

Table 5 Planning Website History Review

Application Number	Site Address	Development Description	Status	Date Registered	Decision
EPF/1355/18	Albany Stud Farm Epping New Road Buckhurst Hill Essex IG9 5UA	This proposal is to demolish all structures and dwellings on site and erect a new stable block. The new stable block will feature 12 new stables, a new store rooms and offices and a relocated ménage.	REGISTERED	20-07-2018	
EPF/1536/17	Albany Stud Farm Epping New Road Buckhurst Hill Essex IG9 5UA	Redevelopment of site by erection of a single-family dwelling house and replacement of stables and stores in association with the established stud farm.	FINAL DECISION	15-06-2017	Grant Permission (With Conditions)
EPF/2484/14	Albany Stud Epping New Road Buckhurst Hill Essex IG9 5UA	Redevelopment of site by erection of a single-family dwelling house and replacement of stables and stores in association with the established stud farm.	FINAL DECISION	25-10-2014	Grant Permission (With Conditions)
EPF/0958/84	Albany Stud Farm and Oak Hall, Epping New Road, Buckhurst Hill	Construction of access road. Appeal dismissed 22.4.87	FINAL DECISION	24-07-1984	<b>Refuse Permission</b>
EPF/1038/81	Albany Stud Farm, Epping New Road, Buckhurst Hill	Erection of seven foaling boxes and hay store.	FINAL DECISION	22-07-1981	<b>Refuse Permission</b>
EPF/0836/76	Albany Stud Farm, Epping New Road, Buckhurst Hill	Erection of single storey building comprising 9 stables.	FINAL DECISION	11-06-1976	<b>Refuse Permission</b>
EPF/0294/75	Albany Stud Farm, Epping New Road, Buckhurst Hill	Erection of steel framed building for storage of hay and straw.	FINAL DECISION	26-02-1975	<b>Refuse Permission</b>
CHI/0469A/73	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Details of landscaping scheme (Plot to North West of Oak Hall)	FINAL DECISION	29-07-1974	Grant Permission
CHI/0734/73	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Indoor riding school (Plot to East of Albany Stud)	FINAL DECISION	03-12-1973	<b>Refuse Permission</b>
CHI/0721/73	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	O/A errec of detached house (Nightingale Cottage and adjacent Plot to West)	FINAL DECISION	23-11-1973	<b>Refuse Permission</b>
CHI/0469/73	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Formation of car park (Plot to North West of Oak Hall)	FINAL DECISION	11-07-1973	Grant Permission (With Conditions)

Reference : CSG / DTS / 14965

Site at Albany Stud Farm, Epping New Road, Buckhurst Hill, IG9 5UA

Table 5a Planning Website History Review..... Continued

Application Number	Site Address	Development Description	Status	Date Registered	Decision
CHI/0273/73	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec detached house (Nightingale Cottage and adjacent plot to West) *APPEAL LODGED BUT LAPSED - NO DATE*	FINAL DECISION	11-04-1973	<b>Refuse Permission</b>
CHI/0101/73	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Foaling boxes (Albany Stud)	FINAL DECISION	12-02-1973	Grant Permission (With Conditions)
CHI/0264/72	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of detached house (Nightingale Cottage & adjacent plot to West) *APPEAL LODGED BUT LAPSED - NO DATE*	FINAL DECISION	24-04-1972	<b>Refuse Permission</b>
CHI/0358/71	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Change of use to nursery ** APPEAL LODGED BUT LAPSED - NO DATE **	FINAL DECISION	19-07-1971	<b>Refuse Permission</b>
CHI/0357/71	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of riding school	FINAL DECISION	19-07-1971	<b>Withdrawn</b>
CHI/0287/63	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Layout of res estate and erec of 514 flats (South half of whole site including Dell House, Albany Stud, Nightingale Cottage & Oak Hall)	FINAL DECISION	18-09-1963	<b>Refuse Permission</b>
CHI/0286/63	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Layout of res estate and erec of 408 flats (South half of whole site including Albany Stud, Dell House, and Nightingale Cottage)	FINAL DECISION	18-09-1963	<b>Refuse Permission</b>
CHI/0011/63	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Use of land as a soil tip (South half of whole site including Albany Stud and Nightingale Cottage)	FINAL DECISION	16-01-1963	<b>Refuse Permission</b>
CHI/0225A/61	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of transformer chamber (Plot to North of Fernside houses)	FINAL DECISION	19-09-1962	Grant Permission <b>NO INFORMATION ON FILE</b>
CHI/0255A/61	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of transformer chamber (Plot to North of Fernside houses)	FINAL DECISION	12-03-1962	Grant Permission (With Conditions) <b>NO INFORMATION ON FILE</b>
CHI/0255/61	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of transformer chamber (Plot to North of Fernside houses)	FINAL DECISION	04-08-1961	<b>Refuse Permission</b>
CHI/0170/57	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of bailiff's house, garage and stables (Albany House)	FINAL DECISION	17-02-1960	<b>Refuse Permission</b>

Reference : CSG / DTS / 14965

Site at Albany Stud Farm, Epping New Road, Buckhurst Hill, IG9 5UA



**Table 5b** Planning Website History Review..... Continued

<b>Application Number</b>	<b>Site Address</b>	<b>Development Description</b>	<b>Status</b>	<b>Date Registered</b>	<b>Decision</b>
CHI/0170B/57	Albany Stud Farm Epping New Road Buckhurst Hill	Submission of revised detailed plans for erection of bailiff house & garage & block of stabling.	FINAL DECISION	08-01-1960	<b>Refuse Permission</b>
CHI/0170A/57	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Details of second house and garage (Dell House & Nightingale Cottage)	FINAL DECISION	23-08-1958	Grant Permission (With Conditions) <b>NO INFORMATION ON FILE</b>
CHI/0170/57	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Details of house, garage and stables (Albany House, & The Cottage)	FINAL DECISION	21-05-1958	Grant Permission <b>NO INFORMATION ON FILE</b>
CHI/0170/57	Albany Stud Farm Epping New Road Buckhurst Hill	Submission of detailed plans for erection of detached house & garage & block of stabling.	FINAL DECISION	29-04-1958	Grant Permission <b>NO INFORMATION ON FILE</b>
CHI/0003/58	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Erec of 2 additional houses (Plot to East of Albany Stud)	FINAL DECISION	03-01-1958	<b>Refuse Permission</b>
CHI/0170/57	ALBANY STUD FM, ALBANY HOUSE, OAK HALL &, EPPING NEW ROAD, BUCKHURST HILL, ESSEX, IG9 5UA	Use of land for horse breeding and erec of 2 houses, and stabling (Albany House, Dell House and Nightingale Cottage)	FINAL DECISION	18-09-1957	Grant Permission (With Conditions)

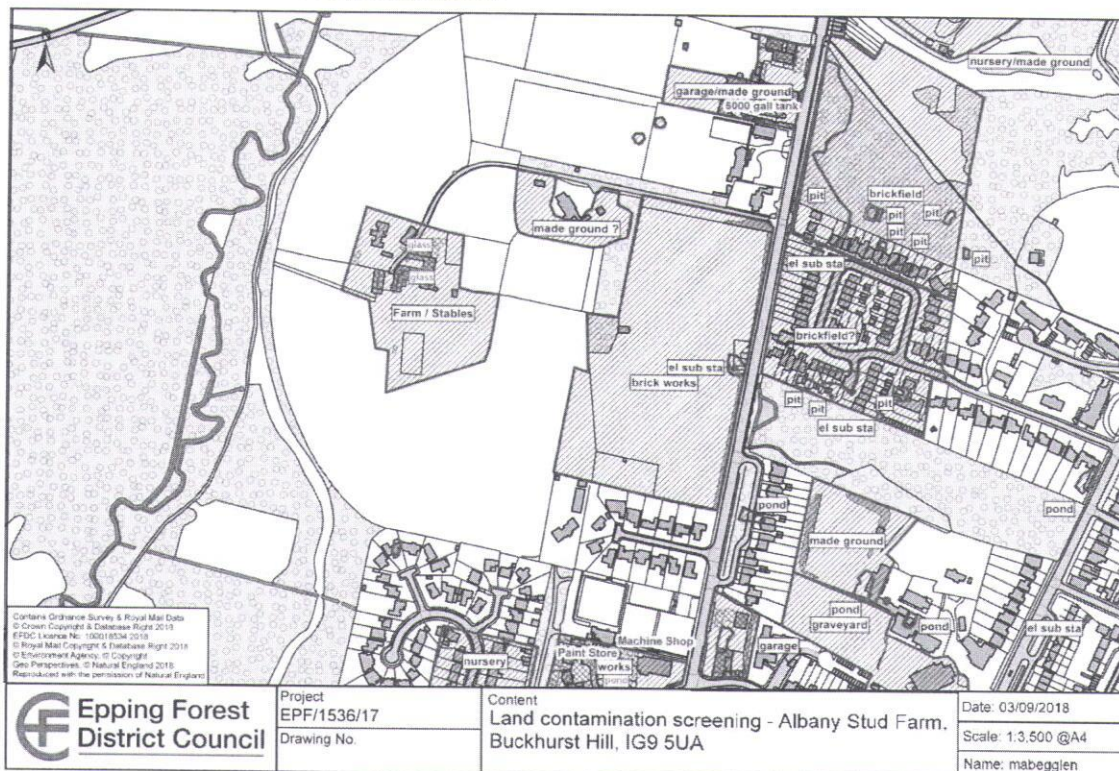
Reference : CSG / DTS / 14965

Site at Albany Stud Farm, Epping New Road, Buckhurst Hill, IG9 5UA

## 7 Discussion with Local Authority

The contact undertaken to date with EFDC has been to confirm the Geographical Information System data, (GIS Data) to confirm the findings of EFDC's own search data in relation to potential risks in the surrounding area of the site.

This has confirmed the following information:-



Considering the above, areas marked with purple hatching confirm potentially contaminated land which from the information confirm the following: -

- Farm / Stables – On Site
- Made Ground – Off Site, 60m, NE;
- Brick Works – Off Site, 60m, E;
- Electric Sub Station – Off Site, 90m, E.

## 8 Consultation with Environment Agency

Consultation has not been made with the Environment Agency at this time. The information gained from Envirocheck and the EA web site has provided sufficient information at this stage. The assessment of the site should take into account the groundwater regime within the site area and the possible risk from both on site and off site contamination.

Should heavy or persistent contamination be identified within any Phase 2 or intrusive investigation, consultation will be required and will be undertaken.

## 9 Consultation with Appropriate Bodies/Local Sources

Consultation with the Local Authority has taken place and an attempt at the Archives department made. This forms the level of assessments made. No other discussions with local sources have been made.



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## 10 Previous Reporting

A previous desk top study has been completed at the site location which was undertaken by GB Card & Partners in October 2014. The findings of the report are broadly the same as that of this report and as such, we consider a likely similar outcome. The findings of this report are outlined below :-

Sources:-

- Made Ground;
- Historical Uses, (Agricultural);
- Electric Sub Station;
- Brickworks.

Pathways :-

- Direct Contact;
- Inhalation;
- Root Uptake;
- Vertical and lateral Migration through permeable soils;
- Migration through shallow aquifer.

Receptors

- Current Site Users;
- Future Site Users;
- Construction Workers;
- Neighbours;
- Buildings and Services;
- Controlled Water Receptors

An intrusive investigation is proposed to confirm the ground conditions beneath the site. Access is currently restricted by buildings and other hard cover as well as trees and vegetation. Heavily sloped ground in some areas of the site may also restrict the extent of intrusive investigations.

The scope of the intrusive investigation is anticipated as comprising:

- Trial pitting or window sampling across the site to confirm shallow ground conditions and the distribution of any soil contamination;
- Possible deeper investigations through window sampler/boreholes to obtain geotechnical parameters for design;
- Installation of gas/groundwater monitoring wells with subsequent monitoring and sampling;
- The purpose of the intrusive investigation will be to gather detailed information to permit design and evaluation of foundation solutions, scope of gas protection requirements and the design of capping in soft landscaping areas and gardens.

## 11 Environmental Settings

### 11.1 Superficial Deposits and Solid Geology

The ground conditions based on geological maps and BGS information shows the site to be located within an area which is identified as London Clay as solid geological profile to depth.

Some 60 meters to the east of the site, the Woodford Gravel Formation is in place which is formed by Sand and Gravel Deposits, although, this forms an off site feature considering the development of the residential development proposed.

### 11.2 BGS Boreholes

No BGS Boreholes are reported surrounding the site.

**Table 6 Geological Information**

<b>Geological Unit</b>	<b>Brief Description</b>	<b>Anticipated thickness, (m)</b>	<b>Aquifer Type</b>
<b><i>Superficial Deposits/Drift</i></b>			
<b><i>On Site</i></b>			
Filled/Re-worked ground	Made Ground, (Potentially Contaminated Stratum).	0.5-1.00 meters+	Not Classified
<b><i>Off Site – 60m E</i></b>			
Woodford Gravel Formation	Sand & Gravel Formation	3-6m	Secondary A Aquifer
<b><i>Solid Geology Deposits</i></b>			
London Clay	Clay	15m +	Unproductive Stratum

## 11.2 Hydrology

The nearest surface water feature is recorded as 18 meters to the east of the site which is identified as a ditch. The ditch runs from north to south.

No discharge consents are recorded surrounding the site, (up to 500 meters away).

A significant pollution incident to controlled waters has been identified as 230 meters to the south east which is recorded as Miscellaneous – Natural. A further significant incident is identified 302 meters to the north east again, as Miscellaneous – Natural.

## 11.3 Hydrogeology

The published Environment Agency Groundwater Vulnerability Map of the area, (Sheet 40 Thames Estuary), indicates the site to be located within an area classified as a Secondary A Aquifer. The underlying geology is recorded as an Unproductive Stratum which is formed by London Clay.

No groundwater abstraction wells are identified surrounding the site and the site does not lie within a Source Protection Zone

## 11.4 Implication of groundwater

In light of the presence of a London Clay underlying the site, absence of a groundwater system underlying the site, groundwater risks are unlikely to be in place.

When considering surface water features, a ditch is located 18 meters to the east of the site and as such, potential surface water run off is possible. This may need a degree of consideration should persistent or significant pollution be in place, although, based on a review of the site condition, this is considered unlikely.

## 11.5 Flooding

The site does not lie within an area which is susceptible to flooding.

## 11.6 Landfill Sites

No landfill sites are recorded are recorded in place.

Potentially infilled land has been identified as 26 meters to the north east of the site which will likely relate to the brickworks being infilled or embankment around Oak Hall

**Table 7** *Sensitivity of Environmental Receptors in the Vicinity of the Site*

<b>Receptor Type</b>	<b>Receptor(s)</b>	<b>Sensitivity</b>	<b>Comments</b>
<b>Groundwater</b>	Secondary A Aquifer	Moderate	This lies off site and is unlikely to form a significant receptor of the site.
	Unproductive Stratum	Low	Limited risk of migration to a lower groundwater system
<b>Water Abstraction</b>	NONE	Low	None surrounding the development
<b>Source Protection Zone</b>	NONE		
<b>Surface Water</b>	Ditch	Low	Located 18 meters to the east of the site. Potential risk is significant or persistent pollution in place.
<b>Flooding</b>	NONE		
<b>Ecological</b>	NONE		

## 12 Site Drainage and Other Potential Man Made Pathways

Drainage is recorded in place, although, the site has not been reviewed for drainage routes. A full drainage assessment may aid in the assessment of the site in relation to pathway creation for pollution to migrate.

## 13 Regulatory Data

Information relating to the potential hazards associated with environmental regulatory controls are summarised in Table 8 and 9. This information is recorded in full within the Envirocheck data provided within Appendix 5. The salient points recorded within this data are re-created below.



Table 8 Summary of Regulatory Data - Sources

Data	On Site	Off Site	Distance from site.	Is potential risk in place?
<b>Sources</b>				
Discharge Consents	None	Discharge of other matter – surface water into freshwater stream or river	518m, E	<b>X</b>
LAPPC	None	Petrol Filling Station	119m, NE	<b>X</b>
Pollution Incident to Controlled Waters	None	Significant Incident – Miscellaneous – Unknown	230m, SE	<b>X</b>
		Significant Incident – Miscellaneous – Unknown	302m, NE	<b>X</b>
Potentially Infilled Land	None	Unknown Filled Ground	26m, NE	<b>✓</b>
Radon Potential - Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions			<b>X</b>



**Table 9 Summary of Regulatory Data - Receptors**

<b>Data</b>	<b>On Site</b>	<b>Off Site</b>	<b>Distance from site.</b>	<b>Is potential risk in place?</b>
<b>Receptors</b>				
Nearest Surface Water Feature	None	Ditch	18m, E	✓
Water Abstractions	None	Water Supply – Process Water	1612m, SE	X
OS Water Network Lines	None	Inland River	18m, E	✓
Source Protection Zone	None	None	-	X

**Table 10 BGS Estimated Chemistry Data**

BGS Estimated Soil Chemistry Pollutant	BGS Estimated Soil Chemistry	BGS Urban Soil Chemistry Averages(mg / kg)		
		Minimum		Maximum
		Average		
Arsenic	15-25	1.00	17.00	161.00
Cadmium	<1.8	0.10	0.90	165.20
Chromium	90-120	13.00	79.00	2094.00
Lead	<100	11.00	280.00	10000.00
Nickel	15-30	2.00	28.00	506.00

**Table 11 Geological Hazards**

<b>Geological Hazard</b>	<b>Distance &amp; Direction</b>	<b>Feature</b>	<b>Risk Assessment Required</b>
Non Coal Mining Areas of Great Britain	On Site		No Hazard
Collapseable Ground	On Site		Very Low
Compressible Ground	On Site		No Hazard
Ground Dissolution Features	On Site		No Hazard
Landslide	On Site		Very Low
Running Sand	On Site		No Hazard
Shrinking or Swelling Clay	On Site		Moderate

**Table 12 Summary of Contemporary Trade Entries**

<b>Trade Name</b>	<b>Trade Use</b>	<b>Distance &amp; Direction from Site</b>	<b>Is potential risk in place?</b>	<b>Comment</b>
BPI Packaging	Packaging and wrapping Equipment	106m, S	<b>X</b>	
Texaco	Petrol Filling Station	119m, NE	<b>X</b>	
Glynn Hopkins	Car Customisation and conversion	130m, SE	<b>X</b>	

**Further Trades Extend Away From The Site, (See Envirocheck Data)**

<sup>\*NB</sup> The above information is taken from the Envirocheck trade directories



#### 14 Identification of Potential Contaminants of Concern and Source Areas

Potential sources of contamination are brought forward for further risk assessment which are detailed in Table 12 :-

**Table 13 Table of Source Risk**

Source Risk	Additional Features	Source of Information	Location	Date	Considering Site Specific Pathways	
					Assessment Required.	Method of Assessment
Historical Maps						
Made Ground			On Site – Site Wide	1872 - Present	Possible Soil Risk	Recover Soil Samples
Buildings & Glasshouses, (Farm?)			On Site – Site Wide	1872 - Present	Possible GW Risk	Install Standpipes
					Possible Vapour Risk	GW & Vapour Assessments
Brick Works		Historical Maps	Off Site, 60m, E	1965-1980		
Brick Works Infilled			Off Site, 60m, E	1980 – Present	Possible GW Risk	Install Standpipes
					Possible Vapour Risk	GW & Vapour Assessments
Embankment – Made Ground			Off Site, 60m, N	1965 - Present		
Walk Over Survey						
Stables, Farming, Asbestos, Manure Deposits, Tractor Parking, Road Scalping's		Walk Over Inspection	On Site – Site Wide	1872 - Present	Possible Soil, Risk	Recover Soil Samples
					Possible GW Risk	Install Standpipes
					Possible Vapour Risk	GW & Vapour Assessments
Envirocheck Data						
None						

Reference : CSG / DTS / 14965

Site at Albany Stud Farm, Epping New Road, Buckhurst Hill, IG9 5UA

## 15 Outline Conceptual Model

What must now be considered is what contamination should be identified as a potential hazard as a result of the use of the site specific areas. In order to undertake this task, the **Contaminated Land Reports, (CLR10)**, has been used which details some trades and potential sources of contamination. In addition to this, the Department of Environment Industry Profiles have been incorporated which detail trade, and also, specific site usage of the trade and contaminant sources.

The information below incorporates a hazard assessment of the features surrounding the site that could potentially impact on the proposed development. This is based on the information below :-

**Table 14 CIRIA Contaminated Land Risk Assessment Table**

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

Extracted from CIRIA Publication C552 Contaminated Land Risk Assessment



Table 15 Risk Assessment A

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Proposed Site Use Risk Assessment		
					Likelihood of occurrence	Potential Risk	Notes
Farming Uses including:- Made Ground Farm; Stables; Asbestos; Manure; Tractor Parking; Parking Areas; Road Scaping's; Glasshouses.  Combination of walk over survey and historical map assessments.	TPH's Naphthalene, Fertilizers, CO <sub>2</sub> , CH <sub>4</sub> .	Site Users Construction Workers.	Direct contact; Inhalation dust and fibers. Dermal contact	Medium	Likely	Moderate	Possible risk in place
			Ingestion of home grown produce	Medium	Likely	Moderate	Possible risk in place
			Ingestion of contaminated water through water main pipework	Medium	Likely	Moderate	Possible risk in place
			Inhalation of vapours	Medium	Likely	Moderate	Possible risk in place
			Inhalation of land Gases	Medium	Likely	Moderate	Possible risk in place
			Inhalation of vapours through contaminated ground waters	Medium	Unlikely	Low	No Groundwater Underlying Site
			Direct contact; Inhalation dust and fibers. Dermal contact	Medium	Low Likelihood	Moderate / Low	Limited risk in place
			Ingestion of home grown produce	Medium	Low Likelihood	Moderate / Low	Limited risk in place
			Ingestion of contaminated water through water main pipework	Medium	Low Likelihood	Moderate / Low	Limited risk in place
			Inhalation of vapours	Medium	Low Likelihood	Moderate / Low	Limited risk in place
			Inhalation of vapours through contaminated ground waters	Medium	Unlikely	Low	No Groundwater Underlying Site
			Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Low Likelihood	Moderate / Low	Risk is unlikely Maintain watching brief
Asbestos		Site Users Construction Workers.	Ground Water; Abstraction Well.	Medium	Unlikely	Low	No Groundwater Underlying Site
			Flora Plant Uptake Direct Contact	Medium	Likely	Moderate	Possible risk in place
			Inhalation dust and fibers (from Asbestos within the building)	Severe	Likely	High	Possible risk in place
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Likely	High	Possible risk in place
			Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Likely	Moderate	Possible risk in place
Metals Metalloids PAH's		Site Users Construction Workers.	Ingestion of home grown produce	Medium	Likely	Moderate	Possible risk in place
			Controlled Surface Water;	Medium	Low Likelihood	Moderate / Low	Risk is unlikely Maintain watching brief
			Ground Water; Abstraction Well.	Medium	Unlikely	Low	No Groundwater Underlying Site
TPH's Naphthalene, Fertilizers, CO <sub>2</sub> , CH <sub>4</sub> .		Buildings; Construction Materials Services	Direct contact with contaminated soils;	Medium	Likely	Moderate	Possible risk in place
			Direct contact with contaminated groundwater	Medium	Unlikely	Low	No Groundwater Underlying Site

Table 16 Risk Assessment B

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Likelihood of occurrence	Proposed Site Use Risk Assessment Potential Risk	Notes
Brickworks, Infilled Brickworks, Embankment  Including:-  General backfill for depth	TPH's Naphthalene, Phenols, CO <sub>2</sub> , CH <sub>4</sub> .	Site Users Construction Workers.	Direct contact; Inhalation dust and fibers. Dermal contact	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of contaminated water through water main pipework	Medium	Unlikely	Low	Limited risk due to distance
			Inhalation of vapours	Medium	Low Likelihood	Moderate / Low	Some Assessment Required.
			Inhalation of land Gases	Medium	Low Likelihood	Moderate / Low	Some Assessment Required.
			Inhalation of vapours through contaminated ground waters	Medium	Unlikely	Low	Limited risk due to distance and absence of groundwater.
			Direct contact; Inhalation dust and fibers. Dermal contact				
			Ingestion of home grown produce				
			Ingestion of contaminated water through water main pipework				
			Inhalation of vapours				
Adjoining Land Owners			Inhalation of vapours through contaminated ground waters				
			Leaching, lateral migration of shallow groundwater to a target receptor.				
			Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
			Plant Uptake Direct Contact	Medium	Unlikely	Low	Limited risk due to distance
			Inhalation dust and fibers (from Asbestos within the building)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				
			Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
Asbestos		Site Users Construction Workers.	Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				
			Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
			Plant Uptake Direct Contact	Medium	Unlikely	Low	Limited risk due to distance
			Inhalation dust and fibers (from Asbestos within the building)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				
Metals Metalloids PAH's		Site Users Construction Workers.	Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				
			Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
			Plant Uptake Direct Contact	Medium	Unlikely	Low	Limited risk due to distance
			Inhalation dust and fibers (from Asbestos within the building)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				
TPH's Naphthalene, Phenols, CO <sub>2</sub> , CH <sub>4</sub> .		Buildings; Construction Materials, Services	Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				
			Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
			Plant Uptake Direct Contact	Medium	Unlikely	Low	Limited risk due to distance
			Inhalation dust and fibers (from Asbestos within the building)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Unlikely	Moderate / Low	Limited risk due to distance
			Direct contact; Inhalation dust and fibers; Dermal contact;	Medium	Unlikely	Low	Limited risk due to distance
			Ingestion of home grown produce	Medium	Unlikely	Low	Limited risk due to distance
			Leaching, lateral migration of shallow groundwater to a target receptor.				



Table 17 Overview of Risk Assessments - Proposed Site Use

Receptors	Pathways	A	B
		Made Ground, Farm, Stables, Asbestos, Manure, Tractor Parking, Parking Areas, Road Scaping's, Glasshouses.	Brickworks, Infilled Brickworks, and Embankment
	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	✓	X
	Ingestion of home-grown vegetation	✓	X
	Ingestion of contaminated water through water main pipework	✓	X
	Inhalation of vapours from soils	✓	✓
Site Users	Inhalation of vapour from contaminated ground waters	X	X
Construction Workers	Inhalation of land gas vapours	✓	✓
	Inhalation Asbestos dust and fibers (from Asbestos within the building)	✓	X
	Inhalation Asbestos dust and fibers (from asbestos within the soil)	✓	X
	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	✓	
Adjoining Land Owners	Ingestion of home grown vegetation	✓	
	Ingestion of contaminated water through water main pipework	✓	No Liability from third parties
	Inhalation of vapours from soils	✓	
	Inhalation of vapours from contaminated ground waters	✓	
Flora	Plant Uptake / Direct Contact	✓	X
Groundwater, Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.	X	
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ	X	No Liability from third parties
Buildings	Direct contact with contaminated soils.	✓	X
	Direct contact with contaminated groundwater	X	✓

\*NB : Due to Severe Consequence from Asbestos and Explosive Gases, some risk is assessed and potentially in place and therefore highlighted above.  
 GW Only: Some risks have been assessed as a direct result of potential mobilisation of groundwater contamination that may influence the site. A pictorial conceptual model has been reproduced within this report to confirm the above findings

**16 Discussion on Sources of Contamination**

The assessments of the site have drawn conclusions of historical and ongoing land uses which may impact on the proposed development which will be further considered through location, (either on or off site) and nature of risk. These are discussed below:-

**Table 18 Pollutant Risk**

<b>Risk Assessment</b>	<b>Land Use</b>	<b>Pollutant</b>
<b>Risk Assessment A</b>	<b>Historic Maps &amp; Walk Over Survey.</b>	<b>Soil, Groundwater &amp; Vapour Risk</b>
	Made Ground, Farm, Stables, Asbestos, Manure, Tractor Parking, Parking Areas, Road Scraping's, Glasshouses.	Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAH's, (EPA Priority 16), Phenols, Asbestos, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band), Naphthalene, CO <sub>2</sub> , CH <sub>4</sub> , Fertilizer.
	<b>On Site</b>	<b>Soil Sampling &amp; Vapour Assessment</b>
<b>Risk Assessment B</b>	<b>Historic Maps</b>	<b>Soil, Groundwater &amp; Vapour Risk</b>
	Brickworks, Brickworks, Embankment.	Infilled and Phenols, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band), Naphthalene, CO <sub>2</sub> , CH <sub>4</sub> .
	<b>Off Site</b>	<b>Vapour and Gas Risk Assessment</b>
<b>Spatial Sampling, (General Assessment)</b>		Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAH's, (EPA Priority 16), Phenols, Asbestos.



## 17 Next Steps

Considering the information gathered to date, we would suggest that an appropriate way forward would be to assess the condition of the subsoil within the site resulting from the historical and former uses of the site as detailed within previous sections of this report. We would suggest that the most viable way of assessing risk will be to consider the following assessment techniques.

### 17.1 Soil Assessment

Considering the site area, we would suggest that the most appropriate way forward would be to undertake a series of window sampler boreholes across the site to provide targeted sampling and additionally, general and spatial sampling of the subsoil to provide the necessary coverage of the site conditions.

Soil sampling will be completed recovering samples in appropriate containers for analysis by the analytical chemist. All sampling will be sent directly to the chemist in cool boxes to retain the integrity of the soil sample. Appropriate GQRA or DQRA assessments will be completed and reported in an Environmental Report as and when this is available and where appropriate.

**Table 19** Soils Assessment - Targeted Sampling

<u>Feature</u>	<u>Method Of Investigation</u>
Made Ground and Manure	
Farm	
Stables	Window Sampler Boreholes Hand Auger Boreholes
Tractor Parking, Road Scalping's and Parking Areas	Trial Pits
Glasshouses	

**Table 20** Soils Assessment – Spatial Sampling

<u>Feature</u>	<u>Method Of Investigation</u>
Asbestos	
PAH's, (EPA Priority 16 – Speciated)	Window Sampler Boreholes Hand Auger Boreholes
Basic Metals, (Lead, Arsenic)	Trial Pits

### 17.2 Risk to the Ground Water

- Pathway to the ground water and receptors are unlikely to be in place within the site area due to the London Clay.

#### Human Health Risk from groundwater

- Groundwater is unlikely to be in place within the site area and therefore contamination within the site is unlikely to impact on the groundwater. Pathway from the ground water to the receptors is unlikely to be in place within the site area.

### Method of Groundwater Assessment

In order to gain an understanding of the groundwater system and the level of risk in place, we can confirm that the following works should be completed:-

- Assess the Geology and absence or presents of groundwater;
- Groundwater assessments are considered limited at present. Should groundwater be encountered within the site, an additional assessment should be made and standpipes installed. At present, this is not considered unlikely.

### 17.3 Land Gas Assessment

Considering the potential for Land Gas risks due to the potential made ground and infilled ground highlighted by this report as potentially in place within the site area, land gas risk assessments must be completed. These will include the potential for contamination migration from on and off site sources which may be present in concentrations where risk is recorded.

Land gas monitoring should be specifically targeting the following land uses.

**Table 21 Land Gas Assessment - Response Zone**

<i>Feature</i>	<i>Targeted Response Zone</i>	<i>Location to Target</i>	<i>Gas risk</i>
Made ground and Manure	Made Ground		
Infilled Brickworks	Made Ground	Site Wide	Land Gases - CO <sub>2</sub> , CH <sub>4</sub> .
Embankment	Made Ground		

Considering the above, we would suggest that soil testing is undertaken to assess the infilled ground its depth and type, and a standpipe should be installed within the site with response zones placed within the upper made ground solely, and the following assessments completed as follows :-

- Install standpipes to allow vapour and Land Gas risk to be considered from the upper made ground.
- Assess vapour risk over a minimum of six monitoring rounds to comply with CIRIA C665 to consider risks to buildings, CLR 11 and R & D Publication 66;
- Monitoring should be completed over falling or low atmospheric pressures or in periods where ground conditions are frozen to provide the worst case scenario for the site, although, the site is laid to hard cover which will restrict natural ventilation of any gases.
- Reporting of land gas and vapour risk/ can be completed assessing soils in situ using a Photo Ionisation Detector for Volatile Organic Compounds, (which include BTEX). Flow rates should also be noted for reporting purposes.

### 17.4 Vapour Risk Assessment

Considering the potential for vapour risk to be in place from various source as noted below, the following risk are in place.

**Table 22**      **Vapour Risk Assessment - Response Zone**

<b>Feature</b>	<b>Targeted Response Zone</b>	<b>Location to Target</b>	<b>Vapour risk</b>
Made Ground and Manure	Made Ground	Site wide	TPH's, Naphthalene, Land Gases - CO <sub>2</sub> , CH <sub>4</sub> .
Farm			
Stables			
Tractor Parking, Road Scalping's and Parking Areas			
Glasshouses			
Made ground and Manure			
Infilled Brickworks			
Embankment			

Considering the above, we would suggest that soil testing is undertaken to assess whether contamination that may promote a vapour risk is in place within the site area and the groundwater.

#### **17.5 Working Brief**

It should be noted that this investigation is undertaken in order to identify the extent of contamination as a result of historic and ongoing use. Should any areas of the site be encountered within the development that appear potentially contaminated through visual or olfactory assessment outside that discussed within this report, consultation with ourselves should be undertaken in order to identify the risk associated with the material.



Table 23 Overview of Works

Receptor	Scope of Investigation Works Required			Proposed Method of Assessment	Proposed Site Works to Complete
	Soils	Assessment of : Vapour and Gas	Ground and Surface Water		
<b>Human Health</b>	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe - Groundwater sampling*	Recover samples of the made ground; Assessment of the underlying natural soils to consider contamination; Leachate testing on elevated samples; Vapour Risk Assessment; Analysis of soil samples for GORA Assessment; Reporting
<b>Surface Water</b>	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe - Groundwater sampling*	Recover samples of the made ground; Assessment of the underlying natural soils to consider contamination; Leachate testing on elevated samples.
<b>Ground Water</b>	X	X	X		
<b>Services &amp; Building</b>	✓	✓ <sup>#</sup>	X	Window Sampling - Soil sampling	Recover samples of the made ground; Vapour Risk Assessment; Groundwater Assessment; Analysis of soil samples for GORA Assessment. Reporting
<b>Geotechnical Assessment</b>	✓	N/A	X	Window Sampling	Recover samples of the natural soils for laboratory testing; Assessment of shallow soils for conventional foundation; Consider deeper or piled foundations; Reporting.
NB * #	Initial assessments of the site should be undertaken using Leachate Testing and water sampling if required. Complete soils testing to assess if vaporous contamination is in place within the site area.				