



Units 14 + 15, River Road Business Park,
33 River Road, Barking, Essex IG11 0EA

Directors: J. S. Warren, M.R.S.C., P. C. Warren, J. I. Pattinson, BSc (Hons), MSc
Consultants: G. Evans, BSc., M.Sc., P.G. Dip., FGS., MIEnvSc. A. J. Kingston, BSc C.Eng. MIMM
F. J. Gibbs, F.I.B.M.S. F.I.F.S.T., F.R.S.H. K. J. Blanchette

Tel: 0208 594 8134
Fax: 0208 594 8072
E-Mail: services@siteanalytical.co.uk

Your Ref:

Our Ref:

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52 HOLMES ROAD

LONDON NW5 3AB

PHASE 3 REMEDIATION STRATEGY AND REMEDIAL ACTION PLAN



Prepared for

Reddington Construction Limited

Reg Office: Units 14 +15, River Road Business Park,
33 River Road Barking, Essex IG11 0EA
Business Reg. No. 2255616



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Author: Aubrey Davidson BSc MSc DIC. Senior Environmental Engineer 
Checked: Jim Warren MRSC. Managing Director 

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1.0 EXECUTIVE SUMMARY

Site Location	52 Holmes Road, London, NW5 3AB					
Client	Reddington Construction Limited					
Proposed Development	Demolition of existing building and replacement with a new build mixed use development of 6 storeys (plus basement) comprising of 9 self-contained units (8x2 bed and 1x3 bed) on floors 1-5 and 377sq.m of industrial employment space (B1c) on the basement and ground floors.					
Previous Investigations	<p>Phase 1 - Preliminary Risk Assessment (SAS Ref: 18/25450, dated August 2016) by Site Analytical Services Limited. The Preliminary Conceptual Site Model identified the following potential risks; <u>Human Health Risk: Workforce, Buildings / Service Materials: Direct contact</u></p> <p>Phase 2 - Report on a Ground Investigation (SAS Ref: 18/25450-1, dated August 2016) by Site Analytical Services Limited. The boreholes and trial pits revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised Made Ground up to 1.00m in thickness underlain by the London Clay Formation. The findings of the Phase 2 site investigation have demonstrated that in the context of a proposed mixed residential and commercial use of the site, the contaminants of concern with respect to end-user protection were Asbestos and Lead, Cyanide and Polycyclic Aromatic Hydrocarbons including Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(a,h)anthracene.</p>					
Viable Pollution Linkages	Potential Contaminants / Source	Pathway	Receptor	Site specific settings	Risk Classification: Based on Phase II Investigation	Action Required
	Asbestos & Cyanide, Lead, PAH	Inhalation, ingestion and dermal contact.	Human health Site users	Mixed residential and commercial use	Low	Further action required – Remediation required
	Asbestos & Cyanide, Lead, PAH	Inhalation, ingestion and dermal contact	Human Health Workers	Workers and the general public should follow regulation on health and safety during development (HSE, 1991)	Low	All site works must be carried out according to Health and Safety Executive (HSE) procedures.
	Sulphates /TPH	Chemical attack, gas accumulation in buildings	Building structures/services	Made ground underlying the site	Low	WATER UK HBF guide recommendations for potable water pipes.
Proposed Remediation Strategy	The proposed risk management / remedial strategy to be adopted at the site is one of managing the pathway between the source of contamination and the critical receptors on-site. The entirety of the site is under buildings and this permanent hardstanding will adequately break exposure pathways to human health and therefore further remedial measures would not be required.					

2.0 INTRODUCTION

At the request of Reddington Construction Limited, a proposed remediation strategy and remedial action plan was prepared in connection with a proposed redevelopment at the above site.

2.1 Report objectives

This report comprises a Phase 3 - Remediation Strategy Report to assess the remediation required for the protection of the end-user from the presence of potential contamination within the soils encountered.

Planning permission granted by councils for development of Brownfield land often have conditions attached which require the following site investigation to be undertaken and submitted to the local authority for approval:

1. Phase 1 - Preliminary Risk Assessment
2. Phase 2 - Intrusive Investigation
3. Phase 3 - Remediation Strategy
4. Phase 4 - Validation Report

Phase 1 - Preliminary Risk Assessment and Phase 2 - Intrusive Investigation have been commissioned as part of this investigation.

This Phase 3 report must be read in conjunction with the Phase 1 Preliminary Risk Assessment (SAS Report Ref: 16/25450 dated August 2016) and Phase 2 Site Investigation report (16/25450-1 August 2016). This document incorporates the results, discussion and conclusions of this work and comprises and remediation strategy for the development of the site.

A Phase 4 - Validation Report should be compiled and submitted to the council when the development has been completed.

2.2 Scope of works

The scope of the investigation was generally agreed with the Consulting Engineer and comprised:

- The identification of a suitable approach to remediation in order to reduce contamination risks to acceptable levels for residential use;
- Producing a remediation strategy that addresses all relevant pollutant linkages, where appropriate by combining remediation options.
- To satisfy any Condition attached to Council planning application stating that a remediation strategy be submitted and agreed with interested parties;
- To define any controls required (legislative, regulatory or otherwise) during the implementation of the Remediation Strategy.
- Recommendations will be provided on further actions that may be required.

The site works were performed in accordance with the methods given in BS 5930+A2:2010 and BS EN ISO 22476-2&3:2005. The work was carried out in accordance with the methodologies detailed in CLR11: Model Procedures for the Management of Land Contamination.

2.3 Report Limitations

The recommendations and comments given in this report are based on the ground conditions encountered in the exploratory holes made during the investigation and the results of the tests made in the field and the laboratory, within the time constraints applied by the project. It must be noted that there may be special conditions prevailing at the site remote from the exploratory hole locations which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

The remediation action plan sets out a combination of investigation and remedial measures which, when considered in the context of the development, will ensure that the final development is suitable for the proposed use.

2.4 Confidentiality, Copyright and Reproduction

This document has been prepared by Site Analytical Services Limited in connection with a contract to supply goods and/or services and is submitted only on the basis of strict confidentiality. The contents must not be disclosed to third parties other than in accordance with the terms of the contract.

Site Analytical Services Limited accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

3.0 SITE DETAILS

(National Grid Reference: TQ 288 850)

3.1 Site Location

52 Holmes Road is a commercial property, located on the northern side of Holmes Road, Kentish Town at approximate postcode NW5 3AB. The site comprises a hardstanding area at the front of a commercial property, which is used for parking. The site covers an approximate area of 0.04 Hectares with the general area being under the authority of the London Borough of Camden.

The site is located on the northern side of Holmes Road with a commercial property to the east, a charity to the west and roadways to the north and south.

3.2 Published Geology

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area (Sheet 256, 'North London', Solid and Drift Edition) indicates the site to be underlain the London Clay Formation at depth.

3.3 Previous Investigations

A report on a Phase 1 Preliminary Risk Assessment was undertaken at the site by Site Analytical Services Limited (SAS Report Ref: 16/25450, dated August 2016).

3.4 Proposed development

Demolition of existing building and replacement with a new build mixed use development of 6 storeys (plus basement) comprising of 9 self-contained units (8x2 bed and 1x3 bed) on floors 1-5 and 377sq.m of industrial employment space (B1c) on the basement and ground floors.

3.5 References of planning applications

The main planning application for the site Ref: 2016/1986/P was registered on the London Borough of Camden portal in April 2016.

4.0 REVIEW OF PREVIOUS REPORTS

4.1 Phase 1 - Preliminary Risk Assessment (SAS Ref: 16/25450, dated August 2016)

A Phase 1 Preliminary Risk Assessment (PRA) was undertaken across the site by Site Analytical Services Limited.

From historical map evidence it would appear that the site was first built on prior to 1873, however several major changes have taken place on-site since, with the last occurring between 1980 and 1982. The surrounding area has been predominately residential throughout its history, although industrial sites including warehouses, depots, paper salvage works, sheet metal works, a chemical warehouse and a large number of railways have been present within the area.

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area (Sheet 256, 'North London', Solid and Drift Edition) indicates the site to be underlain the London Clay Formation at depth.

The Bedrock geology underlying the site has been classified as Unproductive Strata.

There are currently no source protection zones within 1 kilometre of the site.

There are 6 water abstraction licences within 1 kilometre of the site. The closest is located 371m to the south of the site.

The closest surface water feature is a drain located 726m north of the site. Due to the distance from the site, this not considered to be vulnerable to potential contaminants that may be present on site.

There are no sensitive land issues within 1 kilometre of the site.

No Landfills within 1 kilometre of the site.

The preliminary Risk Assessment identified the following potential risks:

Human Health Risk:

- Workforce – potential risk from contact with potentially contaminated Made Ground
- Direct contact
- Dust Inhalation

Buildings / Service Materials:

- Direct contact – Potential risk to building structures and potable water supply from direct contact with impacted soils.

4.2 Phase 2 - Report on a Ground Investigation (SAS Ref: 16/25450-1, dated August 2016)

The work was undertaken as proposed prior to the commencement of the investigations with the following works undertaken:-

- The drilling of one rotary percussive borehole to a depth of 20.00m below ground level (Borehole 1).
- The drilling of two continuous flight auger boreholes to a depth of 10.00m below ground level (Boreholes 2 and 3). In the event, Borehole 3 was attempted three times, but has to be terminated at approximately 0.70m depth due to concrete obstructions.
- The excavation by hand of three trial pits, to 1.50m maximum depth to expose existing foundations on-site.
- Sampling and in-situ testing as appropriate to the ground conditions encountered in the boreholes and trial pits.
- A study into the possibility of the presence of toxic substances in the soil, together with limited comment on any remediation required.

The locations of the exploratory holes are shown on the site sketch plan, Figure 1.

The boreholes and trial pits revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised Made Ground up to 1.00m in thickness underlain by the London Clay Formation.

Made Ground /Topsoil

Depth of Made Ground	
Trial Hole	Depth (bgl)
BH1	1.00m
BH2	0.60m
BH3A	Full Depth – 0.70m
BH3B	Full Depth – 0.70m
BH3C	Full Depth – 0.62m
TP1	Full Depth – 0.65m
TP2	Full Depth – 0.55m
TP3	Full Depth – 0.70m

Table 1

London Clay Formation

Soils described as London Clay were encountered directly below the Made Ground to depths of 20.00m bgl.

The London Clay mainly comprises 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. It commonly contains thin courses of carbonate concretions ('Cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.

Chemical analysis

The findings of the Phase 2 site investigation have demonstrated that in the context of a proposed mixed residential and commercial use of the site, the contaminants of concern with respect to end-user protection were Asbestos and Lead, Cyanide and Polycyclic Aromatic Hydrocarbons including Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(a,h)anthracene.

Additional risks on-site were highlighted which may be present with respect to potable water supply pipe.

5.0 CONCEPTUAL SITE MODEL

In accordance with current UK guidance on contaminated land risk assessment (CLR7, CLR11 and BS10175), the following Conceptual Site Model has been generated to summarise the primary sources, receptors and migration and exposure pathways present on the site and to aid in the decision making process.

For an environmental risk to exist there has to be a source of contamination, receptor or receptors at risk from the contamination and one or more pathway which links the two. Such contaminant – pathway – receptor relationships are termed pollutant linkages.

The subject site has been assessed within the source – pathway – receptor methodology as described above in the framework of a conceptual site model. A conceptual site model can be defined as a testable representation of environmental processes on a site and its vicinity. Its purpose is to identify potential contaminants, pathways and receptors with a view to, initially identifying potential and eventually, quantifying significant pollutant linkages. It should highlight any limitation and uncertainties present in the risk assessment and be able to communicate the results of the risk assessment to all stakeholders.

Table 2 presents the revised site conceptual model showing residual pollutant linkages.

Potential Contaminants / Source	Pathway	Receptor	Site specific settings	Risk Classification: Based on Phase II Investigation	Action Required
Asbestos & Cyanide, Lead, PAH	Inhalation, ingestion and dermal contact.	Human health Site users	Mixed residential and commercial use	Low	Further action required – Remediation required
Asbestos & Cyanide, Lead, PAH	Inhalation, ingestion and dermal contact	Human Health Workers	Workers and the general public should follow regulation on health and safety during development (HSE, 1991)	Low	All site works must be carried out according to Health and Safety Executive (HSE) procedures.
No Source	Through high permeability strata, fissures and shafts, and by inhalation by humans	Human Health Inhalation of Gases	Small amount of Made Ground on-site.	No Risk	No Further Action
Cyanide, Lead, PAH	Leaching (direct precipitation, overland flow and through flow)	None	Unproductive Aquifer underlying the site	No Risk	No Further Action
Cyanide, Lead, PAH	Negligible groundwater flow	None	Unproductive Aquifer underlying the site	No Risk	No Further Action
Sulphates /TPH	Chemical attack, gas accumulation in buildings	Building structures/services	Made ground underlying the site	Low	WATER UK HBF guide recommendations for potable water pipes.
Cyanide, Lead, PAH	Uptake (root and stomata), ingestion, inhalation and dermal absorption by animal)	Ecological features (i.e. Flora and Fauna)	No significant Ecological system within 250m of the site.	No Risk	No Further Action

Table 2

The Phase 2 Site Investigation has revealed that plausible pollutant linkages remain after the risk assessment and further actions are warranted.

6.0 REMEDIATION OPTION APPRAISAL

Plausible pollutant linkages remain at site and further actions are necessary to ensure the protection of sensitive receptors. This can be achieved by either:

- Removal or treatment the source of pollutants;
- Removal or modification of the pathways;
- Removal of or modification of the behaviour of receptors.

The remediation strategy is to render ground conditions at the site 'suitable for use' from an environmental risk perspective taking into account the proposed redevelopment of the site.

The purpose of the strategy is to describe a framework for the treatment of contamination that can be developed by the designers of the development to give the most practical and cost effective treatment for the proposed scheme, and render ground conditions at the site 'suitable for use' from an environmental risk perspective. It should be considered in conjunction with an overall development plan of the site and is specific to the area set by the brief for the investigation.

6.1 Potential Remediation Methods and options

Contaminated soils treatment onsite or offsite are presented in Table 3.

Technology Type	Examples	Medium	Linkage	Suitability	Comments	Relevance
Biological	Bioventing	Soil	Source removal	Hydrocarbons	Reduce contaminants levels by increasing ventilation. Offsite gas monitoring needed	Not relevant
	Microbial or Phytoremediation	Soil	Source removal	Hydrocarbons and metals	Biodegradation by microorganism. Effectiveness can reduce soils condition (e.g. pH)	Not relevant
	Biodegradation	Soil	Source removal	Hydrocarbons	Excavation and piling of contaminated soils to increase the activity of aerobic microorganisms. Treatability testing is useful to determine the biodegradability of contaminants and appropriate oxygen and nutrient loading	Not relevant

Chemical	In-situ oxidation	Soil	Pathway interruption	Organic chemicals	Handling of large quantities of hazardous substance and may not be appropriate for small quantities of soils	Not relevant
	In-situ reduction	Soil	Pathway interruption	Hazardous chemicals	Handling of large quantities of hazardous substance and may not be appropriate for small quantities of soils	Not relevant
Civil Engineering	Capping	Soil	Pathway interruption	Various	This is not a treatment, but fixes the contaminant therefore breaking the pathways to the receptors	Suitable
	Vertical barriers	Free product, water, vapour	Pathway interruption	Various	Involve large amount of heavy constructions. Also contains the contaminants	Suitable
	Excavation and offsite disposal	Soil, Free product, water, vapour	Source removal	Various	The cost of disposal and treatment are a significant factor to consider	Suitable
Physical	Soil washing	Soil, Free product	Source removal	Hydrocarbons and metals	Contaminated soils are excavated, then washed free of contaminants. Not suitable for a mixture of contaminants or for small volumes of soils.	Not relevant
	Membrane	Vapour	Pathway interruption	Vapour	Breaks pathways of contaminants, and/or vapour	Not relevant
	Soil vapour extraction	Vapour	Source removal	chlorinated solvents and hydrocarbons	Exhaust air from in situ soil vapour extraction system may require treatment to eliminate possible harm to the environment as a whole.	Not relevant
Thermal	Thermal desorption	Soil, Free product	Source removal	Organics	Not suitable for metals. Air emission need regulating therefore cost for permitting	Not relevant
	In-situ vitrification	Soil, Free product	Source removal	Organics	Limited application for metals	Not relevant
	Incineration	Soil, Free product	Source removal	Waste	Not a treatment as such. More an alternative to landfill	Not relevant

Table 3

7.0 SITE SPECIFIC REMEDIATION REQUIREMENTS

The site investigations carried out at the site showed Asbestos fibre contamination across the proposed site and elevated Lead, Cyanide and Polycyclic Aromatic Hydrocarbons requiring further actions on site.

The remedial objective should sever any source-pathway-receptor pollutant linkages that must be established within a Conceptual Site Model. Once this has been achieved, by whatever means, there can theoretically be no risk. The remediation objective for the site is to ensure site clean-up removes any unacceptable contamination risk to human health including visitors to the site, construction workers on-site, service and maintenance workers and site neighbours and the wider public.

The preceding assessment was achieved using a risk based approach that considered the circumstances of the site, such as its location and intended use, the sources of contamination, engineering considerations and the need to ensure suitable amenities for any development.

7.1 Remediation Requirement for Asbestos Containing Soils

The asbestos contaminated soil must be appropriately capped or excavated and disposal off site in an appropriate landfill site. One option if all asbestos present on a specific site have no loose fibres is often to handpick the asbestos containing materials by a competent and trained person and dispose of them separately. This is not possible because the site investigation revealed loose fibres at the site which may pose significant human health risk to site users and workers through inhalation.

Groundworkers and site operatives must be aware that fragment(s) of asbestos containing material (Chrysotile loose fibres) was found to be present on site and there is therefore risks that further such material may be present.

7.2 Remediation Requirement for Cyanide, PAH and Lead Containing Soils

The proposed development plan was unknown at the time of writing this report therefore several scenarios are presented below;

- a) Remove all the PAH, Cyanide and Lead contaminated soils (Civil Engineering - Excavation and off-site disposal option)
- b) Cover System on Impacted Garden Areas (Civil Engineering - Capping option)
- c) Construct a Residential Property with Communal Open Space and No Garden Areas (Civil Engineering - Vertical Barriers option)

7.3 Remediation Strategy – Options Considered (Soils) – Basement excavation and hard landscaped

The proposed development plan is for the construction a mixed commercial and residential property on-site with no communal open land and no garden areas. The site has a basement which underlies the entire footprint of the site. The requirement is to break the source – pathway – receptor linkage on-site via one of several scenarios as presented below;

Remediation Option A - Excavation of Contaminated Soils and Made Ground (Civil Engineering - Excavation and offsite disposal)

The proposal is that all contaminated material be removed and transported to permit offsite disposal facilities.

The site was approximately 0.04ha in area and the contamination extended to the full depth of the Made Ground of 1.00m.

Remediation Option B- Cover System on Site (Civil Engineering - Capping option)

Contaminated material has been identified and a cover system could be introduced in any potential soft landscaped areas on-site. Costs will depend on the total soft landscaped area.

Remediation Option C- Construct a Commercial Property without Soft Landscaping or Garden Areas (Civil Engineering - Vertical Barriers option)

No further soil remediation will be needed if the development is to comprise 100% hard landscaping.

8.0 RECOMMENDED REMEDIATION STRATEGY

Based on the current results of chemical testing, the following recommendations can be made about the site.

- If the soils are to be excavated for disposal, the waste soils must be managed according to appropriate and published guidelines.
- The assessment of anticipated waste soils carried out as part of this study showed soils from shallow Made Ground on-site were not hazardous in nature.
- Health and Safety Executive procedures must be followed during all construction and excavation works to protect human health from contaminated soils.

8.1 Proposed Remedial Strategy

The proposed risk management / remedial strategy to be adopted at the site is one of managing the pathway between the source of contamination and the critical receptors on-site.

100% of the site is under buildings or other permanent hardstanding which will adequately break exposure pathways to human health and therefore further remedial measures will not be required in these areas.

This effectively equates to the use of a Vertical Barriers option as described in Remediation Option C.

Remediation Action 1

Remediation Option C- Construct a Commercial Property without Soft Landscaping or Garden Areas (Civil Engineering - Vertical Barriers option)

No further soil remediation will be needed if the development is to comprise 100% hard landscaping.

Remediation Action 3

Any potable water supply pipe laid on-site should comply with WATER UK HBF guide recommendations for potable water pipes. Barrier pipe is recommended on-site.

9.0 SUMMARY OF REMEDIATION MEASURES

The following table summarises the measures that are to be included as part of this remediation action plan. Where measures are included as part of the action plan, reference should be made to the indicated section of this report.

Measure	Description	Measure to be included as part of remedial action plan?	Section reference
Development details and enabling works	Details of the development and enabling and foundation works that will take place	Yes	Section 9.1
Watching brief	The watching brief that will be kept by different parties during the course of the development	Yes	Section 9.2
Staff training/ briefs	Training and staff briefs that will be provided to all staff working on-site	Yes	Section 9.3
Discovery strategy	The discovery strategy that will be kept during the development	Yes	Section 9.4
Further investigation work	Additional investigation work that will be undertaken during the course of development	No	Section 9.5
Cover system	Details of the cover system that will be installed in hard surfaced areas of the site	No	Section 9.6
Chemical quality of imported/site sourced soils and fills	Details of sampling and analyses that will be provided for soils and fills used at the site	No	Section 9.7
Depth of imported soil and fills used in gardens and landscaped areas	Details of how the depth of placed soils will be verified	NA	
Building materials and potable water pipe	Details on proposed water pipe installation	Yes	Section 9.8
Waste management information	Information relating to the import and export of materials classified as wastes	Yes	Section 9.9
Other	Other details including Works specified by the Contaminated Land Officer at the Local Council	Yes	Section 9.10

9.1 Development details and enabling works

The following table summarises the details of the development and makes reference to Annexes. Detailed information on an aspect of development has been provided and where reference is made to an annex, plans have been inserted.

Item	Information needed	Appendix
Site location	A plan showing the location and layout of the existing site	Figure 1
Proposed development layout	Plans showing the proposed development,	Figures 2
Reduced level dig	Details of the reduced level excavation of soil at the site.	Section 9.1.2
Basement details	There is a basement on site a plan of which is presented as Figure 3.	NA

9.1.1 Proposed development layout

The entire site is to be hard landscaped, or under proposed buildings. Proposed areas of hardstanding, including buildings, pathways, roads and hard landscaped communal areas are presented in Figure 2.

9.1.2 Reduced level dig

A reduced level excavation of soil at the site will be undertaken via the removal of the floor slab and the entire site will be reduced by approximately 3.60m below existing ground level.

9.1.3 Basement details

Detailed maps of the foundations proposed as part of the site work are presented in Figure 3.

9.2 Watching brief

During the course of the development it will be the responsibility of the on-site manger to ensure watching briefs are kept. A watching brief consists of a record of:

- Any observations of contamination made during the course of development by any member of site staff, contractor or visitor
- A photographic record of the key stages of development and key occurrences, including any contamination found during the course of the development, the formation levels of excavations, any reduced level dig/mass excavation, formation of landscaped or garden areas, etc.

Examples of observations that should be recorded as part of a watching brief are included within Section 9.4 (Discovery Strategy).

In areas of the site where there is a greater chance of finding contaminated soil and/or water an area specific watching brief will need to be kept. Such a brief will need to be completed by an appropriately qualified site manager and/or an environmental consultant. The following table specifies works in specific parts of the site that require an area specific watching brief, identifying who must complete the watching brief.

Area of site	Works to be observed	Person to observe works
Building foundations	Removal of Made Ground	Site Manager
Drainage Construction	Removal of Made Ground	Site Manager

Upon completion of associated works, a written and signed statement will be obtained by the following parties:

- Ground works contractor(s) upon completion of foundations and ground works
- On-site manager upon completion of groundworks and landscaping work
- Environmental Consultant upon completion of groundworks and landscaping works

The written statement must clearly state whether or not evidence of contamination was identified during the course of the development and the action that was taken.

9.3 Staff training/brief

All site staff, site contractors and, where significant contamination is expected site visitors, will be briefed on the potential presence of land, water or airborne contamination before commencing work on the site. Apart from any standard Health & Safety practices this will include the following information:

- Health & Safety considerations.
- The type of land, water or airborne contamination expected at the development site based on previous use and available site investigation information.
- Any particular areas of the site which are likely to be affected.
- Staff responsibilities under the discovery strategy (see Section 9.4)

Examples of observations that should be recorded as part of a watching brief are included within Section 9.4 (Discovery Strategy).

The on-site manager will need to provide written confirmation that site staff were briefed about contaminated land in line with these recommendations.

9.4 Discovery strategy

The discovery strategy sets out the actions that must be taken if contamination is encountered during the course of a development.

A significant observation includes any observation of contamination. Examples of the types of observations that would be considered significant are set out in the following table.

Evidence	Description
Visual	<ul style="list-style-type: none"> • Fuel or oil like substances mixed in with or smeared on the soil or floating on perched, groundwater or surface waters. • Waste materials (refuse, barrels, industrial wastes, ash, tar, etc.) buried at specific location or across the site. • Marked variation in colour. For example red, orange, yellow, green, light or dark blue, etc. may indicate contamination from a variety of contaminants. • Soils including large amounts of ash and clinker where such contamination of soils wasn't expected.
Odours	<ul style="list-style-type: none"> • Fuel, oil and chemical type odours • Unusual odours such as sweet odours or fishy odours
Wellbeing	<ul style="list-style-type: none"> • Light headedness and/or nausea when in excavations, at the working face of an excavation, when visual or olfactory evidence of contamination exists, etc. • Burning of nasal passages, throat, lungs or skin • Blistering or reddening of skin due to contact with soil

Note: The examples provided in this table are not exhaustive.

The following table sets out the actions that must be taken if significant or suspected land, water or air contamination is observed by site staff, contractors or visitors.

Person observing contamination	To be reported to:	Action to be taken
Site visitor	Must report observations to the site manager	None
Contractor	Must report observations to the site manager	Stop work and where possible and safe make area safe and secure area before reporting to site manager
On-site manager	Must report observations to their direct manager, the appointed Environmental Consultant, the Planning Authority and Contaminated Land Officer	Stop work and where possible and safe make area safe and secure area before reporting to others
Environmental Consultant	Must report observations to the site manager, the Planning Authority and Contaminated Land Officer	Advise that work stops and where possible that the area is made safe before reporting to others

The following table identifies other organisations that may need to be contacted in an emergency or where pollution of controlled waters or nuisance is occurring.

Occurrence	Description	Contact
Risk to the public	If at any point residents, the public or others may be at risk as a result of contamination found during the course of investigation, remediation or development works	<ul style="list-style-type: none"> Contact the emergency services if there is a risk to life Contaminated Land Officer/Planning Authority Health & Safety Executive
Nuisance to residents/the public	If a nuisance has been or is likely to be caused to nearby residents, the public and others – for example odours, dust, noise, vibration, etc.	<ul style="list-style-type: none"> Pollution Control Team at the Local Council (and other Councils where necessary)
Pollution of controlled waters	If any surface, culverted or groundwater has been polluted – for example slurry, contaminated soil/water or a chemical spillage entering a river or canal.	<ul style="list-style-type: none"> Environment Agency Planning Authority and Contaminated Land Officer at the Local Council
Pollution of adjoining land	If land outside the boundary of the development site is polluted from site activities – for example slurry, contaminated soil/water or a chemical spillage	<ul style="list-style-type: none"> The owner of the land Planning Authority and Contaminated Land Officer at the Local Council

9.5 Further investigation work

Further investigation work may need to be undertaken during the course of development as a result of:

- Access restrictions during the initial phase of investigation
- New evidence of sources of contamination becoming available
- Limitations with the initial phase of investigation work

Allowing further investigation work to take place during the course of development minimises delays to development work, enables better access to and often provides better opportunities to fully investigate parts of a site.

The following table sets out further investigation work that must be undertaken during the course of the development.

Item	Description	When work to be undertaken	When results to be presented
None	No Further assessment required	NA	NA

The results of all further investigation work will be included within the final verification report for the development.

9.6 Building materials and potable water pipe

If at any point in the future it be intended to install new water supply pipes within the Made Ground then consideration to the pipe materials used and/or the trench construction in accordance with UKWIR (2010) and the WATER UK HBF guide. Based upon the analysis undertaken, the concentrations of TPH returned by several of the samples of Made Ground may preclude the use of standard PE pipe materials at the site.

9.7 Waste management information

Soil may be required to be removed from the site as part of the remediation strategy. Under such circumstances the material will be defined as waste and all the necessary regulatory steps must be adhered to under this scenario.

An assessment of potential waste soils carried out as part of this study showed soils from shallow made ground on-site were not hazardous in nature.

Excavated material must be classified in accordance with Environment Agency protocols for disposal at an appropriately licensed disposal facility.

Both Producers and Waste Management companies must ensure compliance with the Waste Acceptance Criteria (WAC) prior to landfill in Hazardous, stable non-reactive cells and inert sites. These regulations govern the operation of landfill in England and Wales. Basic characterisation is the responsibility of the waste producer and compliance checking is generally the responsibility of the landfill operator. Therefore landfill operators will be unlikely to accept waste that does not meet the Waste Acceptance Criteria for their class of site.

10.0 OTHER CONSIDERATIONS

10.1 Excavated materials intended for re-use

Where possible any natural materials excavated on-site for foundation purposes will be re-used in order to reduce the volumes of material reporting to landfill.

10.2 Workforce duty of care

Site worker exposure is acute in nature, i.e. high level exposure over a short time span. Appropriate Health and Safety procedures and provision of appropriate PPE should mitigate such risks.

The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

10.3 Validation Reporting

Verification is based on an assessment of remediation performance to demonstrate that the risk associated with contamination has been reduced to meet remediation objectives and that the site is rendered suitable for use after development has been completed. This is a regular requirement under the planning process.

A verification report will be provided as soon as all groundworks at the site are completed and foundations / surface coverings are down.

Verification details of the completed development, any agreed remedial measures completed, materials imported onto or off the site with waste management and/or appropriate analysis to demonstrate chemical suitability/absence of asbestos, written statements clearly identifying whether or not any contamination was identified at the site during works will be provided.

Information for the validation report relating to work undertaken is to be supplied during the course of the works, including the following:

- Details of disposal of hazardous materials during demolition and site preparation
- Details of total disposal quantities and final disposal fates for waste soil
- Copies of relevant waste management/disposal licences or PC Permits, as applicable;
- Copies of registered waste carrier certificates
- Records of any consents, permits authorisation and/or licences held or obtained by the Contractor (and subcontractors) relevant to the Works
- Validation sample records.

Import and backfill records, including the following, as applicable:

- Chemical and geotechnical data for site derived fill materials and topsoil.
- Chemical and geotechnical data for imported fill materials and topsoil.
- Imported fill summary records.
- Waste disposal records, including the following, as applicable.
- Soils disposal summary and daily disposal records.
- Liquid waste disposal summary.
- Hazardous waste disposal summary.
- Waste consignment notes.
- Tip tickets for each waste disposal facility use.
- Liquid waste transfer notes.

As built drawings showing placement of imported fill and topsoil and thicknesses.

Clear conclusions regarding the suitability for use of the site, the likelihood of residual contamination being present beneath the site, the likelihood of residual contamination impacting upon site and off-site uses/environment (including groundwater), the likelihood of off-site contamination impacting significantly upon the site in the future and any other relevant information shall be provided.

10.4 List of Figures

Figure 1 – Site current layout

Figure 2 – Proposed site plan

Figure 3 – Basement Plan



Site Analytical Services Ltd.

REF: 16/25450

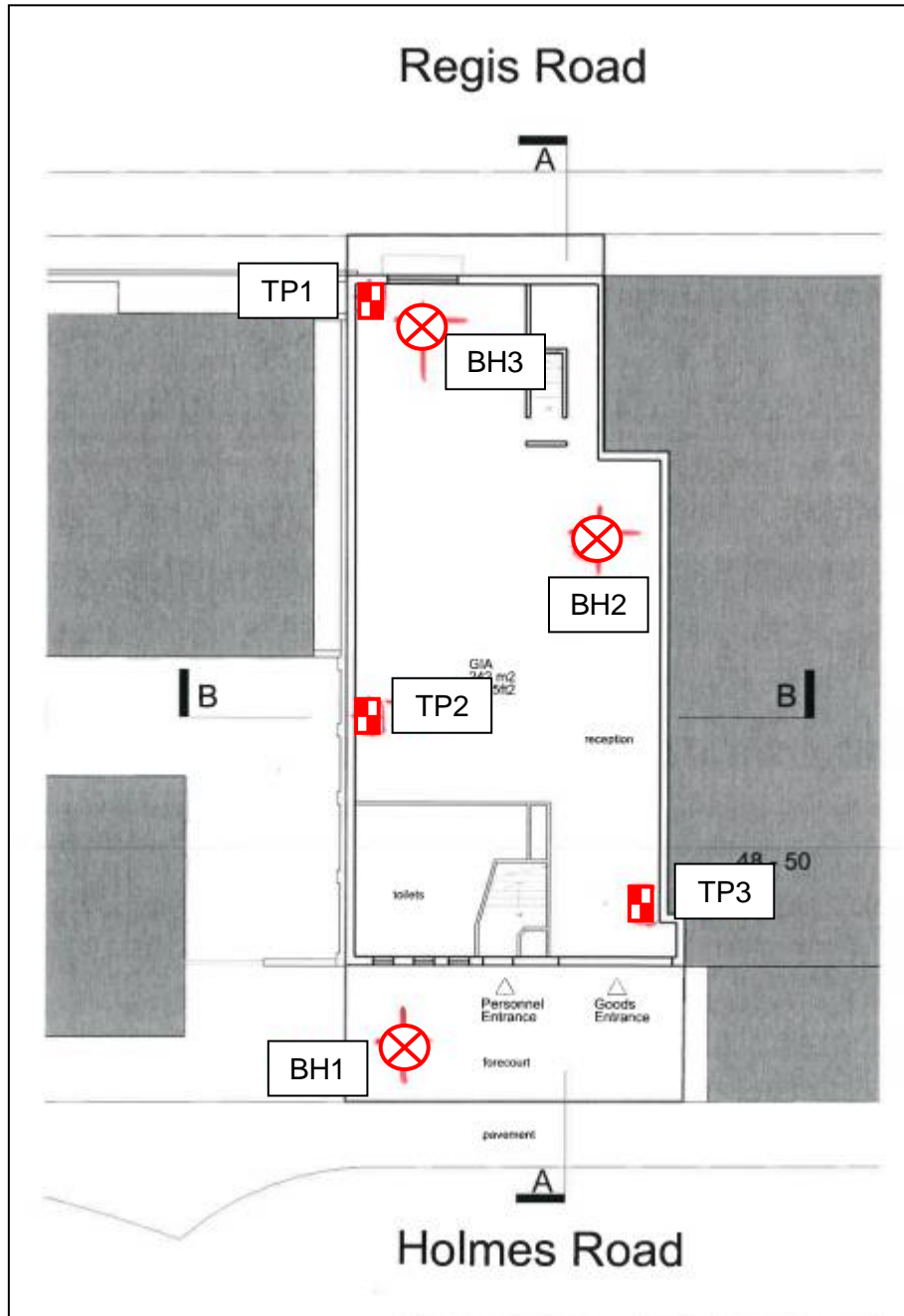
LOCATION: 52 Holmes Road, London, NW5 3AB

FIG: 1

TITLE: Site Sketch Plan

DATE: August 2016

SCALE: NTS



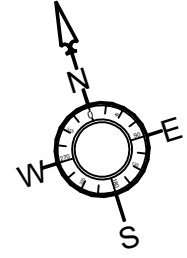
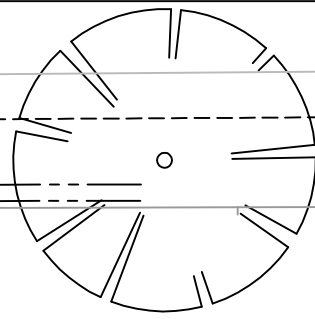
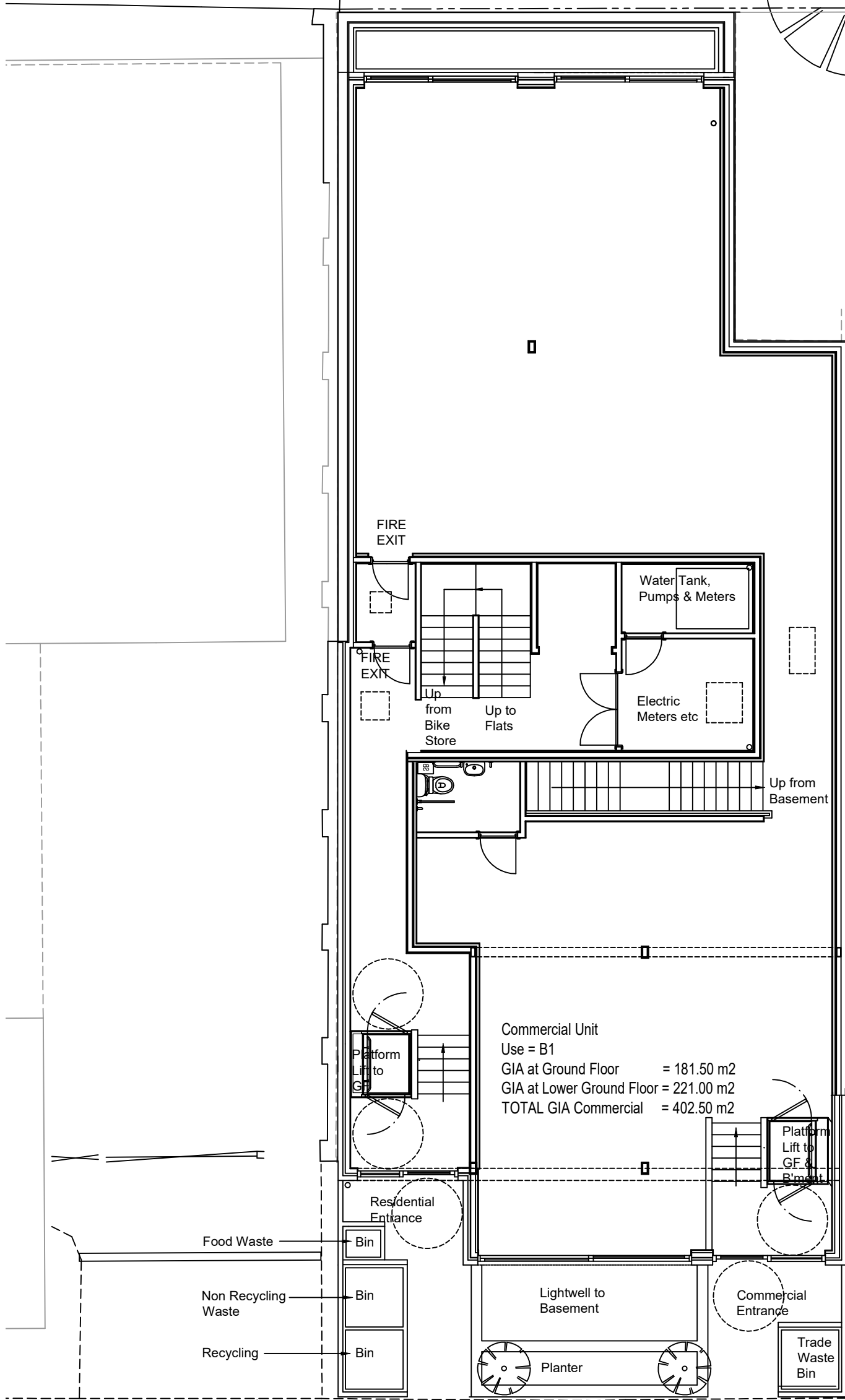


Figure 2 - Proposed Ground Floor



Commercial Unit
 Use = B1
 GIA at Ground Floor = 181.50 m2
 GIA at Lower Ground Floor = 221.00 m2
 TOTAL GIA Commercial = 402.50 m2

Bins stored in Timber clad enclosures 1.5m high.

STN.1
 E528770.782
 N185071.729
 Δ L33.936

0 1M 2M 3M 4M 5M 6M 7M 8M 9M 10M

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Rev.	Detail/Date/By
A	Revise to align front of basement with original, ditto rear.
B	Revise GF to match approved footprint
C	Align GF & Basement rear walls with balcony over
D	Revise Rear wall position to improve daylight

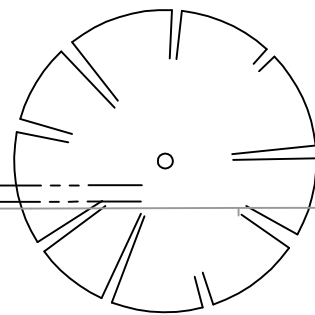
P.H.D. ASSOCIATES
 BRAEMAR HOUSE
 WATER LANE
 STANSTED, ESSEX
 CM24 8BJ
 TEL: 01279 817342
 FAX: 01279 847086
 EMAIL: INFO@PHDASSOCIATES.CO.UK



Project 52 Holmes Road
 London NW5 3AB
 Residential & Commercial Development
 Drawing Ground Floor Plan
 As Proposed Commercial

Date	20-03-2018
Drawn By	SHD
Scale	1-100 at A3
Drawing Number	1715/PL2 201 D

Line of Retaining Wall assumed to exist below Ground Level in continuation of wall at left. Existence and location will be confirmed by trial holes. If not present retaining works to neighbours land will be required as demolition progresses.



Rooflight Over

100mm dia rainwater pipe serving roof and balconies drops to basement and connects to collection chamber with 150mm dia yard gully.

Studios to be installed once project is completed as Commercial Layout.

Figure 3 - Proposed Basement Plan

100mm dia Rainwater pipe to run from flat roof over stairwell lobby into basement and then to SW store as shown via collection chamber.

FIRE EXIT

Lift to all Levels

Bicycle Store for 24 Bikes.

100mm dia RWP drops from roof to basement and connects to 450mm dia collection chamber then to 10m3 storage tank. All below ground drainage to be 150mm dia.

Ramp to rear area of Commercial Unit

FIRE EXIT

Up to Ground Floor

100mm dia RWP drops from roof to basement and connects to 450mm dia collection chamber then to 10m3 storage tank.

Up to GF

Store

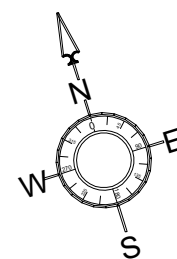
Commercial Unit Lower Ground Level Gross Internal Floor Area = 221 m2

Rainwater pipe to run from flat roof over entrance into basement and then to SW store as shown

10m3 SW tank to hold rainwater, 5l/sec pump to empty into combined sewer.

Platform Lift to GF & Basement

Commercial Waste Store



Open Lightwell to Lower Ground Floor

Edincare twin pump chamber to pump out SW to combined Sewer

0 1M 2M 3M 4M 5M 6M 7M 8M 9M 10M

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Rev.	Detail/Date/By
A	Align frontage and rear areas to be generally as approved
B	Amend Basement layout to reflect original footprint
C	Align Rear wall of GF & Basement with Balcony above
D	Realign rear wall and introduce roof light to improve daylight as report

P.H.D. ASSOCIATES
 BRAEMAR HOUSE
 WATER LANE
 STANSTED, ESSEX
 CM24 8BJ
 TEL: 01279 817342
 FAX: 01279 847086
 EMAIL: INFO@PHDASSOCIATES.CO.UK



Project: 52 Holmes Road
 London NW5 3AB
 Residential & Commercial Development
 Drawing: Lower Ground Floor Layout Plan
 Post Completion Layout

Date	10th Jan 2018
Drawn By	SHD
Scale	1-100 at A3
Drawing Number	1715/PL2/ 200 D