



**Castledine
Environmental**

LAND CONTAMINATION SURVEYS

**Phase 1 Land Contamination
Risk Assessment
for
The Proposed Change of use
from Sui Generis to Class C3
(Commercial to Residential) and
Fenestration Changes
on the site of
Units 14-16 Ryefield Crescent,
Pinner, Northwood HA6 1LT**

Date: September 2024

Status: Final Report

Reference: 3787D P1 Bankway Properties Ltd – Northwood Rev 1

Date: 30/09/2024

EXECUTIVE SUMMARY

The site is currently occupied by a vehicle repair garage, which is known to have been on site since at least circa.2014 (and likely prior to this). The site itself is located within a larger structure, present since circa.1965 before being marked as an engineering works and a 'works' by circa.1990/92 (following which the vehicle repair usage was likely in situ; however, alongside this, it is known that following the works usage, the site was obtained by lease from Temporary US Aid Charity in 2020 and was both vacant and used as office space until recently).

Whilst limited potential sources of soil contamination have been identified in the surrounding areas (adjacent mainline railway, various developments and a nearby allotment gardens), no soft-landscaping is present nor proposed and the entirety of site is and will remain occupied by building footprint and hardstanding, thus acting to negate relevant pollutant linkages associated with physical soil contamination; however, potential vapour hazards may remain.

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 physical soil contamination and a **MODERATE** risk associated with potential hydrocarbon contamination on site.

It is recommended that further investigation inline with Section 16.0 be planned and carried out on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 2 intrusive testing to be undertaken.

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1.0 QUALITY ASSURANCE

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

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

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 Bankway Properties Ltd to undertake a Phase 1 Desk study on a site at Nos. 14-16 Ryefield Crescent, Pinner, Northwood HA6 1LT.

4.0 SCOPE

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

- Paragraph(s) 180, 185, 189 & 190 of the National Planning Policy Framework (NPPF) 2023.
- Part C1 of the building regulations.
- Support of Planning Application No.20331/PRC/2024/38

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, hydrological 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 Pinner, Northwood, Greater London at National Grid Reference: 510317,190187 and is approximately 0.02ha in area.

The site is located in a predominantly urbanised area and is directly bounded by the grounds of an associated buildings to the north, east and west with Ryefield Crescent (roadside) located directly north. The surrounding areas beyond this are predominantly residential, with a mainline railway bounding the larger building to the north (with residential areas beyond), residential areas directly east and south and a commercial area (shop fronts) to the west of site.

The site interior comprises a vehicle repair garage within the larger building situated on Ryefield Crescent. Access to site was provided directly off Ryefield Crescent, via a vehicle accessway on the southern face of the building. Inside the garage, the area was seen to be occupied by generic mechanics features such as vehicles, vehicle lifts, vehicles under repair and tools, benches, workstations and materials stored around the sides of the unit. The flooring within the unit was seen to be concreted, with some minor staining noted in areas (possibly of hydrocarbons), alongside a manhole in the eastern extent of the unit, around which further staining was noted.

The rear rooms were seen to be largely empty and unoccupied, beyond some small-scale overflow storage from the garage unit and numerous acrow props, which appeared to be supporting the ceiling.

The vehicle repair garage usage, noted staining on the flooring (and around the manhole covering) are considered potential sources of contamination noted on the site walkover. Topographically, the interior of site is level; however, the surrounding area drops off gently from the west down to the 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

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

6.1.1.2 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
2	168	SE	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

None recorded within 1000m of site with the nearest active potable abstraction site being located 1448m west of site (sourced via Thames groundwater – in effect from circa.2023).

6.1.3 SOURCE PROTECTION ZONE

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

6.1.4 GROUNDWATER VULNERABILITY AND SOIL LEACHING POTENTIAL

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

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.

- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

ID	Location	Summary	Soil / Surface	Superficial Geology	Bedrock Geology
1	On site	Summary Classification: 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

6.1.5 POTENTIAL SURFACE WATER

The Groundsure report records an unnamed watercourse located 168m east and 203m south east (surface level).

6.1.6 FLOOD RISK

According to both the Groundsure report and Environment Agency interactive online maps, the site is recorded to be at a low risk of flooding from the River and Seas (RoFRaS), a 1 in 30-year (0.3-1.00m) risk from surface water flooding on site and a low risk associated with groundwater flooding on site.

This report does not replace a full hydrogeological survey and specialist studies may need to be undertaken to fully assess the risks posed from flooding.

6.1.7 DISCHARGE CONSENTS

None recorded within 500m of site.

6.2 PERMITTED PROCESSES

The Groundsure report records a current Part B Permit relating to the unloading of petrol into storage located 77m south west; an inactive petrol vapour recovery Part B Permit formerly located 89m south west; and active

and historical Part B Permits relating to dry cleaning processes located 96m west and 295m north of site, respectively.

6.3 POLLUTION INCIDENTS

The Groundsure report records no impact or minor impact pollution incidents associated with household wastes located 179m west (2 No. records here, both dated circa.2002), a minor impact incident located 227m east and associated with grey waters and a significant impact incident (to water and air qualities) associated with biodegradable wastes located 228m east and dated circa.2002.

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

None recorded within 500m of site.

6.6 HAZARDOUS SUBSTANCES

None recorded within 500m of site.

6.7 ECOLOGICAL RECEPTORS

The Groundsure report records the London Greenbelt, as operated by Hillingdon Local Authority located 90m south, 297m north west and 944m north east of site and as operated by Harrow Local Authority 891m north east of site; and a Site of Special Scientific Interest (SSSI) named Ruislip Woods located 907m south west of site, which is also recorded as a National Nature Reserve (NNR) and an area of Designated Ancient Woodland.

No further sensitive land usages are recorded within 1000m of site.

6.8 SOILS AND GEOLOGY

"Contains British Geological Survey materials © NERC 2024" obtained from <http://www.bgs.ac.uk/data/mapViewers/home.html> under the [Open Government Licence](#)

6.8.1 SUPERFICIAL DEPOSITS

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

6.8.2 BEDROCK DEPOSITS

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

6.8.3 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.

6.8.4 ARTIFICIAL GROUND

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

6.8.5 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.

6.8.6 NON-COAL MINING

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

"Underground mine workings may have occurred in the past, or current mines may be operating to modern engineering standards. The potential for difficult ground conditions should be considered".

6.8.7 SURFACE WORKINGS

ID	Distance (m)	Direction	Land Usage	Year of Mapping
A	21	NE	Cuttings	1920
B	24	NE	Cuttings	1911
B	24	NE	Cuttings	1894
A	24	NE	Cuttings	1911
A	24	NE	Cuttings	1894
B	99	NW	Cuttings	1920
B	100	NW	Cuttings	1938
B	106	NW	Cuttings	1935
B	108	NW	Cuttings	1911
B	111	NW	Cuttings	1959
B	116	NW	Cuttings	1894
2	143	SE	Cuttings	1935
B	199	NW	Cuttings	1992
B	199	NW	Cuttings	1976

6.8.8 RADON

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

6.9 AERIAL PHOTOGRAPHY

Aerial photography shows the following:

6.9.1 GOOGLE EARTH

24 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.
February 2011	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.
June 2013	No discernible change on site nor site relevant change to the surrounding areas.
August 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.
October 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.
April 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.
April 2022	No discernible change on site nor site relevant change to the surrounding areas.
May 2024	No discernible change on site nor site relevant change to the surrounding areas.

6.9.2 GOOGLE STREET VIEW

Google Earth Street View imagery is dated circa.2014, 2016, 2017, 2018 and 2020 with the site viewed off Ryefield Crescent and facing north. Imagery dated circa.2014 shows the site as remaining occupied by 'Ferndown Motors', with the garage unit remaining occupied as such by this time. Imagery then dated between circa.2016-2020 shows the site as remaining in a vehicle repair garage usage, with various movements of vehicles noted outside the front face of the garage.

6.10 HISTORIC MAPPING

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

Map	Onsite	Offsite
OS County Series: 1865, 1:2,500	The site is shown as located within a wider, occupied agricultural field.	The immediate surroundings to site comprise open field in all compass directions. A roadside is located approx.76m west of site, in the present-day location and orientation of the B472 and small pond are located approx.105m and 120m north and east of site, respectively. An area of marshy land is located approx.20m south and extending further south and marked as 'Poor's Field'.

Map	Onsite	Offsite
OS County Series: 1864-1865, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1883, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1894-1895, 1:10,560	No discernible change on site.	A railway line has been erected approx.20m north east of site and in a NW to SE orientation, with cuttings located NW and east of site. The pond formerly located to the east of site has been removed as part of the railway development.
OS County Series: 1896, 1:2,500	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, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1913, 1:2,500	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: 1932, 1:2,500	No discernible change on site.	The surrounding areas have seen the erection of a linear building directly south (approx.15m) with the former 'Poor's Field' beyond this now shown as an extensive allotment gardens (which remain persistent until the present-day).
OS County Series: 1935, 1:2,500 & 1:10,560	No discernible change on site.	The areas north of the railway line (north again of site) have now seen extensive residential development, as have areas west of site beyond the B472. and Northwood Hill station is now located approx.64m NW of site.
OS County Series: 1938, 1:10,560	No discernible change on site.	Surrounding areas see further residential infill.
Provisional: 1955-1960 1:10,560,	The site has now been developed with the large, triangular shaped building seen in the present-day.	Housing is now located directly south of site (replacing the former linear building here) and a large building (present-day commercial properties) is now located directly west of site. Surrounding areas again see further residential infill.
National Grid: 1965, 1:1,250	The site is now marked as 'Hawthorne Court – Engineering works'	A 'clinic' is marked directly west of site, within the same structure as the site itself. A garage and forecourt is now located approx.70m SW of site. Additional tracks laid directly north, NW and SE of site in the railway cutting, Northwood Station enlarged.

Map	Onsite	Offsite
Provisional: 1965-1968, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1966, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1973-1976, 1:10,000	No discernible change on site.	A piggery is marked approx.250m south of site.
National Grid: 1986-1990, 1:1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1987-1992, 1:10,000	No discernible change on site.	Piggeries approx.250m south of site no longer marked as such.
National Grid: 1989-1992, 1:1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1990-1992, 1:1,250	Site is now simply marked as 'works'.	Surrounding areas see little site relevant change.
National Grid: 2001, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
Landline: 2003, 1:1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2010, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2024, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.

6.11 CURRENT LAND USE DATA

ID	Distance (m)	Direction	Company	Activity	Category
1	8	SE	Ferndown Motor Service	Vehicle repair, testing and servicing	Repair and servicing
A	87	SW	Tesco Petrol Station	Petrol and fuel stations	Road and rail
2	88	NW	Northwood Hills	Underground network stations	Public transport, stations and infrastructure
B	94	W	Auto Shiners Ltd	Vehicle cleaning services	Personal, consumer and other services
B	94	W	Vara Consulting Engineers	Civil engineers	Engineering services
B	94	W	Hi Tech IME Europe Ltd	General construction supplies	Industrial products

ID	Distance (m)	Direction	Company	Activity	Category
B	94	W	Aspire Healthcare Group	Medical equipment supplies and pharmaceuticals	Industrial products
4	153	NW	Cartridge Works Northwood Ltd	Printing relating machinery	Industrial products
5	202	SW	Electricity substation	Electrical features	Infrastructure and facilities
6	237	N	Eggfree Cake Box	Baking and confectionary	Foodstuffs
7	248	NE	Soundzgood	Electronic equipment	Industrial products

6.12 PETROL AND FUEL SITES

The Groundsure report records an active Esso fuel station located 85m south west and an obsolete former fuel station located 93m south west (likely the prior brand / company operating the site).

6.13 HISTORICAL PETROL AND FUEL SITE DATABASE

None recorded within 500m of site.

6.14 POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED ON MAPPING

ID	Distance (m)	Direction	Use	Date
A	21	NE	Cuttings	1911-1920
B	24	NE	Cuttings	1911
B	24	NE	Cuttings	1894
A	24	NE	Cuttings	1894
C	56	S	Garage	1968
A	64	NW	Railway station	1968-1974
A	64	NW	Railway station	1992
A	65	NW	Railway station	1935
A	66	NW	Railway station	1959
B	99	NW	Cuttings	1911-1920
B	100	NW	Cuttings	1935-1938
B	111	NW	Cuttings	1959
B	116	NW	Cuttings	1894

ID	Distance (m)	Direction	Use	Date
1	143	SE	Cuttings	1935
B	199	NW	Cuttings	1968-1992
E	312	SE	Cuttings	1920
E	314	SE	Cuttings	1911
E	321	SE	Cuttings	1959
E	322	SE	Cuttings	1935-1938
E	324	SE	Cuttings	1992
E	324	SE	Cuttings	1968-1976
E	324	SE	Cuttings	1894
E	324	SE	Cuttings	1894
F	401	NW	Railway sidings	1955
F	404	NW	Railway sidings	1935
F	408	NW	Railway sidings	1938
E	412	SE	Cuttings	1960-1966
F	420	NW	Railway sidings	1965
F	436	NW	Unspecified works	1898
F	437	NW	Unspecified works	1965-1976
F	447	NW	Unspecified commercial / industrial	1935
E	466	SE	Cuttings	1974-1990
H	466	W	Cemetery	1989
H	475	W	Cemetery	1955-1976
I	494	NW	Hospital	1938
I	496	NW	Hospital	1992
I	496	NW	Hospital	1968-1976
I	496	NW	Hospital	1959
I	497	NW	Hospital	1935

6.15 HISTORICAL TANK DATABASE

The Groundsure report records historical tanks formerly located 461m west of site and identified from historical mapping dated circa.1988.

6.16 HISTORICAL ENERGY FACILITIES (<250M)

ID	Distance (m)	Direction	Use	Date
2	200	SW	Electricity substation	1989
3	245	NE	Electricity substation	1973-1992

6.17 HISTORICAL GARAGE DATABASE

ID	Distance (m)	Direction	Use	Date
C	55	S	Garage	1966
C	56	S	Garage	1965
C	56	S	Garage	1989
D	257	N	Garage	1989
D	257	N	Garage	1965-1966

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

- Development and usage of the wider site structure as engineering works (circa.1965 and marked as 'works' by circa.1990/92)
- Subsequent usage of site area for vehicle repair garage (at least circa.2014 and likely prior to this ~90's)

Potential Sources and Associated Contaminants Identified	
Source	Potential Contaminants of Concern
Development and usage of the wider site structure as engineering works (circa.1965 and marked as 'works' by circa.1990/92)	Heavy metals, petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), asbestos
Subsequent usage of site area for vehicle repair garage (at least circa.2014 and likely prior to this ~90's)	Heavy metals, petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), asbestos, VOC's

7.1.2 OFFSITE

- Adjacent mainline railway (approx.20m north, circa.1895 until present-day)

- Development and usage of the wider site structure as engineering works (circa.1965 and marked as 'works' by circa.1990/92)

Potential Sources and Associated Contaminants Identified	
Source	Potential Contaminants of Concern
Adjacent mainline railway (approx.20m north, circa.1895 until present-day)	Asbestos – largely discounted as a potential source due to lack of soft-landscaping present nor proposed on site and railway being on the far side of the structure the site is located within
Development and usage of the wider site structure as engineering works (circa.1965 and marked as 'works' by circa.1990/92)	Heavy metals, petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), asbestos

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;
- 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;
- 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 is currently occupied by a vehicle repair garage, which is known to have been on site since at least circa.2014 (and likely prior to this). The site itself is located within a larger structure, present since circa.1965 before being marked as an engineering works and a 'works' by circa.1990/92 (following which the vehicle repair usage was likely in situ; however, alongside this, it is known that following the works usage, the site was obtained by lease from Temporary US Aid Charity in 2020 and was both vacant and used as office space until recently).

Whilst limited potential sources of soil contamination have been identified in the surrounding areas (adjacent mainline railway, various developments and a nearby allotment gardens), no soft-landscaping is present nor proposed and the entirety of site is and will remain occupied by building footprint and hardstanding, thus acting to negate relevant pollutant linkages associated with physical soil contamination.

8.1.2 GROUND GAS AND HAZARDOUS VAPOURS

No significant potential sources of hazardous ground gas generation have been identified on or nearby to site and the site is located in area lacking superficial deposits and atop the London Clay Formation, which is predominantly low to very low in permeability, thus acting to inhibit migration from offsite sources.

The sites historical usage as an engineering works, unspecified 'works' and the more contemporary vehicle repair garage usage are considered potential sources of hazardous vapours, which should be investigated further.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Conseq.	Risk	Possible Mitigation
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Direct Ingestion & Direct Contact	Site Workers (during site works, excavations, eating and drinking)	Lw	Md	M/L	Site workers to wear appropriate PPE for health and safety reasons, suitable usage of PPE and adherence to relevant HSE guidance during site works considered sufficient to mitigate hazards to LOW – following confirmation of potential hazardous vapours / hydrocarbon presence on site.
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Inhalation of Dust, Dry Arisings	Site Workers (during site works, excavations, eating and drinking)	Lw	Md	M/L	
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Crop Uptake & Direct Ingestion, Direct Contact	End Users (residents / tenants, children, visitors, service personnel)	UI	Md	L	No soft-landscaping is present on site nor proposed in the final site-design, as such the risks from physical soil contamination are considered to be low; however, potential hazards remain to site workers, end-users of the site and new potable piping arising from the potential presence of hydrocarbons on and below site and thus the potential for vaporous emissions. Should significant hydrocarbon storage and/or release or spillages have occurred (particularly around the known manhole / drain), there may be impact to site workers during redevelopment, end-users following redevelopment and any new potable piping, should new potable piping be laid on site. As such, it is recommended that a proportionate Phase II SI is planned and carried out on site.
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Inhalation of Dust, Dry Arisings	End Users (residents / tenants, children, visitors, service personnel)	UI	Md	L	
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Crop Uptake & Direct Ingestion, Direct Contact	Flora and Fauna (on and offsite)	UI	Md	L	
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Vertical and lateral migration (no superficial, bedrock predominantly very low to low in permeability)	Controlled Waters (Unproductive)	UI	Md	L	
Contaminated Soils (development and usage of site as engineering works, unspecified 'works' and contemporary vehicle repair garage usage)	Direct contact (pipe degradation and leaching)	Services (impacted new potable supply piping)	Li	Md	M	
Ground Gases (Methane and CO ₂) (no significant potential sources identified)	Vertical and lateral migration (no superficial, bedrock predominantly very low to low in permeability)	Site Workers & Excavations, End Users & Building Envelope (ingress and build-up)	UI	Md	L	No significant potential sources of ground gas generation identified and site located atop low permeability geological formation – see Section 8.1.2.
Volatile and Semi-volatile Organic Compounds (engineering works, unspecified 'works' usage and contemporary vehicle repair garage usage)	Vertical and lateral migration (no superficial, bedrock predominantly very low to low in permeability)	Site Workers & Excavations, End Users & Building Envelope (ingress and build-up)	Li	Md	M	Potential sources of hazardous vapours / hydrocarbon presence identified, recommend further investigation as part of a proportionate Phase II SI.
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

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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/Lo w Risk	Low Risk
	Low Likelihood (Lw)	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely (Ui)	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

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

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

TABLE 3. CLASSIFICATION OF RISK

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

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

9.0 ENVIRONMENTAL RISK ASSESSMENT

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a **LOW** level of risk with respect to physical soil contamination and a **MODERATE** risk associated with potential hydrocarbon contamination on site.

It is recommended that further investigation inline with Section 16.0 be planned and carried out on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 2 intrusive testing to be undertaken.

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10.0 SUMMARY OF RISKS

11.0 HUMAN HEALTH

Heavily urbanised areas such as London have seen extensive construction, redevelopment, land filling and use of numerous contaminants over a significant amount of time, and as such elevated concentration (heavy metals, PAHs, asbestos, inorganics etc) can be found in many inner city and highly industrialised areas which may give rise to concerns about the risks presented to human health. This is likely the reason why a contamination condition was placed on your application.

11.1.1 RESIDENTS / END-USERS

The risks to end-users of the site are considered to be low when assessed the site's historical legacy and various usages and the lack of present nor proposed soft-landscaping in the final site design and no significant sources of offsite contamination have been identified that are considered capable of adversely impacting the proposed development. The site is proposed to be almost entirely encapsulated beneath building footprint and hardstanding and as such, relevant pollutant linkages associated with end-users of the site and physical soil contamination will be effectively severed.

More pertinently, on this particularly site, are hydrocarbon and vapour hazards associated with the prior and contemporary usages of the site. As such, it is recommended that further investigation of the subbase to the present concrete floor and the existing manhole and drain be planned and carried out, to assess potential impact arising from vapour emissions or impact to new potable piping on site.

11.1.2 SITE WORKERS

The risks to site workers during site works are considered to be low to moderate, due to the potential hydrocarbon presence on site and the potential for vaporous emissions / release during site redevelopment (i.e. mobilisation of contamination during the site works, exposing hydrocarbon

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impacted soils during redevelopment / foundational or flooring works). 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 vapour hazards on site via an intrusive Phase II Site Investigation.

12.0 CONTROLLED WATERS

The risks to controlled waters are considered to be, due to the largely impermeable bedrock geology in the area inhibiting significant offsite migration, the lack of productive aquifer in said bedrock deposits and the lack of surface waters or abstraction sites nearby to site.

13.0 STRUCTURES

13.1.1 GROUND GASES

No significant potential sources of hazardous ground gas generation have been identified on or nearby to site and the site is located in area lacking superficial deposits and atop the London Clay Formation, which is predominantly low to very low in permeability, thus acting to inhibit migration from offsite sources.

13.1.2 HAZARDOUS VAPOURS

The sites historical usage as an engineering works, unspecified 'works' and the more contemporary vehicle repair garage usage are considered potential sources of hazardous vapours, which should be investigated further.

14.0 RECOMMENDATIONS

It is recommended that a proportionate Phase II Site Investigation is planned and carried out on site, ideally following the site being vacated and emptied of associated vehicles, machinery and tools. The site works should involve the formation of either hand-excavated or cored-out inspection pits within the site itself (including within the garage work area and particularly at the manhole cover and likely drain below). Following

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formation of inspection pits, an assessment of the ground conditions should be made (i.e. made ground, natural or reworked natural deposits, their nature, extent and depth) alongside environmental sampling at each location and change in stratum. Environmental sampling should be targeted at hydrocarbons, VOC's via TPH CWG analysis and usage of PID during the formation of the inspection pits. Works will inform site worker safety during redevelopment, end-user safety following redevelopment (i.e. vaporous emissions, impact to potable piping) and the extent to which remediation is required (or not). Should elevated hydrocarbon presence or vapour emissions be detected, it is likely that gas / vapour protection measures will be required in the final site design.

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.

Environmental

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, 2023: National Planning Policy Framework.

Environmental

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

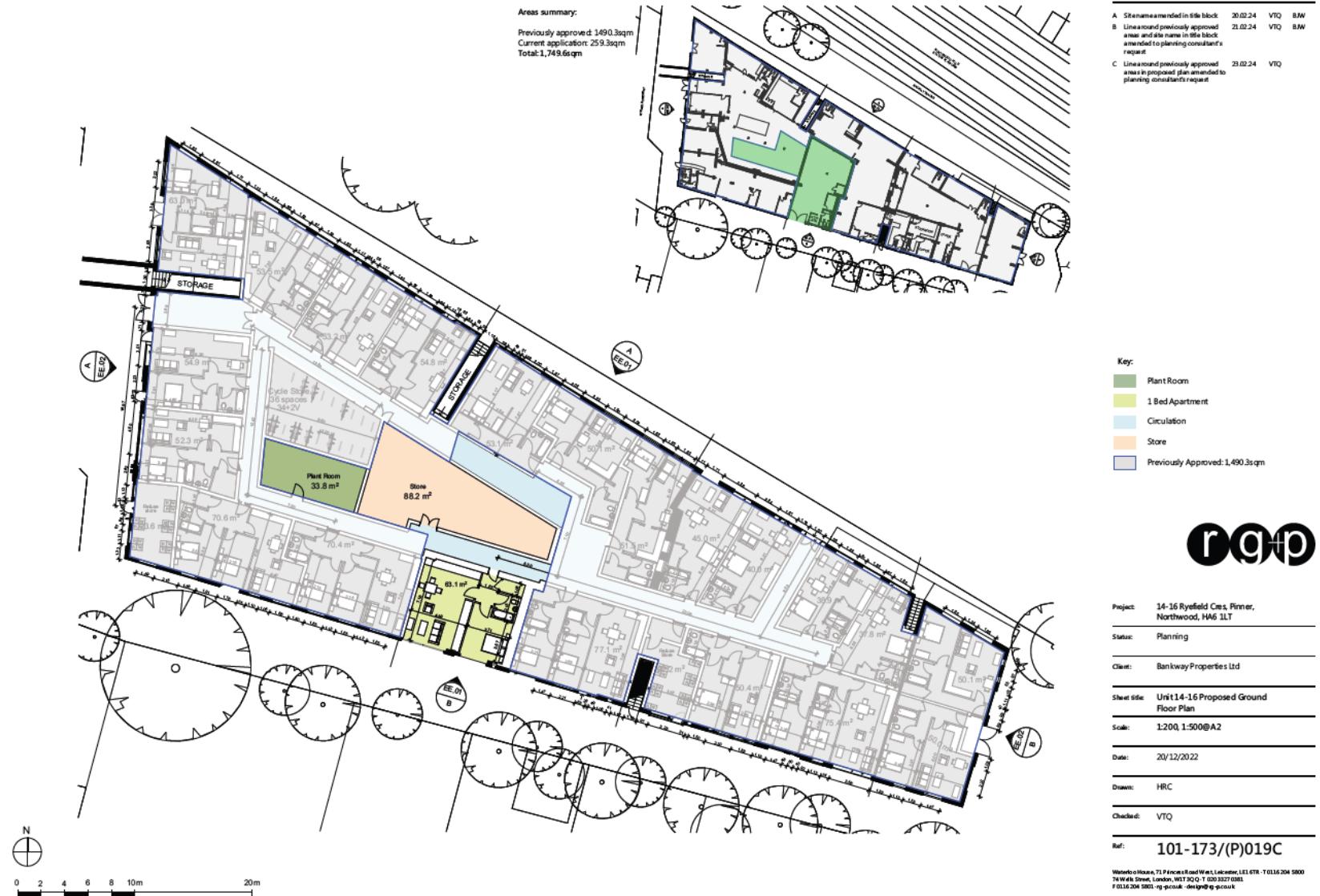
APPENDIX B

HISTORICAL MAPPING

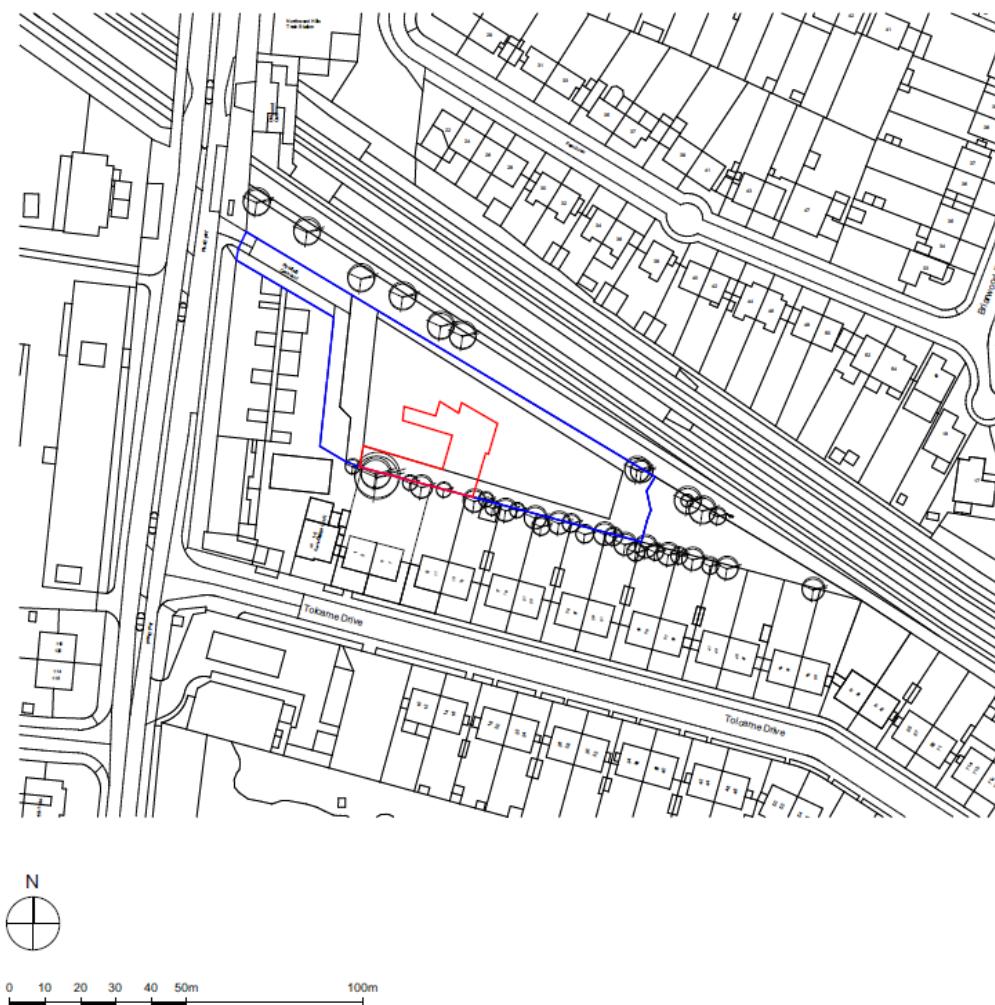
Separate Map Packs (2 No. files)

APPENDIX C

PROPOSED AND CURRENT SITE PLANS



Revision	Date	Drawn	Check
A	Site name entered in title block	20.02.24	VTQ SW
B	Site name in title block amended	21.02.24	VTQ
C	Planning consultant required Bounding and ownership lines connected	25.09.24	APR VTQ



Key:
— Ownership Boundary
— Development Boundary



Project: 14-16 Ryefield Close, Pinney, Northwood, HA6 1LT
 Status: Planning
 Client: Bankway Properties Ltd
 Sheet title: Unit 14-16 Site Location Plan
 Scale: 1:1250@A3
 Date: 20/12/2023
 Drawn: HRC
 Checked: VTQ

Ref: 101-173/(P)018C

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APPENDIX D

SITE PHOTOS AND LOCATIONS



Site Walkover Photos

Photo No.1: Facing slightly NE outside the southern boundary of site (demarcated by wall) showing vehicular access



Address: Nos.14-16 Ryefield Crescent, Northwood
Client: Bankway Properties Ltd

Photo No.2: facing north within the vehicle access showing the vehicle repair garage usage of the interior of site



Site Walkover Photos

Photo No.3: Facing slightly NE from within the garage



Address: Nos.14-16 Ryefield Crescent, Northwood
Client: Bankway Properties Ltd

Photo No.4: Facing SE showing the tools and benches arrayed along and inside the eastern boundary of site



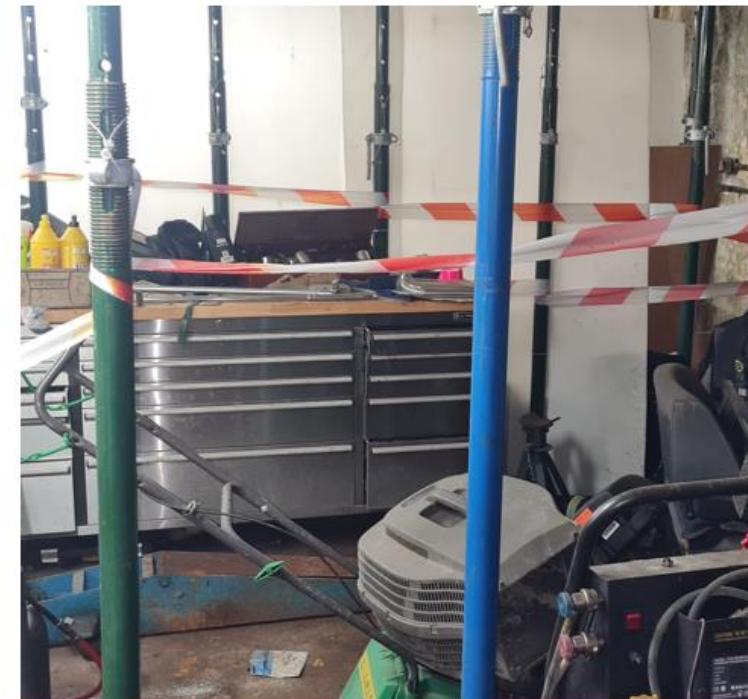
Site Walkover Photos

Photo No.5: Manhole covering noted in concrete-flooring of the garage unit, some staining noted around the feature



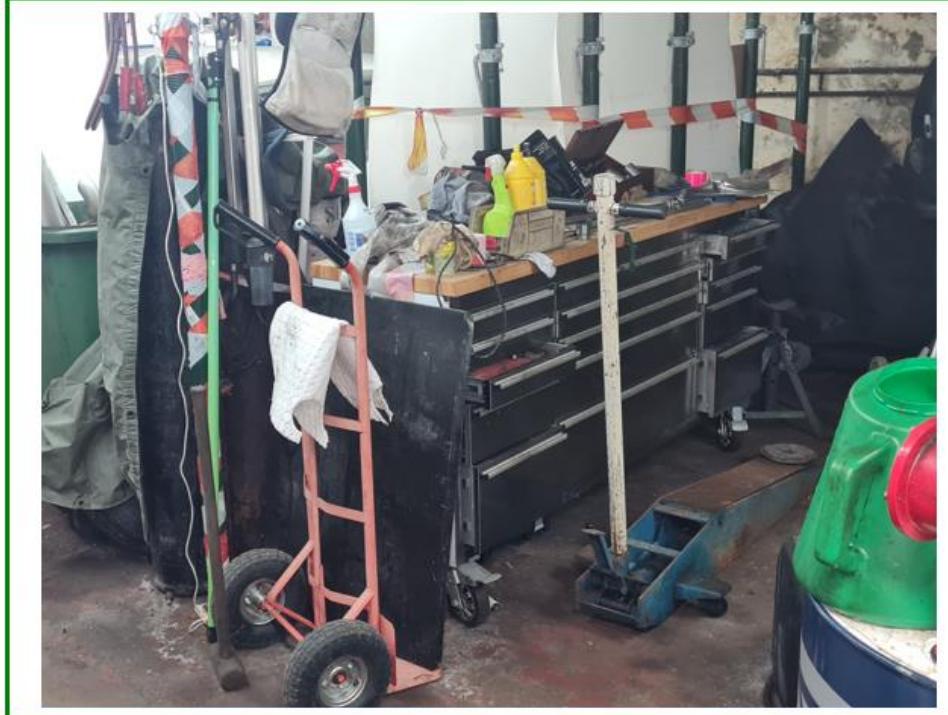
Address: Nos.14-16 Ryefield Crescent, Northwood
Client: Bankway Properties Ltd

Photo No.6: Facing west showing the rear of the garage



Site Walkover Photos

Photo No.7: Further shot showing the rear of the garage unit



Address: Nos.14-16 Ryefield Crescent, Northwood
Client: Bankway Properties Ltd

Photo No.8: Again showing rear rooms to the garage units



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

