Castledine Environmental

LAND CONTAMINATION SURVEYS

Phase 1 Land Contamination Risk Assessment

for

Proposed Conversion of Commercial Floorspace (Charitable Service Units to Residential Use)

on the site of

Units No.2-6, 8-12, 15-20, 22-30, Hawthorne Court, Ryefield Crescent, Northwood HA6 1LJ

Date: December 2022

Status:	Final Report
Reference:	3398D P1 Hamways Ltd - Northwood
Date:	07/12/2022

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EXECUTIVE SUMMARY

The site is currently occupied by vacant, ground-floor commercial workspaces. Historically, the site was unoccupied field prior the being developed with the building seen today, which was subsequently marked as an engineering works, a 'works' and a clinic. Following this, a number of commercial enterprises have variously occupied the units. Whilst the site usage and surrounding developments (mainline railway) may have had some impact on shallow site soils, no soft-landscaping is present nor proposed and the entirety of site occupied by building footprint and hardstanding in the form of significant concrete flooring; as such, the relevant pollutant linkages on site related to soil contamination will be effectively severed. Site workers are to wear suitable PPE and adhere to relevant HSE guidance, which will be sufficient to mitigate the risk to site workers to low. Furthermore, a previous investigation inside the building confirmed a significant, intact concrete base of 0.10m thickness; and environmental sampling of the underling soils showed very little impact from the site usage, with all determinants below laboratory detection limits or relevant GAC thresholds.

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

It is not envisaged that any further works or investigation are required.

It is recommended that 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**.**

It is also recommended that the building be subject to an asbestos survey(and subsequent removal, if identified) by appropriately qualified personnel. This should be carried out prior to any demolition or redevelopment occurring in order to ensure site works do not cause future contamination of the site.

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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 Hamways Ltd to undertake a Phase 1 Desk study on a site at Hawthorne Court, Units No.2-6, 8-12, 15-20, 22-30, Ryefield Crescent, Northwood HA6 1LJ.

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Hamways Ltd 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 Northwood, London at National Grid Reference: 510314,190184 and is approximately 0.18ha in area.

The site is an irregular rectangle in shape and is oriented slightly north west to south east. The site is located in a heavily urbanised area and is directly bounded by a railway line to the north with a station and second railway line and housing beyond this, a vehicle turning area east with housing beyond and Ryefield Crescent to the south and west with further housing and flats and commercial shops beyond, respectively.

The site interior comprises the building of Hawthorne Court, which itself comprises a three-storey building comprised of ground-floor commercial spaces and the remaining first- and second-floors as occupied by residential flats. The commercial floor-space occupies the entirety of site and residential flats above are arrayed around a central courtyard which is formed by the roofing of the commercial floor-spaces.

Starting from the west of the building and moving east, the first units to be accessed were units No.2-6. The units were accessed via the western face of the building, with a pedestrian doorway and 2 No. garage doors noted leading into units No.2-6. These units appeared to have formerly been in use as an unknown commercial-usage formed by a large room (with the roofing presently supported by numerous acrows) and adjacent office and storeroom spaces. The unit in the far north western corner of site appeared to be formerly in use as a paint and DIY tools and materials supplier. The flooring throughout these units was noted to be painted concrete or carpet atop concrete.

Moving eastwards, units No.8-12 were inaccessible due to missing keys; however, from what could be observed, the units appeared very similar to those seen in the adjacent units No.2-6. Moving eastwards again, units No.14-16 were not located within the site boundary, however they were noted to be occupied by a vehicle garage.

Access to unit No.20 was then provided via a pedestrian entrance on the southern face of the building. This unit was also noted to be unoccupied and comprised what appeared to be former office and storeroom space with a limited kitchen area and toilets. Garage doors adjacent to the pedestrian entrance were noted, providing access to both unit.20 and the rear unit No.18/19. Units No.18/19 comprised what appeared to be a former joinery workshop with concrete flooring, wooden shelving and other miscellaneous materials noted. Further, numerous acrows were noted supporting the ceiling in this unit. The far north western corner of this unit was noted to contain a wooden toilet enclosure, itself occupied by a large number of plastic and cardboard bags and boxes, filled with materials, fittings and other, undiscernible debris.

Moving eastwards once again, access to unit No.22 was provided via shuttered and pedestrian entrance. This unit was noted to be unoccupied save for remnants of what appeared to be a former nursery with toilets and a small kitchen – as evidenced by some toys, plastic ball-pit balls, colourful children's decorations on the walls. Further acrows were noted in this unit. Access to unit No.28 was provided via leading east through the nursery, leading into the already-investigated unit No.28. This unit was noted to remain occupied by noise monitoring equipment and a large number of supporting acrows. Evidence of the former hazardous vapours investigated was noted in this unit via concreted, former VOC inspection pits formed by concrete coring (photo No.28 in the site walkover photographs).

The far eastern extent of site is then occupied by unit No.30, which appeared to be a former furniture makers, according to the signage on the eastern face of the building. Access to this unit was provided via large, heavy-duty double doors. This unit was again noted to be unoccupied, comprised of concrete flooring and again possessed sound monitoring equipment.

Within all units, service entries were noted on the exterior faces of the building (noted on the western, southern and eastern faces). The general

former commercial usage of the site (including apparent joinery, furniture and DIY businesses) are considered potential sources of contamination; however, no significant fuel or chemical storage has been noted and the entirety of site is occupied by significant concrete flooring.
Topographically, the area around the building slopes gently from the west to the east (becoming much steeper to the west of site and leading up to Joel Street) and as such, the interior of the building reflects this with a stepping-down of each unit.

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.

7.0 PREVIOUS REPORTING

A previous Phase 1 Report for Unit No.28 was carried out by Castledine Environmental in March of 2022. The report found a low risk from soil contamination due to the lack of present and proposed soft-landscaping, a low risk from ground gas hazards and a low to moderate risk from hazardous vapours – associated with the sites historical industrial / commercial usage. Accordingly, the report recommended:

“a Phase 2 Intrusive Site Investigation should be planned and carried out on site. This should take the form of coring through the concrete flooring or the removal of concrete flooring, with samples then taken from the underlying residual soils and tested for a standard suite of contaminants along with VOC’s (TPH CWG).”

As such, a Phase 2 Site Investigation was planned and carried out on site in April of 2022. The site investigated comprised 3 No. locations (designated CC1 to CC3) which were cored through the existing concrete flooring, with the underlying strata encountered then logged and sampled.

The ground conditions encountered comprised an existing concrete base atop a layer of made ground deposits which were seen to be atop natural clay at 2 No. locations.

The concrete base which was cored through to reach the underlying deposits was noted to be 0.10m in thickness and seen at all locations.

The made ground underlying the concrete base was encountered at all 3 No. locations from 0.10m to depths of 0.30m, 0.40m and 0.30m, respectively. This stratum was seen to comprise a dark grey, sandy, ashy Made Ground Gravel of sub-angular to sub-rounded, fine to coarse fragments of flint, brick, concrete and clinker, with occasional metal and ceramic fragments noted in this stratum at CC2.

At the locations of CC1 and CC2 underlying both the concrete and made ground a soft, brown, slightly sandy Clay was encountered to maximum confirmed depths of 0.40m.

Laboratory analysis of the samples taken the showed that the majority of determinants were below laboratory detection limits, with any reading above this being themselves below relevant GAC thresholds.

As such, the report found a low risk from hazardous gases.

7.1 HYDROLOGICAL

7.1.1 AQUIFER

7.1.1.1 SUPERFICIAL GEOLOGY

The Groundsure report records no superficial aquifer classification for the site nor within 250m of site.

7.1.1.2 BEDROCK GEOLOGY

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
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

7.1.2 ABSTRACTIONS AND PRIVATE WATER SUPPLIES

None recorded within 250m of site.

7.1.3 SOURCE PROTECTION ZONE

The site is located in a Type 2 Outer Catchment Area – Source Protection Zones (SPZ) define the sensitivity of an area around a potable abstraction site to contamination.

7.1.4 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: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: 40-70% Dilution value: 300-550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Mixed

7.1.5 POTENTIAL SURFACE WATER

The Groundsure report records an unnamed watercourse located 128m east of site (whether at surface or culverted not recorded) and further, surface level watercourses located 128m east and 167m south east of site.

7.1.6 DISCHARGE CONSENTS

None recorded within 250m of site.

7.2 PERMITTED PROCESSES

The Groundsure report records a current Part B Permit relating to the unloading of petrol into storage located 75m south west of site and a historical Part B Permit relating to petrol vapour recovery located 82m south west of site.

7.3 POLLUTION INCIDENTS

The Groundsure report records 2 No. incidents located 164m west of site and dated 12/07/2002 and relating to household wastes with no impact to land, water or air qualities; and a further 2 No. incidents located 198m east of site and dated 18/03/2002 and 15/04/2003. The earlier incident related to biodegradable foodstuffs and had a significant impact to both water and air quality with no impact to land quality and the second incident related to grey water sewage materials with a minor impact to water quality and no impact to land or air qualities.

7.4 RADIOACTIVE SUBSTANCES REGISTRATIONS

None recorded within 250m of site.

7.5 WASTE

7.5.1 LICENSED WASTE MANAGEMENT FACILITIES (LOCATIONS)

None recorded within 250m of site.

7.5.2 LANDFILL SITES

None recorded within 500m of site.

7.6 HAZARDOUS SUBSTANCES

None recorded within 250m of site.

7.7 ECOLOGICAL RECEPTORS

The Groundsure report records the London Greenbelt (as operated by the Hillingdon LPA) located 89m south and 277m north west of site. No further sensitive land usages are located within 500m of site.

7.8 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

7.8.1 SUPERFICIAL DEPOSITS

Both BGS geological mapping and the Groundsure report record no superficial geological deposits located on or within 250m of site.

7.8.2 BEDROCK DEPOSITS

Both BGS geological mapping Groundsure report record bedrock geology of the London Clay Formation underlying site, comprising a bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.

7.8.3 BEDROCK PERMEABILITY

The Groundsure report records the site as being within an area where the maximum permeability of bedrock geology is recorded as ‘moderate’ and the minimum permeability as ‘very low’ and facilitated by mixed 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).

7.8.4 ARTIFICIAL GROUND

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

7.8.5 BGS ESTIMATED URBAN SOIL CHEMISTRY

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km2)..

The Groundsure report records arsenic & bioaccessible arsenic, lead & bioaccessible lead, cadmium, chromium and nickel at background concentrations of 15-16mg/kg & 2.6mg/kg, 126-143mg/kg & 87-98mg/kg, 0.6-0.8g/kg, 82-85mg/kg, 44-51mg/kg, 27-28mg/kg and 10-13mg/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.

7.8.6 COAL MINING

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

7.8.7 NON-COAL MINING

The Groundsure report records the site as being located in an area where:

"Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered."

7.8.8 SURFACE WORKINGS

ID	Distance [m]	Direction	Land Usage	Year of Mapping
A	12	NW	Cuttings	1913
B	15	NE	Cuttings	1911
B	15	NE	Cuttings	1897
A	16	NE	Cuttings	1911
A	16	NE	Cuttings	1894
B	74	NW	Cuttings	1913
B	75	NW	Cuttings	1938
B	81	NW	Cuttings	1935
B	83	NW	Cuttings	1911
B	86	NW	Cuttings	1959
B	91	NW	Cuttings	1897
2	103	SE	Cuttings	1935
B	175	NW	Cuttings	1992
B	175	NW	Cuttings	1974
B	175	NW	Cuttings	1968

7.8.9 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.

7.9 AERIAL PHOTOGRAPHY

Aerial photography shows the following:

7.9.1 GOOGLE EARTH

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

Date	Description
December 1945	The site and surrounding areas generally resemble that seen in the present-day; with the site occupied by a building which forms a larger building in a triangular shape, a railway line immediately north of site and residential areas to the south, north beyond the railway line, east and west.
September 1999	The site is now clearly shown as occupied by the structure seen in the present-day. A large building has been erected approx.124m west of site and a petrol station is now located approx.100m south west of site.
December 2003	No discernible change on site nor site relevant change to the surrounding areas.
June 2005	No discernible change on site nor site relevant change to the surrounding areas.
December 2006	No discernible change on site nor site relevant change to the surrounding areas.
June 2010	No discernible change on site nor site relevant change to the surrounding areas.
March 2011	No discernible change on site nor site relevant change to the surrounding areas.
March 2012	No discernible change on site nor site relevant change to the surrounding areas.
April 2013	No discernible change on site nor site relevant change to the surrounding areas.
February 2014	No discernible change on site nor site relevant change to the surrounding areas.
June 2015	No discernible change on site nor site relevant change to the surrounding areas.
April 2017	No discernible change on site nor site relevant change to the surrounding areas.
May 2018	No discernible change on site nor site relevant change to the surrounding areas.

Date	Description
June 2019	No discernible change on site nor site relevant change to the surrounding areas.
March 2020	No discernible change on site nor site relevant change to the surrounding areas.
March 2021	No discernible change on site nor site relevant change to the surrounding areas.
March 2022	No discernible change on site nor site relevant change to the surrounding areas.

7.10 GOOGLE STREET VIEW

Google Street View imagery is dated April of 2018 to September of 2020 with the site viewed off Ryefield Crescent and facing west, north and east. The site appears much as that seen on the site walkover, comprising ground-floor commercial spaces and residential flats above this. The commercial units on site appear to be disused at this time, other than the vehicle garage at units No.14-16.

7.11 HISTORIC MAPPING

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

Map	Onsite	Offsite
OS County Series: 1864-1865, 1:2,500 & 1:10,560	The site is shown as unoccupied field.	The surrounding areas at this time are predominantly agricultural field. Notable features include small ponds located approx.105 north and 95m east of site and marshland located approx. 20m south of site.
OS County Series: 1883, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.

Map	Onsite	Offsite
OS County Series: 1896, 1:2,500	No discernible change on site.	A railway line has been erected approx.10m north east of site and in a NW to SE orientation, with cuttings located approx. 3m north extending NW and 107m east and extending SW. The pond formerly located to the east of site has been removed as part of the railway development.
OS County Series: 1895-1897, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1894-1899, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1911, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1911-1913, 1:2,500 & 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1920, 1;10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1935, 1:2,500 & 1:10,560	No discernible change on site.	The surrounding areas have now seen a great deal of change since circa.1920, with the area immediately beyond the railway line north now fully occupied by residential areas in the form of terraced housing, with further terraced housing located to the west of site beyond the roadside (present-day location of road). The former marshy area to the south of site is now an allotments gardens (approx.45m south, persistent until the present-day).
OS County Series: 1938, 1:10,560	No discernible change on site.	Further housing has been erected immediately south of site.

Map	Onsite	Offsite
Provisional: 1955-1960, 1:10,560	The site has now been developed and is part of the larger, triangular shaped building that is seen in the present-day.	Housing immediately south is now shown as detached housing with gardens, as see in present-day. Areas to the north, north east and north west, west, south east and south west of site have seen further terraced developments.
National Grid: 1965, 1:1,250	The site is now marked as 'Hawthorne Court – Engineering works'	A clinic is marked in the western extent of the building in which the site is located. A garage is now located approx.70m south west of site. Larger-scale mapping now shows the mainline railway to the north of site with additional tracks laid and Northwood Hills Station (which has been extended and enlarged from the former siding) to the north west of site. A garge is now marked approx.60m SW of site.
National Grid: 1966, 1;2,500	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1965-1968, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1974-1976, 1:10,000	No discernible change on site.	Piggeries are marked approx.260m south of site.
National Grid: 1986-1990, 1:1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1992, 1:1,250 & 1:10,000	Site is now marked as 'works'.	The piggeries to the south of site adjacent to the allotments are no longer present.
National Grid: 2001, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
Landline: 2003, 1:1,250	Site now marked as 'works'.	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.

7.12 CURRENT LAND USE DATA

ID	Distance[m]	Direction	Company	Activity	Category
A	0	On site	Ferndown Motor Service	Vehicle repair, testing and servicing	Repair and servicing
A	0	On site	Works	Unspecified works or factories	Industrial features
1	61	NW	Northwood Hills	Underground network stations	Public transport and infrastructure
B	80	SW	Tesco Petrol Station	Petrol and fuel stations	Road and rail
C	82	W	Vara Consulting Engineers	Civil engineers	Engineering services
C	82	W	Hi TECH I M E Europe Ltd	General construction supplies	Industrial products
C	82	W	Alpha1Machinery Ltd	Industrial repairs and servicing	Repair and servicing
C	82	W	Aspire Healthcare Group	Medical equipment, supplies and pharmaceuticals	Industrial products
2	126	NW	Cartridge Works Northwood Ltd	Printing related machinery	Industrial products
3	139	N	DCL	Dental and medical laboratories	Health auctioneers and establishments
4	184	NW	Unique Bedrooms Direct	Furniture	Consumer products
5	192	SW	Electricity substation	Electrical features	Infrastructure and facilities
F	210	N	Eggfree Cakebox	Baking and confectionery	Foodstuffs
F	218	N	Northwood Hills Tyre & Battery Co	Vehicle repair, testing and servicing	Repair and servicing
6	232	NW	Electricity substation	Electrical features	Infrastructure and facilities
7	234	NE	Electricity substation	Electrical features	Infrastructure and facilities
F	240	N	Northwood Hills Service Station	Vehicle repair, testing and servicing	Repair and servicing
8	240	NE	Soundzgood	Electronic equipment	Industrial products

7.13 PETROL AND FUEL SITES

The Groundsure report records an open Esso fuel station located 76m south west and an obsolete fuel station located 82m south west of site.

7.14 HISTORICAL PETROL AND FUEL SITE DATABASE

None recorded within 250m of site.

7.15 POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED ON MAPPING

ID	Distance [m]	Direction	Use	Date
A	12	NW	Cuttings	1911-1913
B	15	NE	Cuttings	1897
B	15	NE	Cuttings	1911
A	16	NE	Cuttings	1894
A	37	NW	Railway station	1992
A	37	NW	Railway station	1968-1974
A	38	NW	Railway station	1935
A	39	NW	Railway station	1959
C	55	S	Garage	1968
B	74	NW	Cuttings	1911-1992
B	75	NW	Cuttings	1935-1938
B	91	NW	Cuttings	1894
1	103	SE	Cuttings	1935

7.16 HISTORICAL TANK DATABASE

None recorded within 250m of site.

7.17 HISTORICAL ENERGY FACILITIES

ID	Distance(m)	Direction	Use	Date
2	190	SW	Electricity substation	1989
3	227	NE	Electricity substation	1973-1992
4	239	NW	Electricity substation	1989

7.18 HISTORICAL GARAGE DATABASE

ID	Distance(m)	Direction	Use	Date
C	56	S	Garage	1964
C	56	S	Garage	1965
C	56	S	Garage	1989
D	233	N	Garage	1989
D	233	N	Garage	1967-1965

8.0 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.

8.1 SOURCES

The following potential sources of contamination have been identified.

8.1.1 ONSITE

- Development of and usage of the site as engineering works
- Unknown prior industrial usages

8.1.2 OFFSITE

- Adjacent mainline railway (immediately north, circa.1895 to present-day)

8.2 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

8.3 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

9.0 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.

9.1 PRELIMINARY CONCEPTUAL SITE MODEL

9.1.1 SOIL CONTAMINATION

The site is currently occupied by vacant, ground-floor commercial workspaces. Historically, the site was unoccupied field prior the being developed with the building seen today, which was subsequently marked as an engineering works, a ‘works’ and a clinic. Following this, a number of commercial enterprises have variously occupied by the units. Whilst the site usage and surrounding developments (mainline railway) may have had some impact on shallow site soils, no soft-landscaping is present nor proposed and the entirety of site occupied by building footprint and hardstanding in the form of significant concrete flooring; as such, the relevant pollutant linkages on site related to soil contamination will be effectively severed. Site workers are to wear suitable PPE and adhere to relevant HSE guidance, which will be sufficient to mitigate the risk to site workers to low. Furthermore, a previous investigation inside the building confirmed a significant, intact concrete base of 0.10m thickness; and environmental sampling of the underling soils showed very little impact from the site usage, with all determinants below laboratory detection limits or relevant GAC thresholds.

9.1.2 HAZARDOUS GROUND GAS AND VAPOURS

No significant sources of ground gas or vapour generation identified, and the site is located in a predominantly low permeability area, thus inhibiting lateral migration. Whilst the sites historical usages as an engineering works and historical ‘works’ may have involved the storage and usage of fuels, oils and lubricants and as such, this has been previously investigated and subsurface soils have been shown to be clean and unimpacted by the sites historical usage.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Consequence	Risk	Possible Mitigation
Contaminated Soils	Direct Ingestion & Direct Contact	Site Workers	Lw	Md	M/L	Site workers to wear appropriate PPE for health and safety reasons, considered usage and adherence to HSE regulations would mitigate this risk to **LOW**.
Contaminated Soils	Inhalation of Dust	Site Workers	Lw	Md	M/L	
Contaminated Soils	Direct Ingestion & Direct Contact	End Users	Ul	Md	L	No soft-landscaping is present nor is any proposed, thus the relevant pollutant linkages arising from soil contamination here are severed. Recommend a Watching Brief (inline with Appendix E) be applied during site works.
Contaminated Soils	Inhalation of Dust	End Users	Ul	Md	L	
Contaminated Soils	Direct Ingestion	Flora and Fauna	Ul	Md	L	
Contaminated Soils	Vertical and lateral migration	Controlled Waters	Ul	Md	L	
Contaminated Soils	Direct contact	Services	Ul	Md	L	
Ground Gases (Methane and CO_2)	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	No significant sources of potential ground gas generation identified; site is located in predominantly low permeability area, thus inhibiting lateral and vertical migration.
Volatile and Semi-volatile Organic Compounds	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	A previous investigation inside the building confirmed significant, intact concrete base of 0.10m thickness and no impact to underlying soils.
Radon	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	Site is not 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

10.0 ENVIRONMENTAL RISK ASSESSMENT

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

It is not envisaged that any further works or investigation are required.

It is recommended that 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**.**

It is also recommended that the building be subject to an asbestos survey (and subsequent removal, if identified) by appropriately qualified personnel. This should be carried out prior to any demolition or redevelopment occurring in order to ensure site works do not cause future contamination of the site.

11.0 SUMMARY OF RISKS

11.1.1 SOIL CONTAMINATION

The site is currently occupied by vacant, ground-floor commercial workspaces. Historically, the site was unoccupied field prior the being developed with the building seen today, which was subsequently marked as an engineering works, a ‘works’ and a clinic. Following this, a number of commercial enterprises have variously occupied by the units. Whilst the site usage and surrounding developments (mainline railway) may have had some impact on shallow site soils, no soft-landscaping is present nor proposed and the entirety of site occupied by building footprint and hardstanding in the form of significant concrete flooring; as such, the relevant pollutant linkages on site related to soil contamination will be effectively severed. Site workers are to wear suitable PPE and adhere to relevant HSE guidance, which will be sufficient to mitigate the risk to site workers to low. Furthermore, a previous investigation inside the building confirmed a significant, intact concrete base of 0.10m thickness; and environmental sampling of the underling soils showed very little impact from the site usage, with all determinants below laboratory detection limits or relevant GAC thresholds.

11.1.2 GROUND GASSES AND VAPOURS

No significant sources of ground gas or vapour generation identified, and the site is located in a predominantly low permeability area, thus inhibiting lateral migration. Whilst the sites historical usages as an engineering works and historical ‘works’ may have involved the storage and usage of fuels, oils and lubricants and as such, this has been previously investigated and subsurface soils have been shown to be clean and unimpacted by the sites historical usage.

12.0 RECOMMENDATIONS

It is recommended that 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.

It is also recommended that the building be subject to an asbestos survey (and subsequent removal, if identified) by appropriately qualified personnel. This should be carried out prior to any demolition or redevelopment occurring in order to ensure site works do not cause future contamination of the site.

13.0 REFERENCES

13.1 LEGISLATION AND REGULATIONS

13.1.1 ACTS

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

13.1.2 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

13.1.3 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

13.2 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.

13.3 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)

13.4 NON STATUTORY TECHNICAL GUIDANCE

13.4.1 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.

13.4.2 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

13.4.3 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)

14.0 APPENDICES

APPENDIX A **ENVIRONMENTAL SEARCH**

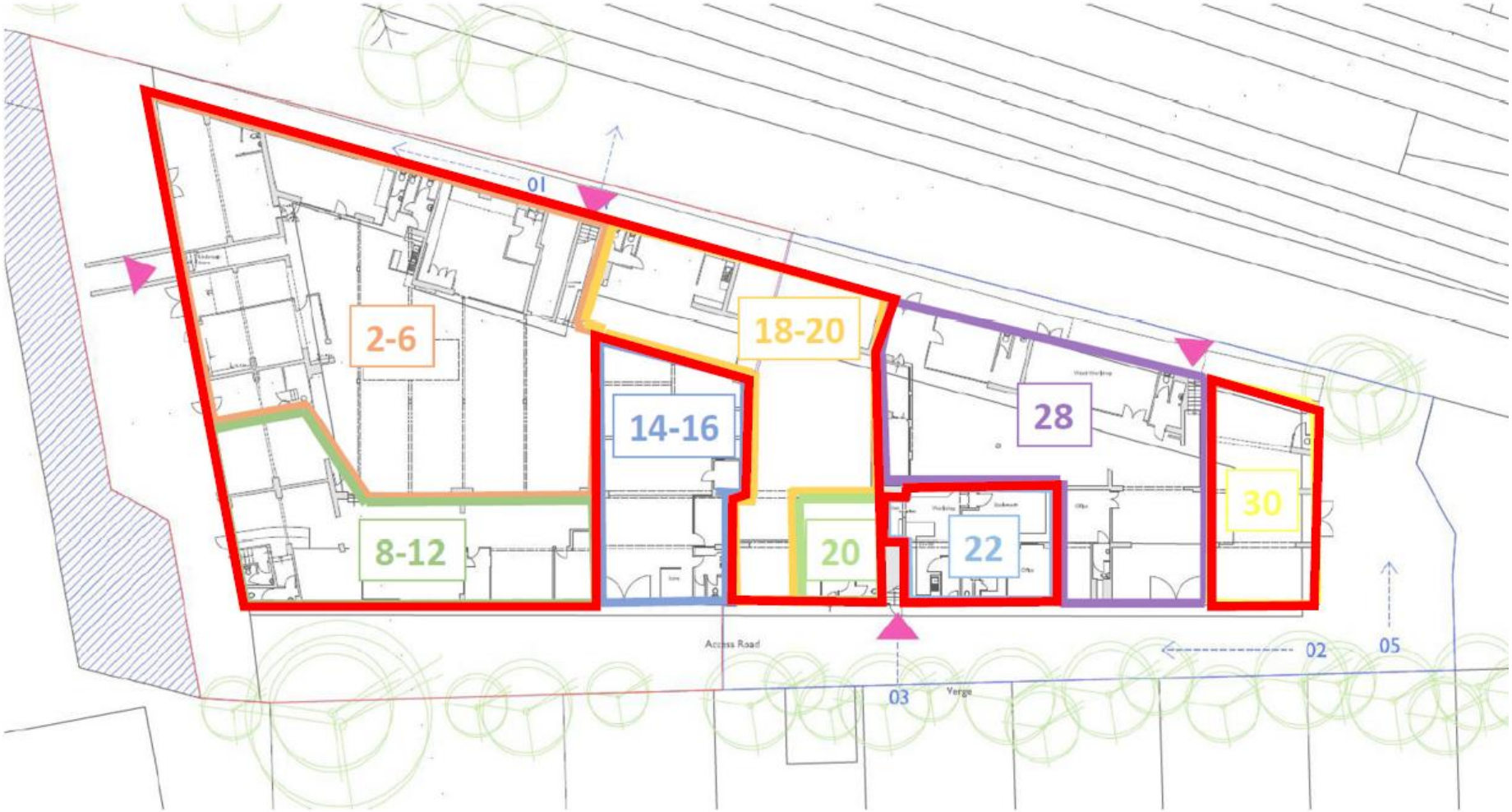
Separate Groundsure Report

APPENDIX B **HISTORICAL MAPPING**

Separate Map Packs (2 No. files)

APPENDIX C CURRENT SITE PLANS

2021 Lease Plan – Ryefield Crescent



APPENDIX D **SITE PHOTOS AND LOCATIONS**

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.1: Facing slightly NE from outside the SW corner of site showing the western face of Hawthorne Court

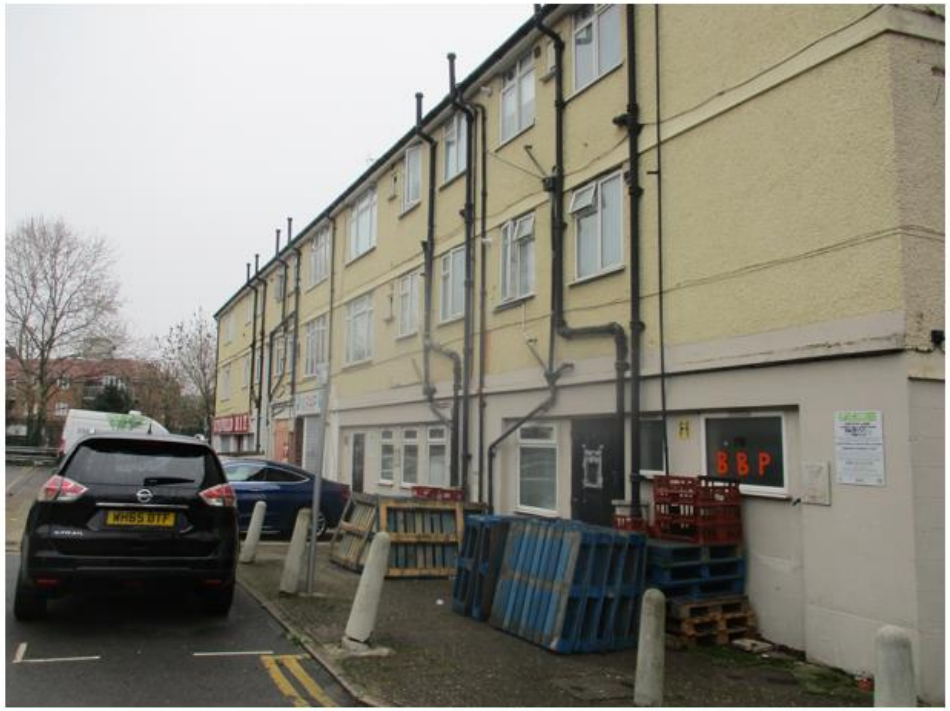
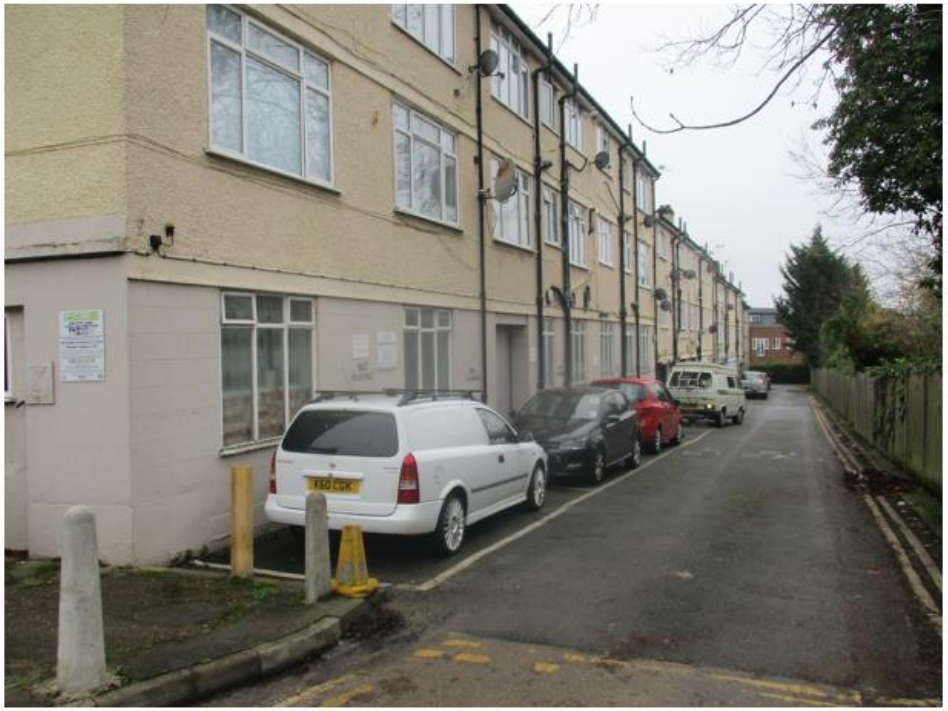


Photo No.2: Facing east from the same location showing the southern face of the building and access road to eastern extent



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.3: Facing NW from outside the SE corner of site showing the eastern face of Hawthorne Court

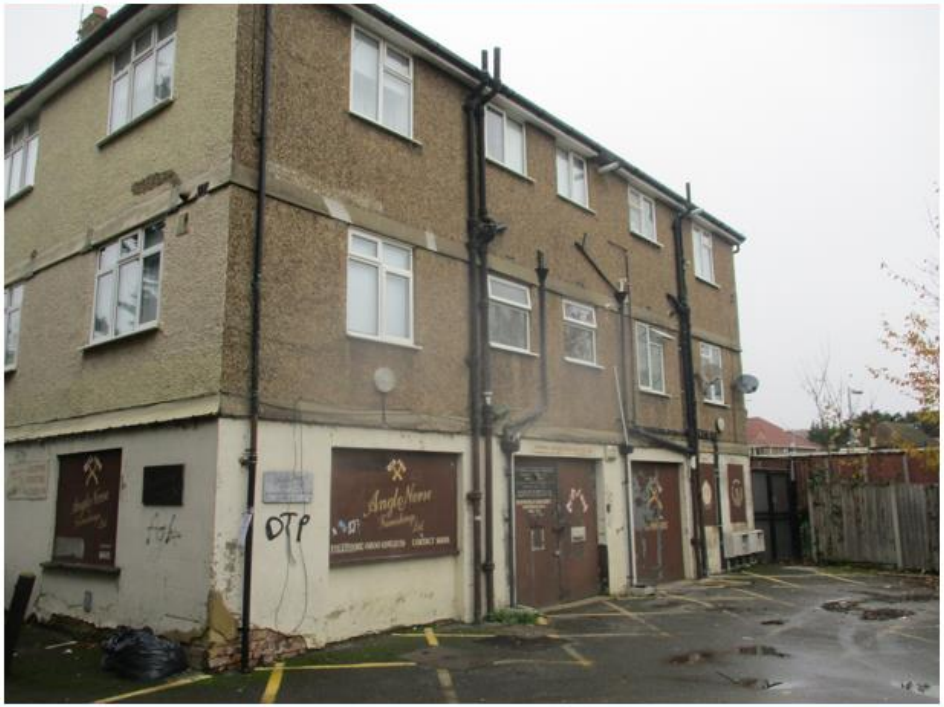
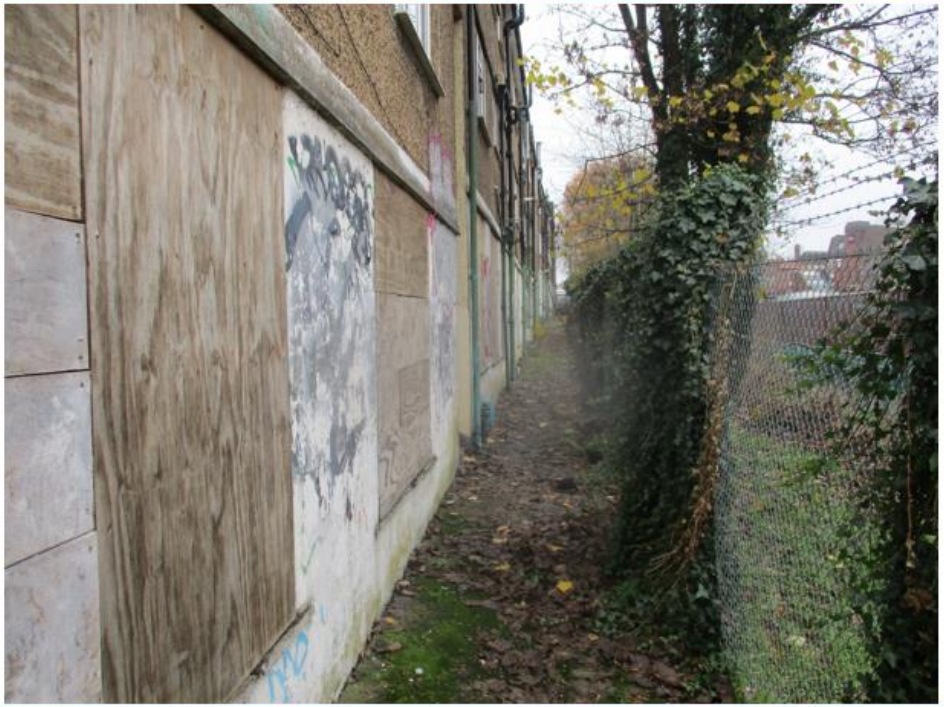


Photo No.4: Facing NW from the NE corner of site showing the northern face of the building and adj. railway (right)



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.5: Facing NW from the SE extent of the first-floor inner courtyard on site showing residential usage here

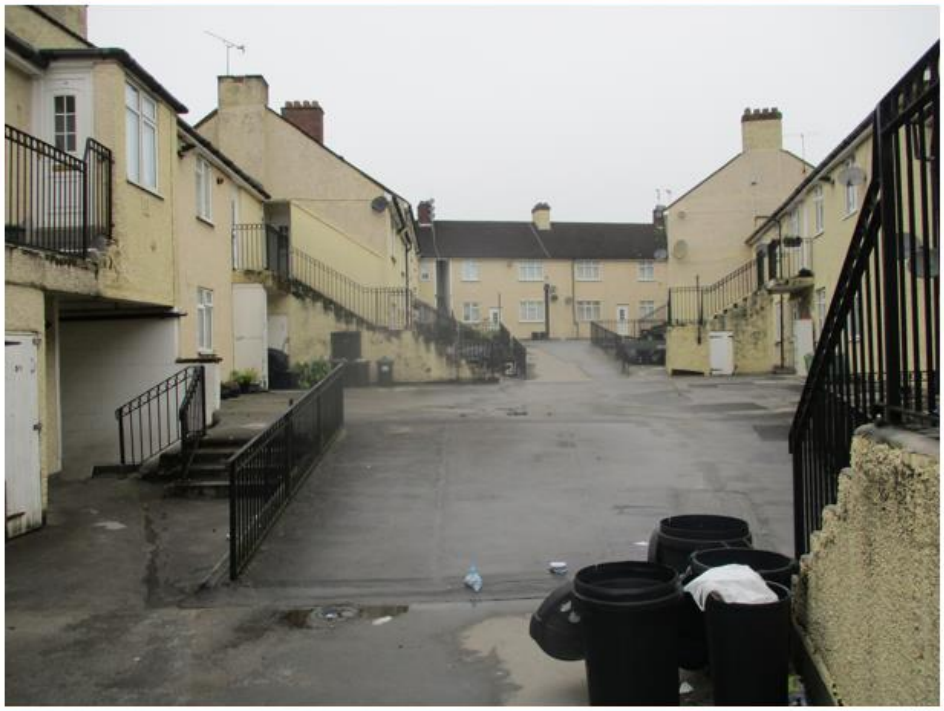
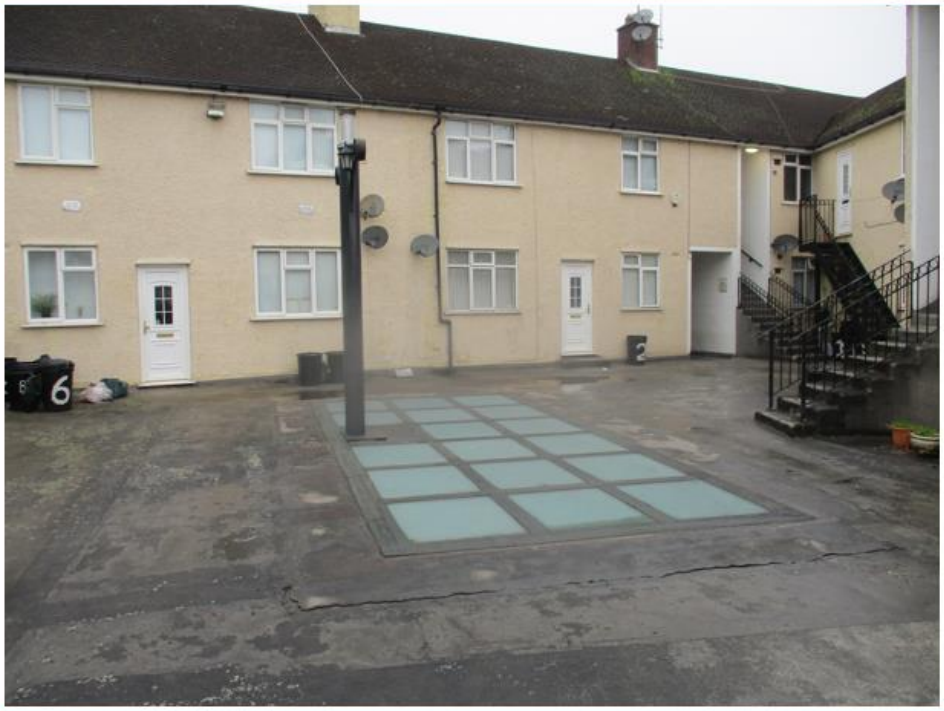


Photo No.6: Skylight and stack of units No.2-6 noted in the NW extent of the inner, first-floor courtyard of the building



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.7: Facing east from outside the western face of Hawthorne Court showing access to units No.2-6

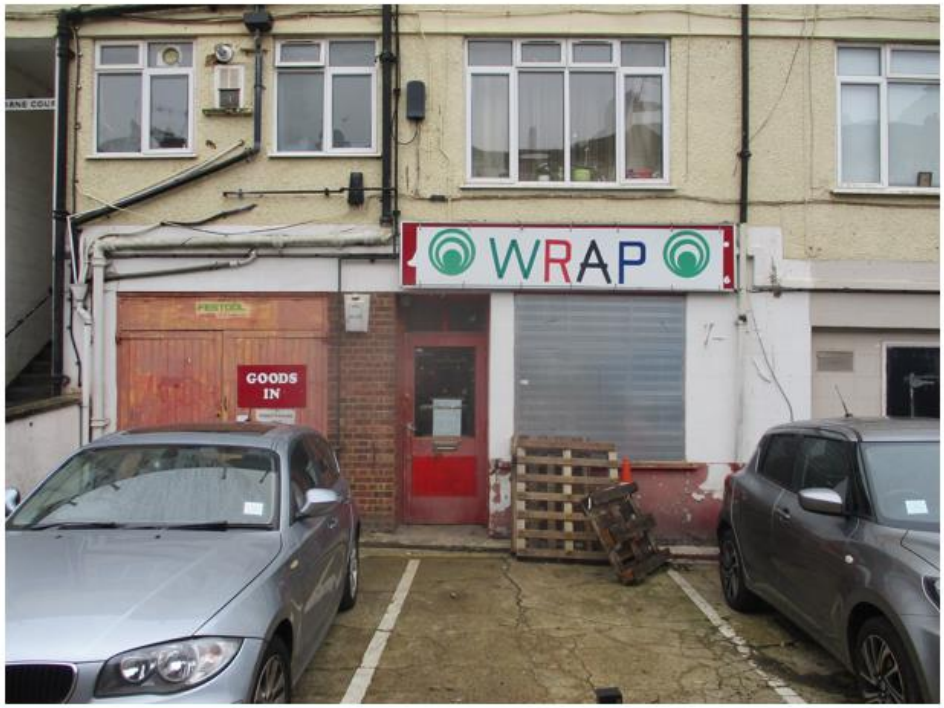


Photo No.8: facing east inside the access to units No.2-6 showing unoccupied, former commercial floorspace

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.9: Example shot of the interior of the largest room comprising units No.2-6 (also showing skylight)

Photo No.10: Facing north showing former office-space in units No.2-6

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.11: facing west in the western extent of units No.2-6 showing concrete flooring and former paint-shop usage

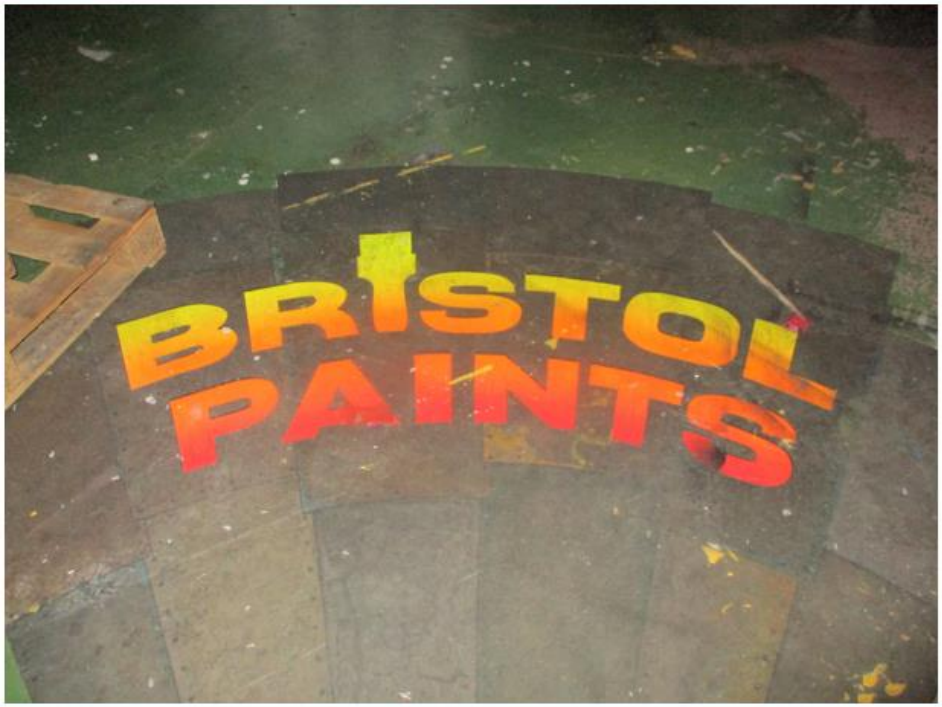


Photo No.12: Facing west in the former paint-shop showing the inside of the western face of the Hawthorne Court

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.13: Facing north from outside the southern face of the building showing access to units No.18-20

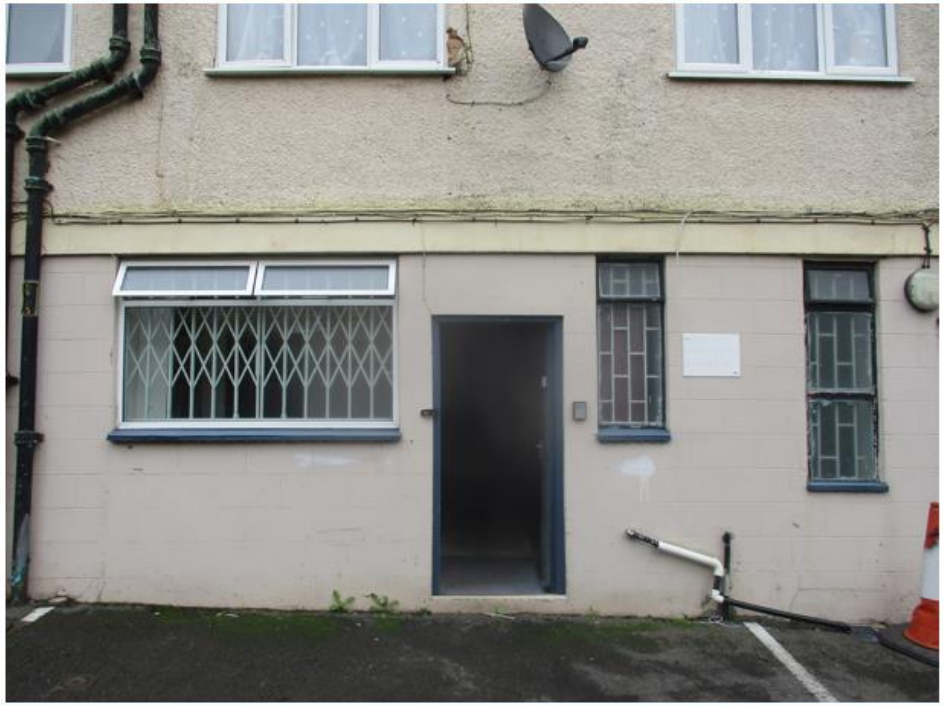
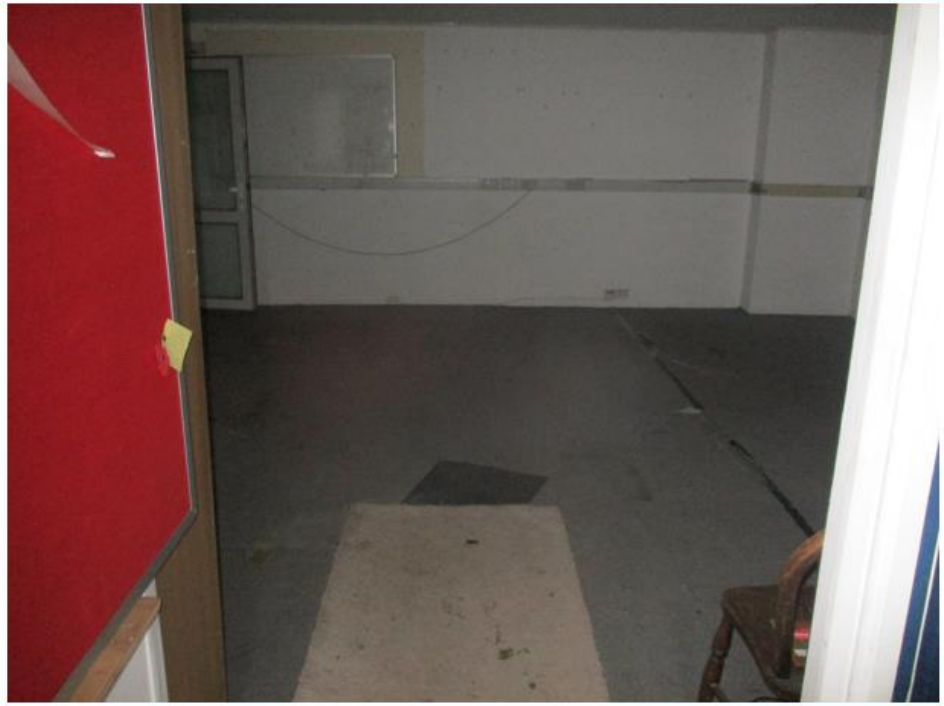


Photo No.14: Facing north from just inside the access of unit No.20 (access to units No.18/19 off to left of photo)



Castledine Environmental
LAND CONTAMINATION SURVEYS

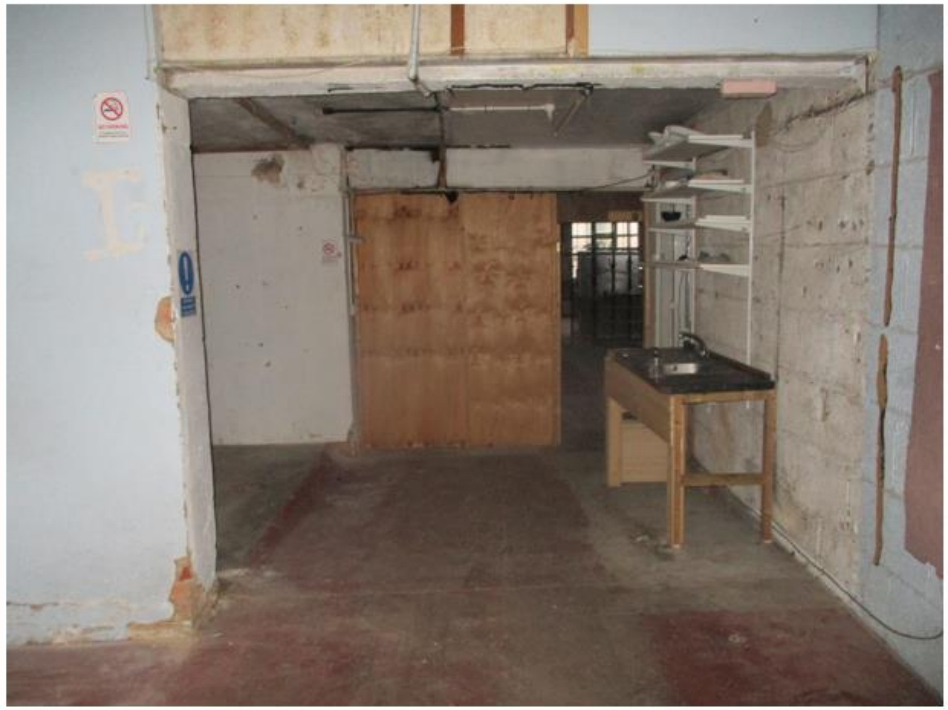
Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.15: Facing south from inside the garage-door of unit No.18 showing concrete floors and being unoccupied

Photo No.16: Facing north from the same spot looking towards the entrance to unit No.18 from unit No.20 (right)



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.17: Facing south from inside the northern face of unit No.18 showing acrows supporting the roofing here

Photo No.18: Example shot of flooring conditions within units No.18-20

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.19:Facing slightly SE from the NW extent of units no.18/19 showing further supporting acrows and shelving

Photo No.20: Facing NW from the same spot showing a toilet enclosure in the far NW of units No.18/19

Castledine Environmental
LAND CONTAMINATION SURVEYS

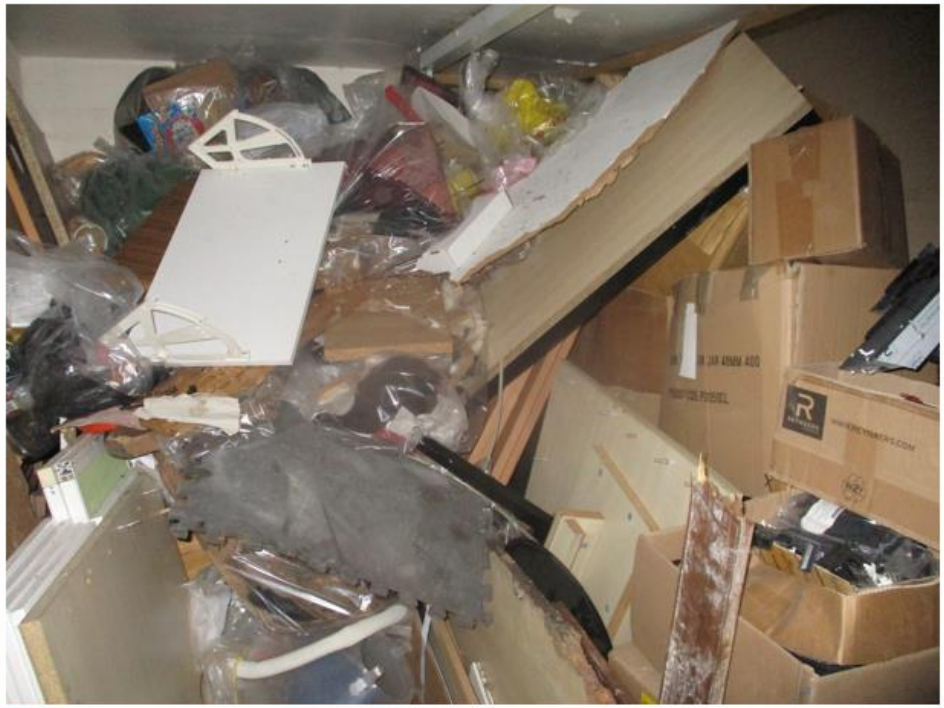
Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.21: Facing west showing entrance to toilet enclosure and miscellaneous joinery materials storage

Photo No.22: Heaps of refuse, debris, materials and equipment noted inside toilet enclosure of units No.18/19



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.23: Facing north from outside the southern face of the building showing the access to unit No.22

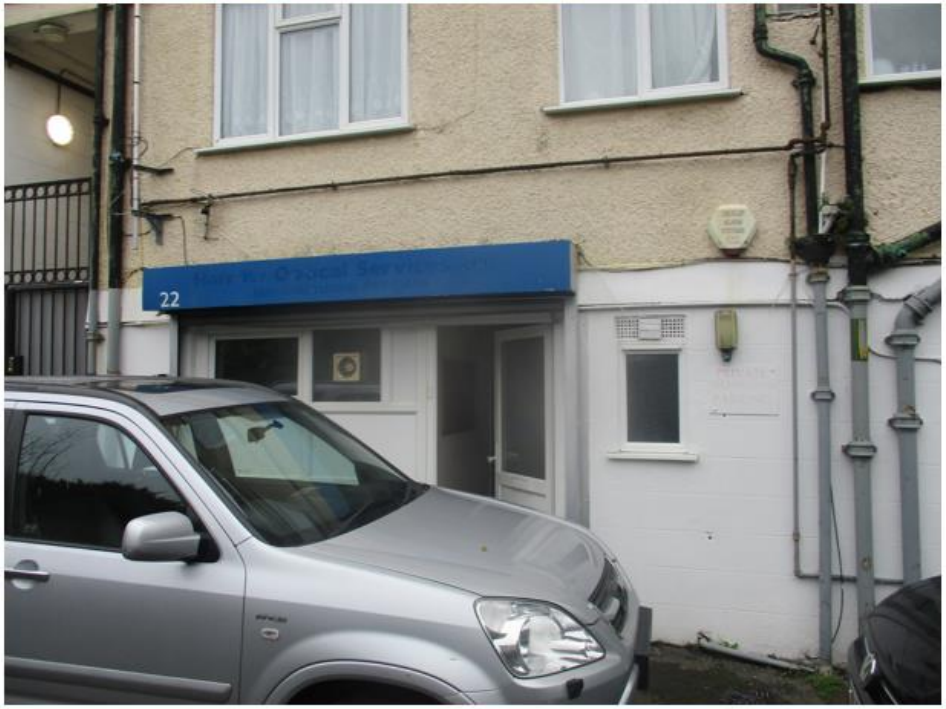
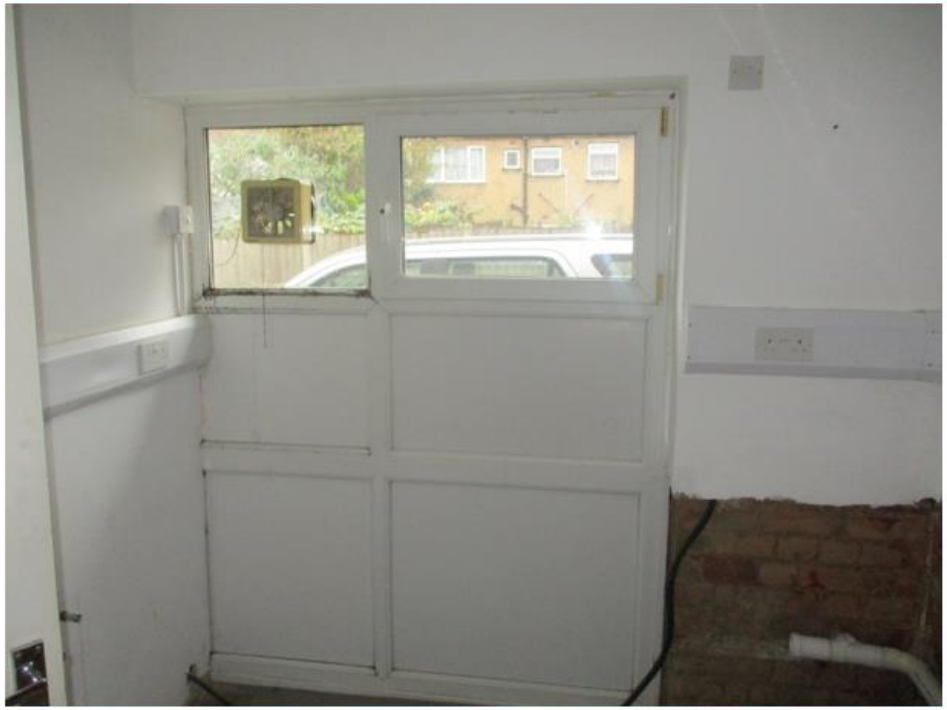


Photo No.24: Facing south from inside unit No.22 showing former office/reception space and service entries



Castledine Environmental
LAND CONTAMINATION SURVEYS

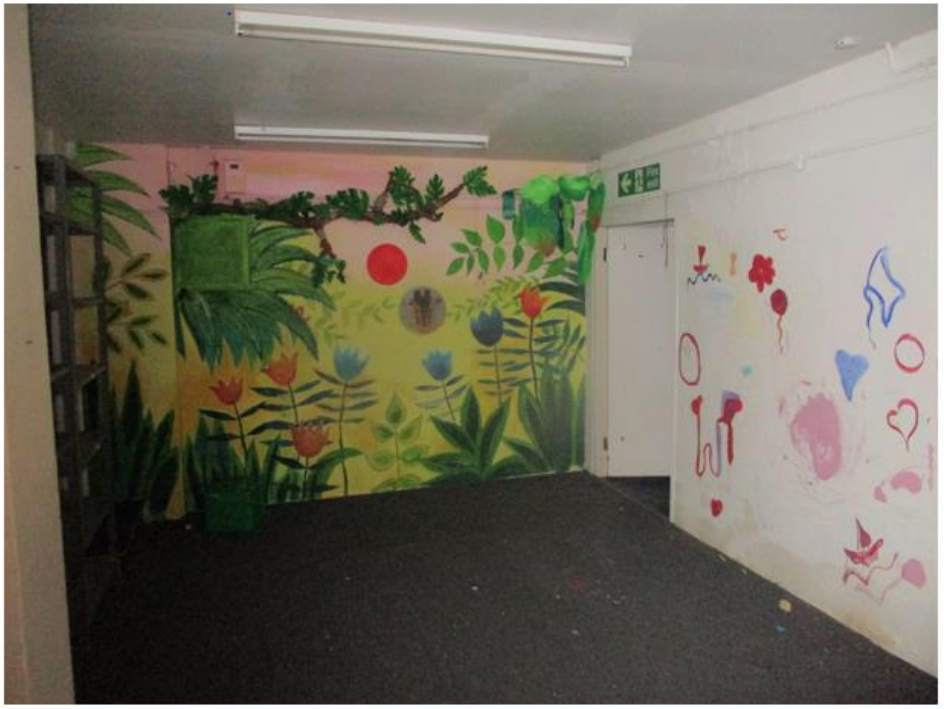
Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.25: Facing east in unit No.22 showing former kitchen space of the former nursery and supporting acrows

Photo No.26: Facing north in unit No.22 showing evidence of former nursery usage



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.27: Facing SE in unit No.28 towards the garage door access and showing further supporting acrows

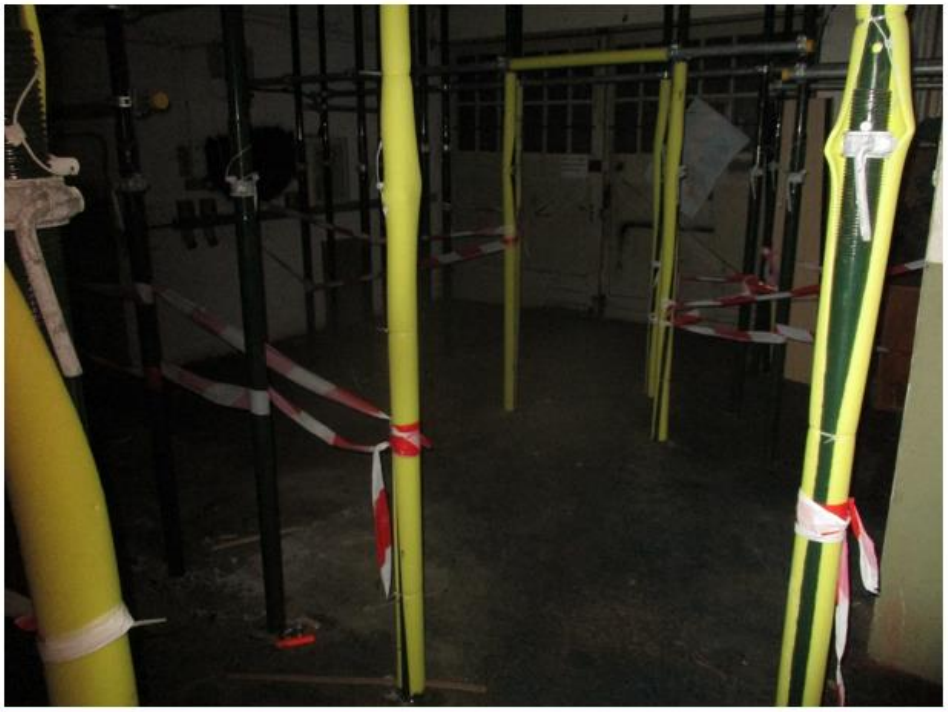


Photo No.28: Former coring location for vapour testing during previous investigation of unit No.28

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.29: Service entry noted on the southern face of the building in unit No.28

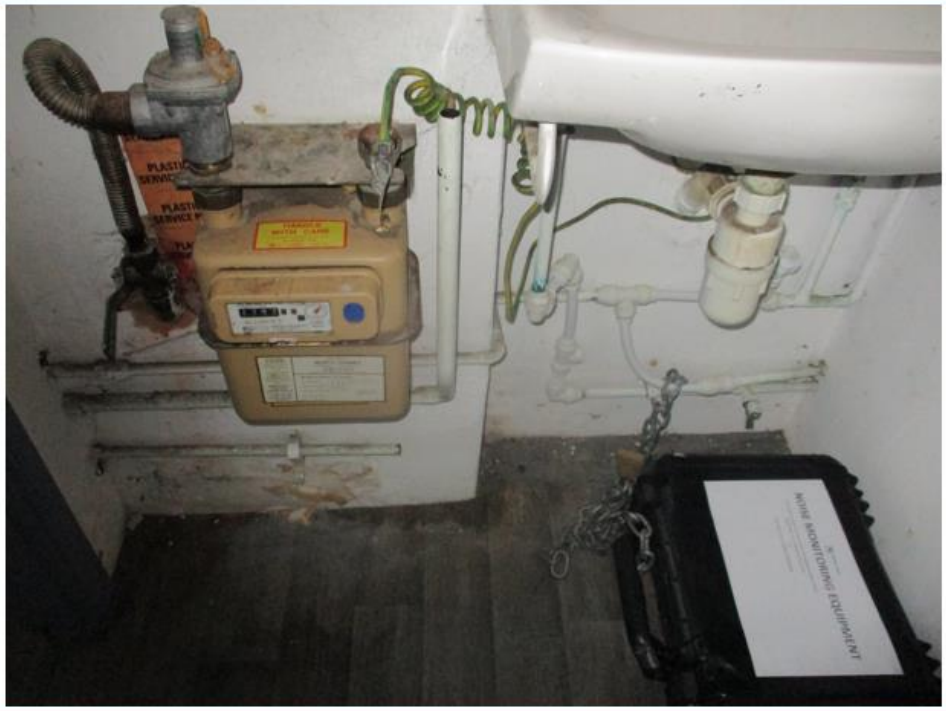
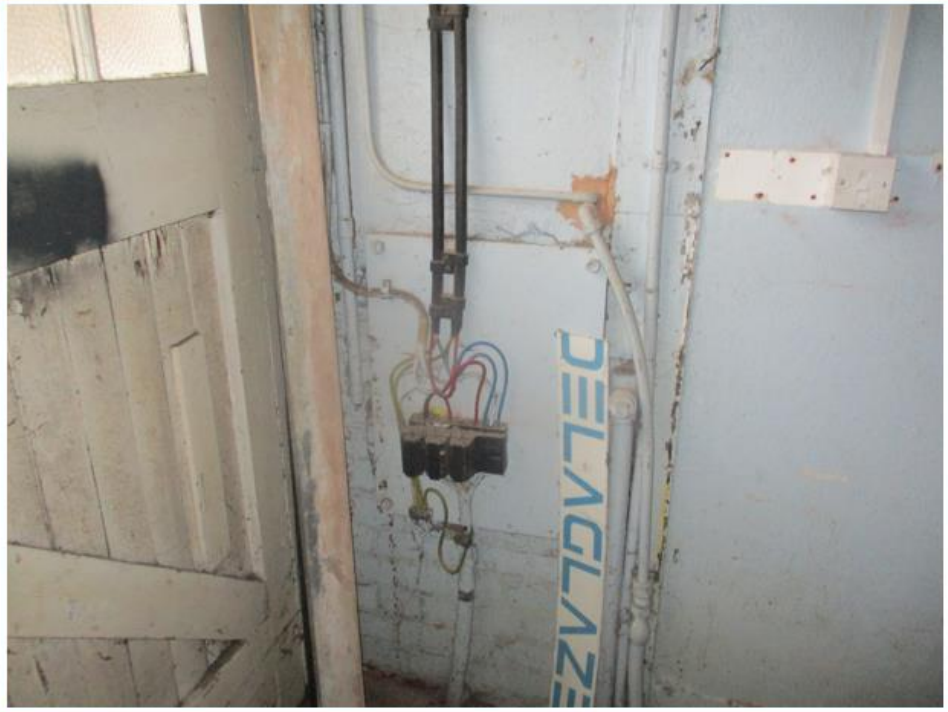


Photo No.30: Service entry noted on the southern face of the building in unit No.22



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.31: Facing west from outside the eastern face of the building showing entrance to unit No.30 (former furniture maker)

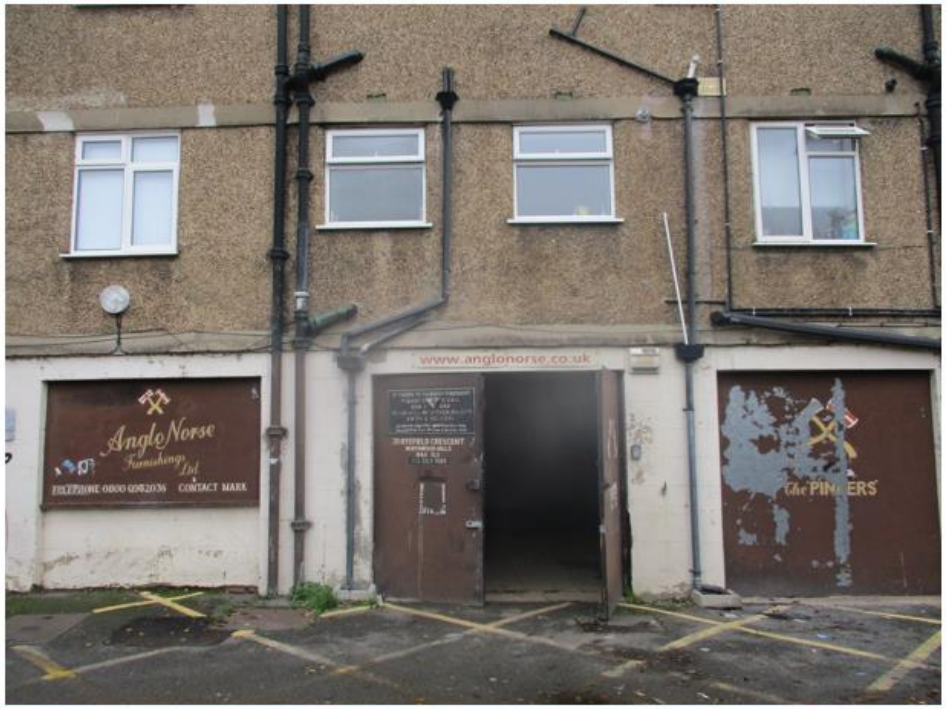
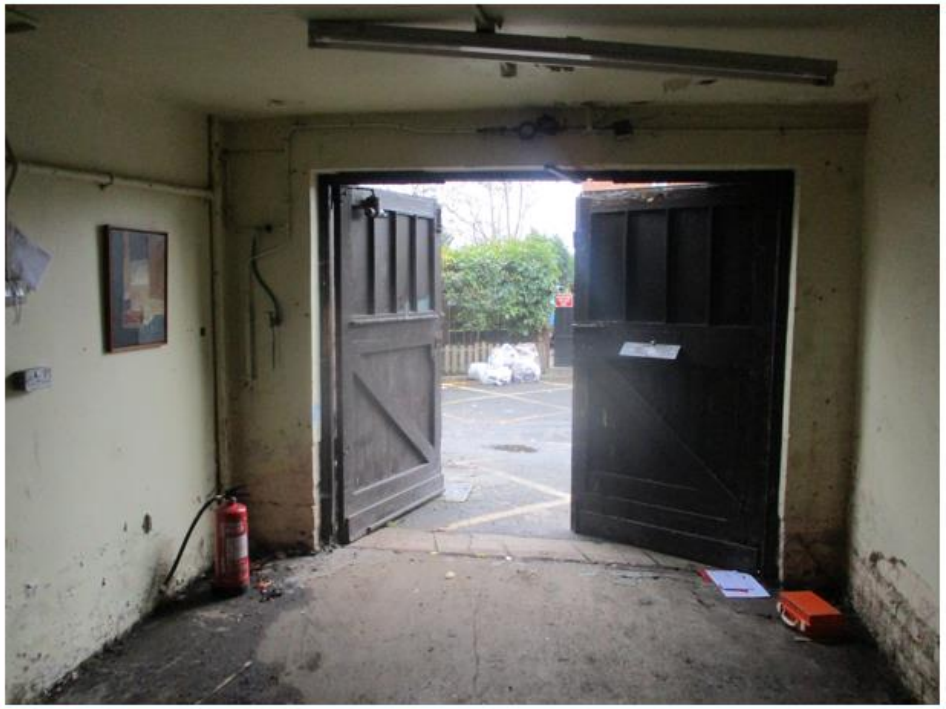


Photo No.32: Facing east from inside the entrance of unit No.30



Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Hawthorne Ct, Ryefield Crescent, Northwood

Client: Hamways Ltd

Photo No.33: Facing SW from the NE corner of unit No.30 showing concrete flooring and noise monitoring equipment

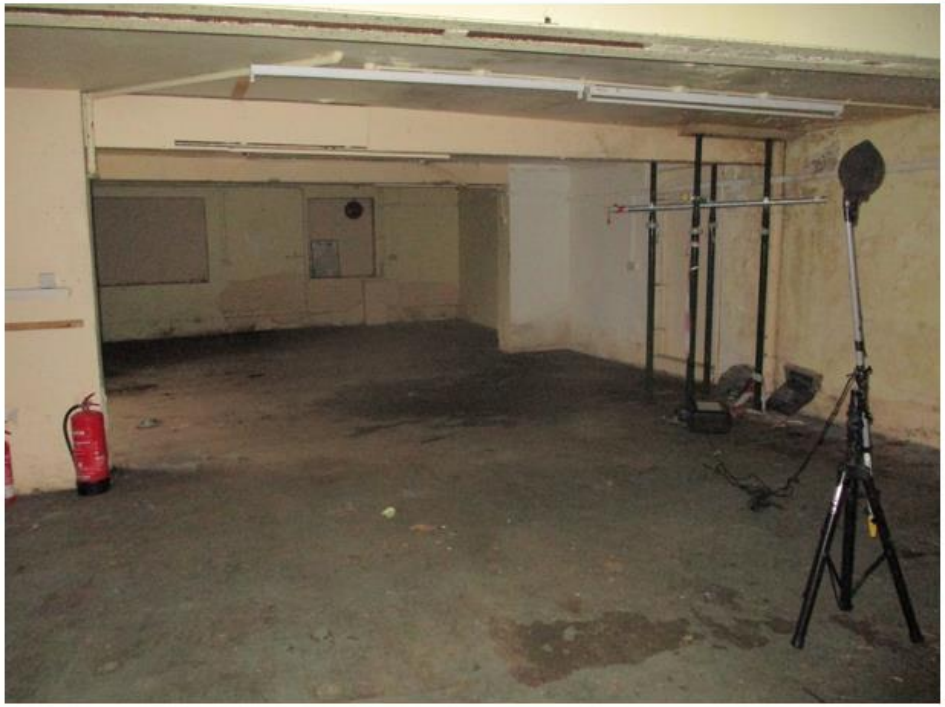
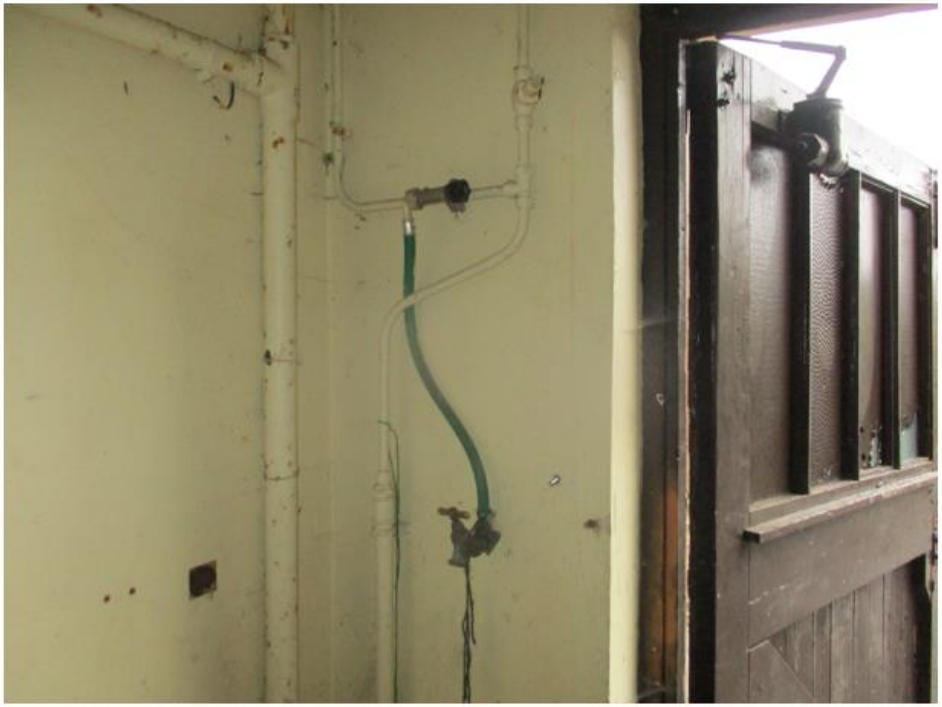


Photo No.34: Service entries noted on eastern face of Hawthorne Court in unit No.30



Castledine Environmental, 4 Wymeswold Road, Hoton, Loughborough, Leicestershire. LE12 5SN
Telephone: 01509 880399 **Mobile:** 07779 305682 kevin@castledineenvironmental.co.uk

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