGISTRATIONS

None recorded within 500m of site.

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

None recorded within 500m of site.

6.5.2 LANDFILL SITES

The Groundsure report records:

- A historical unlicensed landfill formerly located 281m west of site and handling inert, commercial and household waste types, last recorded circa.1960 (no initial date held);
- A historical unlicensed landfill formerly located 352m east of site and handling inert, commercial and household waste types (no initial or last date of entry recorded)

6.6 HISTORICAL WASTE SITES

The Groundsure report records a refuse heap formerly located 172m south of site and identified from historical mapping dated circa.1904.

6.7 HAZARDOUS SUBSTANCES

None recorded within 500m of site.

6.8 ECOLOGICAL RECEPTORS

The Groundsure report records the site as being located within the Soar River surface waters Nitrate Vulnerable Zone (NVZ). No further sensitive land usages are recorded within 1000m of site.

6.9 SOILS AND GEOLOGY

"Contains British Geological Survey materials © NERC 2025" obtained from <http://www.bgs.ac.uk/data/mapViewers/home.html> under the [Open Government Licence](#)

6.9.1 SUPERFICIAL DEPOSITS

Both BGS geological mapping and the Groundsure report record superficial geological deposits of the Wolston Sand and Gravel occupying a small extent of the far north of site and comprising glaciofluvial sands and gravels broadly dominated by quartzite and coal.

6.9.2 SUPERFICIAL DEPOSITS PERMEABILITY

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.

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).

6.9.3 BEDROCK DEPOSITS

Both BGS geological mapping and the Groundsure report records bedrock geology of the Edwalton Member underlying site, comprising a red-brown and greenish-grey mudstone and siltstone with subordinate siltstones and sandstones.

6.9.4 BEDROCK PERMEABILITY

The Groundsure report records the site as being within an area where the maximum permeability of bedrock geology is recorded as 'low' and the minimum permeability as 'low' and facilitated by fracture flow mechanisms.

6.9.5 ARTIFICIAL GROUND

BGS geological mapping records an area of worked ground described as a 'void' located 288m north west of site.

6.9.6 COAL MINING

The site is not located in a coal mining reporting area and the local geology is not considered appropriate for such extraction. As such the risk from coal mining activities is considered to be negligible.

6.9.7 NON-COAL MINING

The Groundsure report records no non-coal mining operations, features or activities located within 500m of site.

6.9.8 SURFACE WORKINGS

ID	Distance (m)	Direction	Land Usage	Year of Mapping
1	172	S	Refuse	1904
2	233	S	Unspecified ground workings	1886

6.9.9 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.

6.10 AERIAL PHOTOGRAPHY

Aerial photography shows the following:

6.10.1 GOOGLE EARTH

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

Date	Description
December 1999	The site is shown as occupied by the car-parking area forming the SW extent of site and at this time, the southern extent with the central and northern extents of site remaining overgrown. The surrounding areas to site remain consistent with that seen in the present-day, comprising residential areas in all compass directions.
July 2006	No major or discernible change on site nor site relevant change to the surrounding areas.
September 2008	No major or discernible change on site nor site relevant change to the surrounding areas.
December 2010	No major or discernible change on site nor site relevant change to the surrounding areas.
September 2011	No major or discernible change on site nor site relevant change to the surrounding areas.
April 2015	No major or discernible change on site nor site relevant change to the surrounding areas.
April 2016	No major or discernible change on site nor site relevant change to the surrounding areas.
April 2018	No major or discernible change on site nor site relevant change to the surrounding areas.
April 2020	No major or discernible change on site nor site relevant change to the surrounding areas.
February 2021	No major or discernible change on site nor site relevant change to the surrounding areas.

Date	Description
March 2021	No major or discernible change on site nor site relevant change to the surrounding areas.
June 2021	No major or discernible change on site nor site relevant change to the surrounding areas.
February 2022	The site has now been entirely cleared of vegetation. Surrounding areas see little site relevant change.
May 2022	Vegetation on site is recovering however the central extent of site is now occupied by a heap of indiscernible debris / possible occupied by the remnants of a bonfire.
November 2024	Site is now wholly overgrown once again, apart from the car-parking area forming the SW extent of site. Surrounding areas see little site relevant change.

6.10.2 GOOGLE STREET VIEW

Google Street View imagery is unavailable for the site due to the site's location away from the public roadside and at the termination of a private access route.

6.11 HISTORIC MAPPING

The following historic maps have been reviewed as part of this assessment:

Map	Onsite	Offsite
OS County Series: 1886, 1:10,560	The site is shown as unoccupied, open field.	Immediate surroundings to site comprise open field with Station Road remaining west of site, as in the present-day. The town of Earl Shilton is largely located 100m north and extends east and west from this point. Notable features from the surrounding areas comprise an orchard directly north and NE of site; a gas works with two gasometers approx.50m SW of site and kilns approx.250m south of site.
OS County Series: 1888, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.

Map	Onsite	Offsite
OS County Series: 1903, 1:2,500	No discernible change on site.	A gasometer is now located approx.20m SW of the site access route. The orchard NE of site remains however that north of site has been redeveloped into house. Kilns formerly located approx.250m south of site no longer marked on mapping.
OS County Series: 1904, 1:10,560	No discernible change on site.	A boot factory is now located approx.275m south and a barracks approx.111m NE of site (being named 'The Barracks' which may indicate this is a hotel or public house).
OS County Series: 1914, 1:10,560	Site is now occupied by a cinema (marked as a Picture Theatre) which occupies the majority of site.	Surrounding areas to the NW, north and NE of site see residential infill. Boot factory south of site now doubled in size.
OS County Series: 1916, 1:2,500	No discernible change on site.	The gasometer directly SW of site and the two within the gasworks approx.50/60m SW of site have been removed and the gas works is no longer marked as such. Housing is now located directly NW of site.
OS County Series: 1938, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
Provisional: 1950, 1:10,560	No discernible change on site.	Surrounding areas see further residential infill.
National Grid: 1964, 1:2,500	On site structure has now been split into two with the northern half marked as a works and the southern remaining as a cinema. The car-parking area at present appears to be occupied by at least 3 No. lock-up garage units.	A bungalow and housing is now located directly west and SW of site, as in the present-day; the area directly south of site is now occupied by a roller skating park; the former gasworks SW of site is now marked as a council yard; the barracks NE of site are no longer marked on mapping and a new factory is located approx.90m NW of site.
Provisional: 1968, 1:10,560	No discernible change on site.	Depot is now marked approx.100m SW of site; former boot factory south of site now reduced in size and marked as factory. Further residential infill in surrounding areas.

Map	Onsite	Offsite
National Grid: 1969, 1:2,500	The northern half of the onsite structure, formerly marked as works, is now marked as motor body works.	New factory NW of site marked as hosiery; engineering works now located adj. to the depot, approx.120m SW of site. New engineering works located approx.200m NW of site.
National Grid: 1979, 1:2,500	Southern half of onsite structure now marked as works.	Roller skating park south of site removed and no longer marked on mapping; areas directly east and SE of site (and extending further in these directions) now occupied by present-day residential estate; former depot SW of site now redeveloped into initial stages of present-day industrial estate.
National Grid: 1980, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1983, 1:2,500	The lock-up garage units previously located in the SW extent of site and the northern half of the structure on site have both been demolished. Site remains marked as works.	Surrounding areas see further residential infill. What appear to be small-scale lock-up garages are now located approx.20m SE and 60m south of site. Former council yard SW of site reduced in size and now occupied by 6 No. units.
National Grid: 1988, 1:2,500	No discernible change on site.	The initial stages of the associated care home south of site are now present, atop the former roller-skating park.
National Grid: 1989, 1:2,500	Remaining structure on site now demolished and the site unoccupied.	Area directly south now marked as Bethel Residential Home.
National Grid: 1994, 1:2,500	No discernible change on site.	Remaining, present-day extension to the care home south of site has now been erected and the area is now inline with the present-day.
National Grid: 2001, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
Landline: 2003: 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.	Former boot factory south of site now redeveloped into housing.
National Grid: 2025, 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
A	79	SW	Industrial estate	Business parks and industrial estates	Industrial features
A	87	SW	Detail Precision Engineering Ltd	Precision engineers	Engineering services
A	97	SW	Meadway Engineering Ltd	Precision engineers	Engineering services
A	104	SW	Works	Unspecified works or factories	Industrial features
A	131	SW	Works	Unspecified works or factories	Industrial features
A	134	SW	Factory	Unspecified works or factories	Industrial features
B	136	W	Electricity substation	Electrical features	Infrastructure and facilities
A	144	SW	West End Woodworking	Office and shop equipment	Industrial products
B	153	NW	The Motorist Centre	Vehicle parts and accessories	Motoring
1	154	NE	Electricity substation	Electrical features	Infrastructure and facilities
A	160	SW	Electricity substation	Electrical features	Infrastructure and facilities
2	182	NE	AJS Motors	Vehicle parts and accessories	Motoring
3	200	W	BS Labels Ltd	Stationary, stamps, tags and labels	Industrial products
4	237	W	Electricity substation	Electrical features	Infrastructure and facilities

6.13 PETROL AND FUEL SITES

The Groundsure report records obsolete filling stations formerly located 271m south and 429m north east of site.

6.14 HISTORICAL PETROL AND FUEL SITE DATABASE

None recorded within 500m of site.

6.15 POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED ON MAPPING

ID	Distance (m)	Direction	Use	Date
A	13	SW	Unspecified tank	1904-1914
B	20	W	Council yard	1968
B	37	SW	Unspecified commercial / industrial	1938
B	37	SW	Gas works	1914
B	38	SW		1886-1904
1	57	NE	Barracks	1950
B	69	SW	Unspecified tank	1886
B	70	SW	Unspecified tank	1938
B	70	SW	Gasometer	1904-1914
C	72	W	Unspecified works	1968
D	73	SW	Unspecified depot	1968
B	74	SW	Gasometer	1886
E	111	NE	Barracks	1886
E	165	NE	Barracks	1914-1938
2	172	S	Refuse	1904
G	233	S	Unspecified ground workings	1886
G	235	SW	Unspecified kiln	1886
H	246	S	Unspecified factory	1968-1980
G	248	SW	Unspecified kiln	1886
H	272	S	Boot factory	1904
I	272	NW	Unspecified pit	1904
I	272	NW	Clay pit	1914
I	272	NW	Unspecified pit	1938-1950
H	275	S	Boot factory	1914-1938
H	276	S	Boot factory	1950
J	295	SE	Unspecified tank	1914-1938
J	297	SE	Unspecified tank	1950
3	355	E	Unspecified ground workings	1886
M	369	NE	Boot factory	1950
M	371	NE	Boot factory	1914
N	385	SW	Unspecified works	1914-1950
5	387	W	Unspecified factory	1968-1980
O	390	NE	Smithy	194
6	412	SW	Unspecified depot	1968-1980
7	443	SW	Unspecified factory	1968-1980
8	452	SW	Boot factory	1904
Q	465	NE	Boot factory	1904
Q	466	NE	Hosiery manufactory	1914

6.16 HISTORICAL TANK DATABASE

ID	Distance (m)	Direction	Use	Date
A	14	SW	Unspecified tank	1903
B	28	SW	Gas works	1888-1903
B	60	SW	Gasometers	1888
B	73	SW	Gasometers	1903
C	109	W	Tanks	1964
J	292	SE	Unspecified tanks	1916
N	408	SW	Unspecified tank	1916
P	449	NE	Unspecified tank	1994
P	451	NE	Unspecified tank	1985
P	451	NE	Unspecified tank	1991
9	489	N	Unspecified tank	1916

6.17 HISTORICAL ENERGY FACILITIES

ID	Distance (m)	Direction	Use	Date
B	28	SW	Gas works	1888-1903
B	60	SW	Gasometers	1888
B	73	SW	Gasometer	1903
C	136	W	Electricity substation	1997
E	147	NE	Electricity substation	1988-1989
E	151	NE	Electricity substation	1983
E	153	NE	Electricity substation	1997
D	157	SW	Electricity substation	1997
D	160	SW	Electricity substation	1983
D	162	SW	Electricity substation	1988-1989
F	227	W	Electricity substation	1997
F	229	W	Electricity substation	1983
F	229	W	Electricity substation	1988-1989
H	250	S	Electricity substation	1997
H	252	S	Electricity substation	1983-1989
K	319	N	Electricity substation	1991
K	319	N	Electricity substation	1994
K	320	N	Electricity substation	1985
4	367	SE	Electricity substation	1979
L	376	SW	Electricity substation	1988-1989
L	377	SW	Electricity substation	1983
L	381	SW	Electricity substation	1997
P	484	NE	Electricity substation	1994
P	485	NE	Electricity substation	1985-1991

6.18 HISTORICAL GARAGE DATABASE

ID	Distance (m)	Direction	Use	Date
G	250	SW	Garage	1997
G	251	S	Garage	1988-1989
G	251	S	Garage	1979
G	253	S	Garage	1983
G	253	S	Garage	1964-1969
L	368	SW	Garage and vehicle testing station	1988-1989
L	368	SW	Garage	1969-1979
L	370	SW	Garage	1964
L	370	NSW	Garage	1983
O	404	NE	Garage	1997
O	408	NE	Garage	1979
O	408	NE	Garage	1988-1989
O	414	NE	Garage	1969
O	414	NE	Garage	1983

7.0 PRELIMINARY CONCEPTUAL SITE MODEL

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 in, on or under land (or within groundwaters) 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.

Source	A contaminant or pollutant that is in, on or under land that has the potential for cause harm or pollution to a receptor.
Pathway	The physical route by which a receptor is or could be affected by a contaminant or pollutant.
Receptor	Something or someone that could be adversely affected by a contaminant, i.e. people, controlled waters, ecological systems, buildings, crops, livestock.

By considering each of the three elements above, an assessment of actual and potential hazards to receptors can be carried out, taking into account the significance and degree of risk of each. The three elements above can exist separately; however, they only create a risk where they are linked together, thus creating a contaminant linkage. During the Preliminary Risk Assessment Stage, the linkages are referred to as 'Potential Contaminant Linkages', until they are confirmed via intrusive sampling, thus becoming 'Relevant Contaminant Linkages'.

A tabled, diagrammatic or matrix of pollutant linkages is considered to be a Conceptual Site Model (CSM), the source-pathway-receptor linkages are reviewed and displayed, apportioning a risk-rating and mitigation suggestion after each summary.

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 (prior to circa.1886 through until circa.1914 when the site was developed with a picture theatre);
- Erection of picture theatre (circa.1914 and split into two units by circa.1964);
- Northern extent of structure on site marked as 'works' – unknown usage (circa.1964, southern extent remains marked as cinema until circa.1979 when marked also marked as 'works – unknown usage);
- Erection of at least 3 No. garage units atop car-parking area (circa.1964, south west of site – demolished circa.1983);
- Northern extent of structure on site marked as 'motor body works' (circa.1969);
- Demolition of northern extent of structure on site (circa.1983);
- Demolition of southern extent of structure on site (circa.1989);
- Made ground deposits & scattered wastes (noted on site walkover).

Potential Sources and Associated Contaminants Identified	
Source	Potential Contaminants of Concern
Agricultural use of the site (prior to circa.1886 through until circa.1914 when the site was developed with a picture theatre);	Agrichemicals (i.e. SVOC) however considered relatively unlikely as prior site soils likely removed as part of various site developments and demolitions
Erection of picture theatre (circa.1914 and split into two units by circa.1964);	Asbestos (within period of usage although a corrugated metal roofing is known), heavy metals, metalloids, PAHs – limited potential for TPH CWG (i.e. heating purposes)
Northern extent of structure on site marked as 'works' – unknown usage (circa.1964, southern extent remains marked as cinema until circa.1979m when marked also marked as 'works – unknown usage);	Various including made ground deposits, asbestos, heavy metals, metalloids, PAHs, TPH CWG (unknown works therefore unknown usage of potential contaminates – generic suite of contaminants)
Erection of at least 3 No. garage units atop car-parking area (circa.1964, south west of site – demolished circa.1983);	Asbestos (likely corrugated roofing or cladding), heavy metals, hydrocarbons TPH CWG / PAH / BTEX MBTE (period of usage)
Northern extent of structure on site marked as 'motor body works' (circa.1969);	Various including made ground deposits, asbestos, heavy metals, metalloids, PAHs, TPH CWG (motor body works likely involves hydrocarbon and solvent usage)
Demolition of northern extent of structure on site (circa.1983);	Various including made ground deposits, asbestos, heavy metals, metalloids, PAHs, TPH CWG (unknown works therefore unknown usage of potential contaminates – generic suite of contaminants)
Demolition of southern extent of structure on site (circa.1989);	Various including made ground deposits, asbestos, heavy metals, metalloids, PAHs, TPH CWG (unknown works therefore unknown usage of potential contaminates – generic suite of contaminants)
Made ground deposits & scattered wastes (noted on site walkover).	Various including made ground deposits, asbestos, heavy metals, metalloids, PAHs, TPH CWG (unknown works therefore unknown usage of potential contaminates – generic suite of contaminants used as surrogated marker for further potential contaminants)

7.1.2 OFFSITE

- Orchard (directly north & NE of site, at least circa.1886-1903)
- Gasworks with infrastructure and 2/3 No. gasometers (approx.50m SW, circa.1886, additional gasometer approx.20m south of site access route by circa.1888 – removed by circa.1916 with buildings remaining); subsequently developed into council yard (circa.1964) followed by industrial unit usage (circa.1983 – remain persistent);
- Roller-skating Park (directly south, circa.1964, demolished 1979);
- Series of lock-up garage units (approx.20m SE & 60m south, circa.1983 until the present-day);
- Nearby industrial usages (i.e. unspecified factories and depots to the NW, SW of site, hosiery factories, engineering works – approx.100-250m in respective directions).

- Historical landfill records:
 - A historical unlicensed landfill formerly located 281m west of site and handling inert, commercial and household waste types, last recorded circa.1960 (no initial date held);
 - A historical unlicensed landfill formerly located 352m east of site and handling inert, commercial and household waste types (no initial or last date of entry recorded).

Potential Sources and Associated Contaminants Identified	
Source	Potential Contaminants of Concern
Orchard (directly north & NE of site, at least circa.1886-1903)	Agrichemicals (i.e. SVOC) however considered relatively unlikely as prior site soils likely removed as part of subsequent residential development of the area
Gasworks with infrastructure and 2/3 No. gasometers (approx.50m SW, circa.1886, additional gasometer approx.20m south of site access route by circa.1888 – removed by circa.1916 with buildings remaining); subsequently developed into council yard (circa.1964) followed by industrial unit usage (circa.1983 – remain persistent);	Ground gases (dependant on infill of gasometer infrastructure / below ground infrastructure), hydrocarbons PAHs / TPH CWG, heavy metals, metalloids, phenolics, cyanide
Roller-skating Park (directly south, circa.1964, demolished 1979);	Likely made ground subbase (i.e. ash subbase – PAHs, heavy metals)
Series of lock-up garage units (approx.20m SE & 60m south, circa.1983 until the present-day);	Asbestos (likely corrugated roofing or cladding), heavy metals, hydrocarbons TPH CWG / PAH / BTEX MBTE (period of usage)
Nearby industrial usages (i.e. unspecified factories and depots to the NW, SW of site, hosiery factories, engineering works – approx.100-250m in respective directions).	Various including made ground deposits, asbestos, heavy metals, metalloids, PAHs, TPH CWG (unknown works therefore unknown usage of potential contaminates – generic suite of contaminants used as surrogated marker for further potential contaminants)
Historical landfills (approx.281m west, 352m east – various waste types)	Ground gases

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 (direct and indirect via crop uptake);
- Dermal contact;
- Inhalation;
- Plant uptake;

- Direct contact by buried structures (i.e. pipe degradation and leaching, pH & Sulphate attack on concrete); and
- 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;
 - Services personnel working in trenches;
- Buried concrete, which may be affected by high concentrations of sulphate and/or low pH, in the soils and groundwater underlying the site;
- Construction Materials;
- Buried water pipes;
- Controlled Waters;
- Ecological Receptors; and
- 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 presently comprises a currently redundant and disused access route, small car-parking area and an expanse of recently cleared ground. The ground conditions underfoot comprised sands and gravels with anthropogenic inclusions such as brick, plastics and some scattered wastes and debris (i.e. domestic wastes such as food wrapping and containers). Historically, the site remained unoccupied field from at least circa.1886 through until circa.1914, when the site was developed with a picture theatre, which remained in such usage until circa.1964, when the structure was split into two (northern half being marked as 'works' and the southern half remaining as a cinema), alongside the erection of at least 3 No. garage lock-up units in the south western extent of site. By circa.1969, the works forming the northern extent of the structure was marked as a 'motor body works' and by circa.1979 the southern half of the structure was also marked as 'works'. Such usages remained on site until circa.1983, when the lock-up garage units were demolished, along with the northern half of the structure on site. The remainder of the structure was then fully demolished by circa.1989 and the site left vacant and overgrown following this – as evidenced by the present site conditions and by a review of historical satellite imagery (see Section 6.10.1).

The surrounding areas over time remained initially and predominantly agricultural with scattered dwellings with an orchard located directly north east of site and a gas works approximately 50m south west of site by circa.1886 (with two gasometers), with the orchard being removed by circa.1903 and the gas works being decommissioned by circa.1916. Following this, the surrounding areas see extensive residential development in all compass directions, with the former gas works being redeveloped into a council yard and subsequent industrial estate by circa.1964 and 1983, respectively. Further notable features from the surrounding areas include the formation and demolition of a roller-skating park directly south of site between circa.1964 and 1979 and the erection of a number of lock-up garage units located approximately 20m south east and 60m south of site, which appear to remain until the present-day.

8.1.2 GROUND GAS AND HAZARDOUS VAPOURS

Potential sources of both hazardous ground gas and vapour generation have been identified.

Potential sources of ground gas generation include a proximate former gas works with at least 3 No. gasometers, being removed by circa.1916, located directly south and south west of site (within 20-50m). Dependant on the infill material used to remove the former gas works excavations, alongside the potential for significantly impacted made ground deposits, such features present a ground gas hazard to site (however, when taking into account the approximately 109 years of potential gas generation, such deposits are likely well beyond their gas generational peak).

Potential sources of hazardous vapours include said gas works, alongside numerous onsite unknown industrial usages, a motor body works, erection and demolition of at least 3 No. garage lock-up units on site and further, adjacent garage lock-up units. Should significant fuel storage or usage have taken place on site (either industrial usage or for heating purposes or recreational usages on site), residual hydrocarbon contamination may exist on site.

It should be noted that the site is located in an area where bedrock deposits (Edwalton Member) underlying site are predominantly low to very low in permeability and thus will act to inhibit onsite impact from offsite sources, however, superficial deposits (Wolston Sands and Gravels) are likely highly permeable and thus, may provide a credible pathway to site development proposals.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Source	Pathway	Receptor	Probability of Pollutant Linkage	Conseq.	Risk	Possible Mitigation
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Direct Ingestion & Direct Contact	Site Workers (<i>during site works, excavations, eating and drinking</i>)	Li	Md	M	Site workers to wear appropriate PPE for health and safety reasons, the suitable usage of PPE and adherence to relevant HSE guidance is considered sufficient to mitigate inherent site worker hazards to low – following confirmation via intrusive Phase II SI.
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Inhalation of Dust, Dry Arisings	Site Workers (<i>during site works, excavations, eating and drinking</i>)	Li	Md	M	
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Crop Uptake & Direct Ingestion, Direct Contact	End Users (<i>residents / tenants, children, visitors, service personnel</i>)	Li	Md	M	Potential sources of contamination have been identified on and adjacent to site which, in light of the sensitive residential site development proposals, require further investigation. Potential sources include various erections and demolitions on site (both industrial – unknown usages & Motor body works – and recreational – theatre, cinema, skate park) and adjacent potential sources (further demolitions, industrialised usages, nearby lock-up garage units). As such, it is recommended that an intrusive Phase II Site Investigation is planned and carried out on site. Trial pit formation across the site and targeted at the footprint of former industrial usages and areas of proposed soft-landscaping (alongside the former lock-up garage units on site) will be sufficient to characterise site soils and inform onsite hazards (i.e. end-users, site workers, controlled waters, adjacent and ecological receptors, new potable water piping). As below, client has opted to combine pragmatic installation of ground gas protective measures (inline with BS8485:2015:A1-2019) with physical contaminant investigation (i.e. trial pitting).
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Inhalation of Dust, Dry Arisings	End Users (<i>residents / tenants, children, visitors, service personnel</i>)	Li	Md	M	
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Crop Uptake & Direct Ingestion, Direct Contact	Flora and Fauna (<i>on and offsite</i>)	Lw	Md	M/L	
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Vertical and lateral migration (<i>superficial highly permeable, bedrock predominantly low</i>)	Controlled Waters (<i>Secondary A & B Aquifers – highly vulnerable</i>)	Lw	Md	M/L	
Contaminated Soils (<i>agricultural usage & orchard, various erections & demolitions – both industrial & recreational i.e. works, motor body works, unknown industrial usages, made ground deposits</i>)	Direct contact (<i>pipe degradation and leaching</i>)	Services (<i>impacted new potable supply piping</i>)	Lw	Md	M/L	
Ground Gases (Methane and CO ₂) (<i>nearby former gas works & at least 3 No. gasometers, distal landfill records</i>)	Vertical and lateral migration (<i>superficial highly permeable, bedrock predominantly low</i>)	Site Workers & Excavations, End Users & Building Envelope (<i>ingress and build-up</i>)	UI	Sv	M/L	Limited potential sources of hazardous ground gas generation identified, see Section 8.1.2. – client has opted to combine pragmatic installation of ground gas protective measures (inline with BS8485:2015:A1-2019) with physical contaminant investigation (i.e. trial pitting). Recommend a Phase 3 Remediation Strategy is produced for the site following intrusive investigation.
Volatile and Semi-volatile Organic Compounds (<i>onsite lock-up garages, potential for heating fuels, nearby gas works</i>)	Vertical and lateral migration (<i>superficial highly permeable, bedrock predominantly low</i>)	Site Workers & Excavations, End Users & Building Envelope (<i>ingress and build-up</i>)	Lw	Md	M/L	Limited potential sources of hazardous vapours identified, see Section 8.1.2. – recommend further investigation as part of an intrusive site investigation comprising trial pit formation (i.e. targeted at former location of lock-up garage units).
Radon	Vertical and lateral migration	End Users & Building Envelope	UI	Md	L	Site is not located in a Radon Affected Area.

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

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

TABLE 2. RISK CLASSIFICATION MATRIX

		Consequence			
		Severe (Sv)	Medium (Md)	Mild (Mi)	Minor (Mr)
Probability	High (Hi)	Very high risk	High risk	Moderate Risk	Moderate/ Low Risk
	Likely (Li)	High risk	Moderate Risk	Moderate/ Low Risk	Low Risk
	Low Likelihood (Lw)	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely (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.
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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 inline with Section 14.0 is planned and carried out on site, thus informing a subsequent Phase 3 Remediation Strategy and Verification Plan outlining the pragmatic installation of ground gas protective measures.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 2 intrusive testing to be undertaken, followed by the Phase 3 Remediation Strategy and Verification Plan (in light of the Phase 2 investigation findings and limited ground gas hazards identified).

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

The risks to end-users of the site following site redevelopment are considered to be moderate when assessed against the sensitive residential end-usage of the site proposed and the site's historical legacy (i.e. various erections and demolitions of both known and unknown industrial usages, alongside recreational usages and noted made ground deposits) and the site's location in a heavily urbanised area. Should contamination associated with such usages be present on site, there exists credible pathways for contamination to impact end-users following site redevelopment (i.e. inhalation of dusts or dry arisings, dermal direct contact with soils, indirect and direct ingestion, surface water run-off or pooling). Furthermore, limited on site vapour hazards and potential offsite ground gas sources have been identified (with onsite hydrocarbons proposed to be analysed and offsite ground gas sources proposed to be guarded against via the pragmatic installation of ground gas protective measures – should analysis identify the requirement, such measures will be upgraded to those that are vapour resistant).

11.1.2 SITE WORKERS

The risks to site workers during site development works are considered to be moderate due to the potential for various physical contaminants on site (i.e. metals, metalloids, PAHs, asbestos) associated with the site's historical legacy and urban location (i.e. various known and unknown industrialised usages, subsequent demolitions etc). The potential for the inhalation of asbestos fibres, direct contact with contaminated made ground or the build-up of vapours / ground gases in excavations are considered risks to site workers. The provision for considered usage of PPE and adherence to relevant HSE guidance would be sufficient to mitigate the risks to low, following confirmation of both soil and ground gas / vapour hazards on site via an intrusive Phase II Site Investigation.

12.0 CONTROLLED WATERS

The risks to controlled waters are considered to be low to moderate, due to the potential for mobile contamination on site inherent within extant made ground deposits – such deposits may be in direct contact with the underlying superficial, highly vulnerable Secondary A Aquifer and as such, an assessment of the deposits should be made; however, the risk is reduced somewhat by the lack of a source protection zone (SPZ) on or nearby to site nor the presence of active abstraction sites within 1000m of the site under review.

13.0 STRUCTURES

13.1.1 GROUND GASES

Potential sources of ground gas generation include a proximate former gas works with at least 3 No. gasometers, being removed by circa.1916, located directly south and south west of site (within 20-50m). Dependant on the infill material used to remove the former gas works excavations, alongside the potential for significantly impacted made ground deposits, such features present a ground gas hazard to site (however, when taking into account the approximately 109 years of potential gas generation, such deposits are likely well beyond their gas generational peak).

It should be noted that the site is located in an area where bedrock deposits (Edwalton Member) underlying site are predominantly low to very low in permeability and thus will act to inhibit onsite impact from offsite sources, however, superficial deposits (Wolston Sands and Gravels) are likely highly permeable and thus, may provide a credible pathway to site development proposals.

13.1.2 HAZARDOUS VAPOURS

Potential sources of hazardous vapours include said gas works, alongside numerous onsite unknown industrial usages, a motor body works, erection and demolition of at least 3 No. garage lock-up units on site and further, adjacent garage lock-up units. Should significantly fuel storage or usage have taken place on site (either industrial usage or for heating purposes of recreational usages on site), residual hydrocarbon contamination may exist on site.

It should be noted that the site is located in an area where bedrock deposits (Edwalton Member) underlying site are predominantly low to very low in permeability and thus will act to inhibit onsite impact from offsite sources, however, superficial deposits (Wolston Sands and Gravels) are likely highly permeable and thus, may provide a credible pathway to site development proposals.

13.1.3 POTABLE WATER SUPPLY PIPING

Due to the potential for both PAH and hydrocarbon contamination on site (i.e. various erections and demolitions, made ground deposits, potential for hydrocarbon presence and/or previous burning events on site), there exists the potential for new potable water piping to be impacted by residual site soils. Hydrocarbon degradation and leaching can impact potable supply piping and thus impact potable supplies themselves, offering a potential risk to end-users via impacted water supplies.

14.0 RECOMMENDATIONS

At this stage, based on the desk study information collected, it is considered that allowance be made for the following:

- A ground investigation designed to BS10175:2011 and BS5930:2015 and comprising trial pitting will be required to confirm ground conditions (i.e. made ground, natural or reworked natural deposits, their nature, extent and depth) alongside the collection of soil samples for chemical analysis;
- Generic site wide environmental sampling (i.e. metals, metalloids, PAHs, asbestos, phenol, SOM & pH) with targeted hydrocarbon testing carried out in the north & south west of site (onsite former industrial usages, garage lock-up units & adj. gas works, respectively), SVOC testing in the north (adj. orchard);
- Gas protection measures comprising under floor venting (i.e. beam and block floors), barrier membrane fully sealed around service entries and extended across cavities (inline with BS8485:2015:A1-2019); being upgraded to VOC-resistant measures (should site investigation prove such is required);

- If point sources have been identified e.g. buried tanks, contaminant sources / plumes, specific sources, then allow for specific remediation.

A watching brief (as outlined in Appendix E) should be carried out by the site supervisor during the course of demolition, site clearance and construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material). Should previously unreported or undiscovered contamination be identified, then development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

15.0 REFERENCES**15.1 LEGISLATION AND REGULATIONS****15.1.1 ACTS**

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

15.1.2 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
- [4] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017 SI2017/No.571

15.1.3 CONTAMINATED LAND REGULATIONS

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

15.2 STATUTORY GUIDANCE

- [8] 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
- [9] Communities and local Government, 2024: National Planning Policy Framework.

15.3 BRITISH STANDARDS

- [10] BS 5930:2015+A1:2020 Code of practice for site investigations
- [11] BS 10175:2011+A2:2017 Investigation of potentially contaminated sites - Code of practice
- [12] BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- [13] BS 8576:2013 Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)
- [14] Bs 10176:2020 Taking Soil Sample for Determination of Volatile Organic Compounds (VOCs)

15.4 NON-STATUTORY TECHNICAL GUIDANCE**15.4.1 ENVIRONMENT AGENCY**

- [15] Land Contamination Risk Management (LCRM) 2020, updated 2023

15.4.2 CIRIA PUBLICATIONS

- [16] 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
- [17] 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

15.4.3 CL:AIRE

- [18] 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)

16.0 APPENDICES

APPENDIX A ENVIRONMENTAL SEARCH

Separate Groundsure Report

APPENDIX B HISTORICAL MAPPING

Separate Map Packs (2 No. files)

APPENDIX C

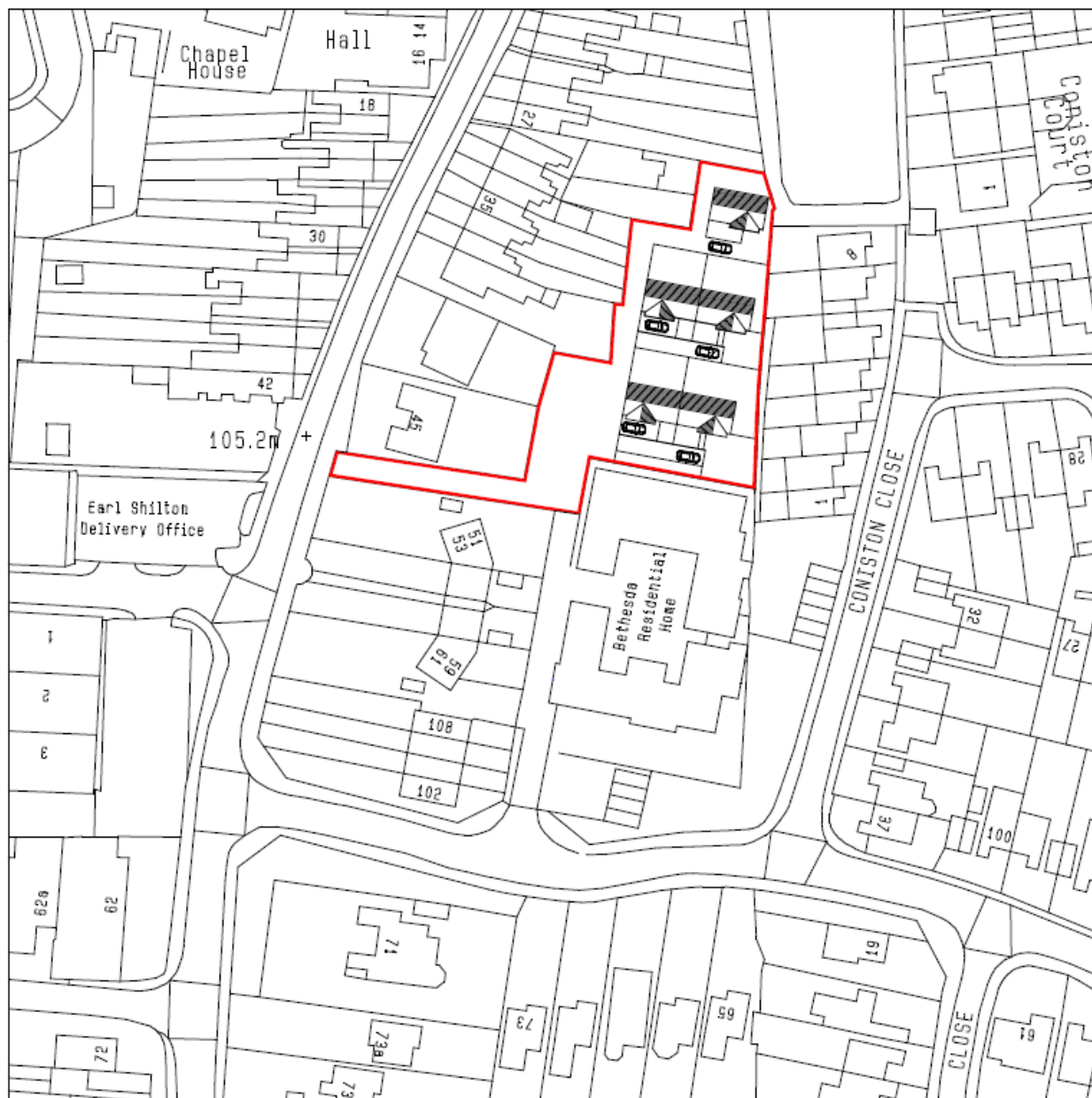
PROPOSED AND CURRENT SITE PLANS

Stanfords VectorMap

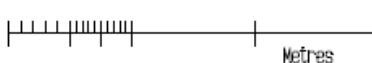
Land To The Rear Of, Bethel Bethesda Residential Home, Equity Road East, Earl Shilton, Leicester, LE9 7FY

REF:0712477

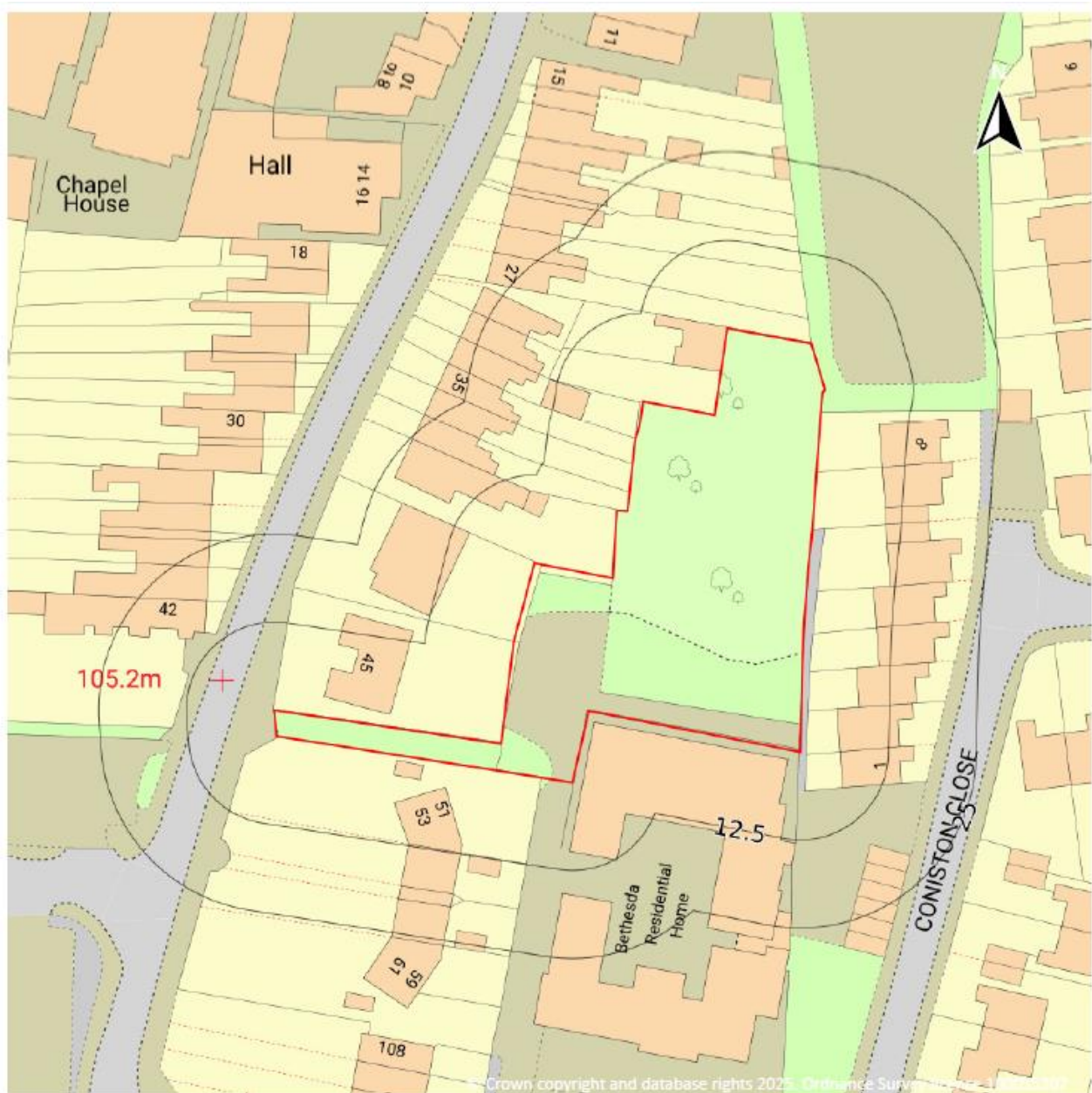
Plan No 1546/BP



Scale, 1:500
Sheet, A2



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APPENDIX D

SITE PHOTOS AND LOCATIONS



Site Walkover Photos

Photo No.1: Facing south from the car-parking area on site showing the site access leading north off Equity Road East



Address: Bethel & Bethesda
Client: Cooper Residential Homes Ltd

Photo No.2: Facing west from the southern extent of the main site area showing the adj. car-parking area forming SW extent





Site Walkover Photos

Photo No.3: Facing NW from the SE extent of site



Address: Bethel & Bethesda
Client: Cooper Residential Homes Ltd

Photo No.4: Facing north from the SE corner of site along the eastern boundary of site (right of photograph)





Site Walkover Photos

Photo No.5: Facing south from the far north of site showing the site entirety and extent



**Address: Bethel & Bethesda
Client: Cooper Residential Homes Ltd**

Photo No.6: Facing slightly SW from the north of site showing the general ground conditions occupying site entirety



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

