

HERTS & ESSEX SITE INVESTIGATIONS

**'THE OLD POST OFFICE', WELLPOND GREEN,
STANDON, WARE, HERTS, SG11 1NJ**

**TELEPHONE
E-MAIL**

**01920 822233
01920 822200**

**E-MAIL INFO@HESI.CO.UK
WEBSITE WWW.HESI.CO.UK**

GEOTECHNICAL ASSESSMENTS – ENVIRONMENTAL ASSESSMENT - DESKTOP STUDY – CONTAMINATED LAND

Report For :

David Evans

Phase I DESK TOP STUDY REPORT

Site location :

***Site at Manor Farm,
Mott Street,
High Beach,
Loughton.
IG10 4AP***

***December 2018
Report No. 15147***

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LIST OF ABBREVIATIONS

BGS	British Geological Society
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
EFDC	Epping Forest District Council
GL	Ground Level
GW	Groundwater
HESI	Herts & Essex Site Investigations
LAPPC	Local Authority Pollution Prevention and Control
NOS	Not Otherwise Specified (waste material)
NHBC	National House-Building Council
OS	Ordnance Survey
PAH	Poly Aromatic Hydrocarbons
SPZ	Source Protection Zone
TPH	Total Petroleum Hydrocarbons
UFST	Underground Fuel Storage Tanks

DESK STUDY GENERAL NOTES

This report has been prepared based on the findings of investigations into the site conditions using current available data which has been recovered from Groundsure to provide environmental data in relation to the site and surrounding area. Where possible, local sources have been researched to gain a better understanding of the site conditions. As part of this review, research has been undertaken with the Local Authority and the Environment Agency as to the site condition.

We can confirm that this report has been prepared based on the information gained and that this information is not exhaustive and that subsequent research may reveal additional facts that may influence the reporting. Where possible, this information has been researched.

All geological information has been researched using the British Geological Society website, (the geology viewer). The disclaimer associated with this portal confirms 'The British Geological Society accept no responsibility for omissions or misinterpretations of the data from their Data Bank as this may be old or obtained from Non-BGS sources and may not represent current interpretation.

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The accuracy of map extracts cannot be guaranteed and it should be recognized that different conditions on site may have existed between subsequent to the various map surveys.

We can confirm that within the assessment of the site, various websites have been visited and as such, we cannot confirm the validity of these sites and as such, this information is accepted de facto and without prejudice. Anyone relying on these sources does so at their own risk, however, Herts & Essex Site Investigations does undertake all reasonable care to ensure this data is relevant and correct.

It should be confirmed that the extent of review of this report has undertaken a broad review of on site features which would promote a contamination ground risk, however, this does not include ecological features and in particular Japanese Knotweed which should be reviewed under separate cover.

A review of the site will be made to confirm the extent of obvious Asbestos product or sheet materials either on the surface of the site soils or evident above ground, however, does not constitute a full Asbestos Survey by any means. This should be sought under separate cover.

DOCUMENT INFORMATION AND CONTROL SHEET

Client

David Evans
Manor Famr,
Mott Street
High Beach
Loughton
IG10 4AP

Environmental Consultants:

Herts & Essex Site Investigations.

The Old Post Office,
Wellpond Green,
Standon,
Ware,
Hertfordshire.
SG11 1NJ

Tel: 01920 822233
Fax: 01920 822200
Mobile: 07770274498
E-Mail: csgrey@hesi.co.uk
Web: <http://www.hesi.co.uk>

Project Manager:

Chris Gray, M.Sc.

Principal Author:



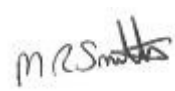
Chris Gray, M.Sc.

Qualifications

C.S.Gray

- ONC - Civil Engineering
- HNC – Civil Engineering
- P.G. Certificate – Geotechnical Engineering, (Inc. Environmental Engineering)
- P.G. Diploma – Geotechnical Engineering, (Inc. Environmental Engineering),
- Master of Science, (Geotechnical Engineering), (Inc. Environmental Engineering)
- SNIFFER modelling course
- CONSIM Groundwater Assessment Course.
- (30 Years in Geotechnical and Environmental Engineering)
- Asbestos Awareness Course – Current;
- Non-Licensed Work with Asbestos Including>NNLW – Current;
- Site Supervisors Safety Training Scheme, (SSSTS) – Current;
- First Aid Course in Construction – 3 Day Course – 3 years – Current.

Document Status and Approval Schedule

Issue No	Status	Date	<i>Prepared by:</i> Chris Gray Signature / Date	<i>Technical review by:</i> Rebecca Chamberlain Martyn Smith Signature / Date	<i>Checked by:</i> Chris Gray Martyn Smith Signature / Date
1	Final	December 2018			

REPORT ISSUE RECORD

As part of Herts & Essex Site Investigations approved Quality Management System, the company is required to document the issue of all reports to provide the client with a traceable control mechanism to prevent the issue of unauthorised copies.

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Please note, this reports has not been sent to the Local Authority, NHBC or Environment Agency with only the below issues made. Should copies be required for sending the relevant authorities, this can be undertaken upon request.

Controlled copies of this report have been issued according to the following schedule :-

Issue No	Recipient	Type	No. of copies	Date
1	HESI, (File Copy).	PDF	1	December 2018
2	David Evans : (Electronic Copy).	PDF	1	December 2018
3				
4				
5				
6				
7				
8				

EXECUTIVE SUMMARY			
PHASE 1 DESK TOP STUDY REPORT			
Client		David Evans	
Site Location		Site at Manor Farm, Mott Street, High Beach, Loughton. IG10 4AP	
Existing Development		Stables, Paddocks, Grazing and former Farm	
Proposed Development		Demolition of existing buildings and construction of 2 x 2 bed, 2 x 3 bed and 2 x 4 bed dwellings and associated amenity space, parking and landscaping.	
Site Settings and Previous Uses		<p>The site has included farming activities from the earliest map record until present day. Some variation in the occupation of uses within the site is however apparent across the site. The earliest map records indicate that the site has uses of open grazing land with an inland river running south to north across a section to the east of the site. Stables are developed across the site from 1992 onwards with a pond infilled in 1935.</p> <p>Surrounding the site, Manor Farm and the main buildings associated with farming are present to the south of the site from 1870 onwards with small variation in buildings which are added and removed throughout the site history. An underground fuel tank is identified as filled in in 1974 although, no other detail is recorded regarding this.</p>	
Nearest Surface Water Feature		The nearest surface water feature is recorded as on site and forms an inland river. This is shown pictorially within the historical maps and also in Section 11.2.	
Geological and Hydrological Profile	Geology		Aquifer Classification
	Made Ground	Shallow Made Ground Anticipated	Not Classified
	Claygate Group	Clay	Unproductive Stratum
Groundwater Abstractions		The nearest abstraction well is located 1286 meters to the north west of the site which is identified as an agricultural – horticultural purposes.	
Source Protection Zone		The site does not lie within a Source Protection Zone.	
Potential Sources of Contamination	On Site	Off Site	
	<ul style="list-style-type: none">Stables.	<ul style="list-style-type: none">Farming.	
Previous Investigations		No historical assessments of the site have been made.	

Human Health Risk	<p>We would suggest that there are potential sources of contamination relating to the historical land use of the site that, may be in place within the upper subsoil which will require assessment.</p> <p>Potential pathways in place within the site area recorded as :-</p> <ul style="list-style-type: none">Dermal Contact;Inhalation of dust and fibres;Ingestion of home grown produce;Ingestion of dust and fibresIngestion of contaminated water through water main pipework;Inhalation of vapours from soils;Inhalation Asbestos dust and fibres (from Asbestos within the building);Inhalation Asbestos dust and fibres (from asbestos within the soil).
Ground Water Risk	<p>Risk to the ground water is reduced due to the Claygate Group, an Unproductive Strata recorded in place within the site and no abstractions wells are recorded close to the site area.</p> <p>A watching brief should be maintained throughout the development, should any significant pollution or suspect materials be encountered reassessment to the risk should be undertaken.</p>
Surface water Risk	Based on the presence of an Inland River system running through the site, (likely culverted), we would suggest that some risk is in place and assessments should be completed. This should include sampling of soils close to the river system and also potential sampling of surface water run off.
Vapour Risk	<p>Sources of contamination that may promote a vapour risk are recorded in place as such risk maybe in place. Based on the historical assessments of the site, these may be significant in number.</p> <p>Potential pathways in place within the site area recorded as:-</p> <ul style="list-style-type: none">Inhalation of vapours from soils - Visual and chemical tests to be completed initially;
Land Gas Risk	<p>Infilled land is recorded in place in the form of made ground in general associated with the farming uses as well as an infilled pond and manure potentially associated with the stables. As such, the potential for contamination and land gas risk is in place.</p> <p>Based on this, we would confirm that a minimum of six monitoring rounds should be completed over falling or low atmospheric pressures or frozen ground conditions. Appropriate reporting should be completed post site monitoring.</p>
Recommend ations	<p>Next Steps</p> <ul style="list-style-type: none">Intrusive shallow based excavation using window sampler to assess the geological conditions and recover samples;Initially assess soils for presence / absence of fuels and if encountered :-<ul style="list-style-type: none">Install standpipe for the monitoring of land gas / vapour risks;Targeted sampling to assess on site source risk;Spatial sampling for use in statistical analysis;Consideration through the site assessment as to the presence of Asbestos product within the site and subsoil within the site;Visual observations of the subsoil encountered to make initial assessment of the potential risk from contamination.Watching brief to record assess and report on unexpected contamination. <p>Based on the above, a risk assessment should be completed when the findings of the investigation have been completed. This will result in a revised conceptual model based on actual site conditions and confirm the risks in place.</p>

PRELIMINARY RISK ASSESSMENT – DESK TOP STUDY - PHASE 1 REPORT

1 Context and Objectives of this report

1.1 Introduction

We have been asked by David Evans to undertake an investigation of the above site in order to assess the potential environmental impact of the existing and historical use of the site on the proposed development sufficient to document the level of risk and impact on future users and the environment.

At this stage, we have been asked to carry out this report without further environmental works proposed, on completion of this report. We would suggest that the protocols for the investigation of the site should form this desk top study, an intrusive investigation and environmental report, a remediation strategy report and a final validation report, where required. This is the basis on which this report has been prepared and as such, these protocols are expected to follow this report.

1.2 Reference to the Current Planning Application Details

This report has been prepared with following planning application with, in mind: -

Application Number: EPF/3187/18.

Proposal: Demolition of existing buildings & construction of x2 no. two bedroom, x2 no. three bedroom & x2 no. four bedroom dwellings with associated amenity space, car parking & landscaping.

Decision: Invalid Application

1.3 Report Objectives

The objectives of the project were as follows:

- To anticipate regulatory action;
- To assess the site for Part IIA;
- To ensure development is 'suitable for use' status;
- To assess the site in other regulatory contexts;
- To inform acquisition, transfer or sale plans;
- To support funding decisions;
- For valuation purposes;
- For insurance purposes

1.4 Timescales of the Assessment

The timescales for the site investigation process are based on immediate site investigation data and the assessment of the site conditions based on this report at present. The scope of this report which define the following: -

- Any immediate risks identified within the site that may promote a high risk to the immediate site conditions;
- Any current site use features that would promote a risk that required 'quick' action;
- Any construction or medium-term risks within the site which may be present during the construction process within the site;
- Any long-term risks within the site that may require long term assessments or interim monitoring;
- Any risks within the site that may change upon the change in use of the site to form the proposed development.

1.5 Level of Technical Confidence Expected

The scope of this report has been prepared in order to assess the historical impact of the site and any previous site uses on the existing and proposed development scheme. The level of risk will be prepared and assessed based on historical mapping and environmental information which has been gained to support the development of this report.

Whilst this is the case, gaps in map records and information will be in place that would reduce the readers confidence of the information sought. As such, this report has been prepared as a preliminary or Indicative Report with a Medium Confidence Level.

1.6 Management Constraints

The site investigation has been prepared based on a budget and time scales which has been agreed with the client. The desk top study fees have been agreed at this time which will dictate a way forward.

2 Broad Characteristics of the site

2.1 The Site

The site is located within a rural area of High Beach, Loughton, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 2, Sheet 1 with the existing site plan shown in Appendix 2, Sheet 2.

Table 1 Site Detail

Site Address:	Site at Manor Farm, Mott Street, High Beach, Loughton. IG10 4AP
Site assessed under	Site Owners Request Planning Application – EPF/3187/18 – File Number 000229
Current use of land:	Stable block and grazing land
Previous use of site, (if known)	As above
Grid Reference	539820, 198030 NGR
Site Area	0.88 Hectares
Local Authority	Epping Forest District Council
Gradient of the site	The site has a gradient from the main road leading down into the site. The sloping site extends down from the south to the north of the site and has small retaining features between the main working stables and the grazing land.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as on site which from historic and current map records is identified on site as is identified on site and as such, this may form a culverted ditch.

2.2 Existing Site Use

The existing site is recorded as an access road leading down from the south of the site and the main road to the rear of the site where the main site opens out into a rectangular shaped parcel of land. The site has stable blocks identified on the southern boundary which runs along the boundary line and has a sharp slope up to the south. A farm building is present to the north west of the site which houses farm machinery. The remainder of the site is laid to grazing land.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below :-

- To the north of the site, open grazing land is in place;
- To the east of the site, open grazing land is in place;
- To the west of the site, a residential house is in place;
- To the south of the site residential housing is in place.

2.4 Site Reconnaissance

The site walk over visit was undertaken in December 2018 on which the weather conditions were recorded cold, windy and overcast.

Access

Access into the site was recorded as off Mott Street where a tarmac road leads down to the north and meanders into the site. A retaining wall is present to the south east with a drop down to the north west.

As the site opens out a road way is present to the east and west where access is available to the stables and also leads off to further stables north east. Beyond this to the north, grassed open grazing land is in place. Pedestrian access is available across the whole site with vehicle access limited to some areas due to the variation in land elevation.

Site Area

The site is recorded as a rectangular parcel of land which, as mentioned, has a meandering road leading down from Mott Street leading into the site. Two large residential houses are present on either side of the main entrance with grounds extending to the rear and up to the site boundary.

As the site opens out, it is made up of a number of outbuildings to include stable blocks and a main warehouse / unit which is used for housing of farming machinery.

The wooden stables were in use as a combination of horse stables and included hay and basic equipment for looking after the horses along with other vacant stables which house items used in the upkeep of the horses. No potentially contaminated materials were identified as stored in the stable blocks. The roof of the stable block was identified as Non-Asbestos and as such, no risk is in place based on the current plan of the site.

In front of the stable blocks, a road system is in place which is made up of concrete and in a poor to reasonable condition. In front of the road system, to the north, a parking area is in place which is laid to loose roadstone. This roadstone area has weeds and wild grasses growing, although, are kept down as a result of trafficking.

Beyond the main parking area, a concrete retaining wall was identified in place which was made up of wooden posts and concrete blocks. This retained approximately 0.30-0.50 meters of soil at the southern end.

To the eastern end of the site, a dirt track is identified in place which leads off to the east of the site up a small hill and also round to the north where it extends in front of a further block of stables. Again, the stables are of wooden construction and include housing and basic items for horses. Around the stables in general, sawdust, hay and general materials for looking after horses is identified in place.

A ménage is recorded in place beyond the main stables to the north east which has fragments of sand and topsoil in place. This had a wooden post fence surrounding it and was for training horses.

To the eastern end of the site, container units were identified in place which were used for keeping sawdust and hay and other basic materials used for looking after the horses.

Beyond the main working site, and in front of the small retaining wall, grazing land is in place which forms a grassed landscape where horses are able to feed and exercise. No features are present within this area and no risk is specifically recorded in place.

To the west of the site, the main storage building for farm machinery was identified in place which houses tractors, trailers, and machinery in use within the stables. Whilst the potential for some risk to be in place was possible within this building, the floor of the building was a concrete floor with no staining identified in place. To the north of the main barn building, an area had been reworked to include a crushed concrete area. The appearance of this area was as if it was going to be developed on, although, nothing had started in the form of work.

Based on or walk over inspection of the site, limited features were present within the site which would promote a significant risk.

Vegetation

Within the main access route into the site, trees are identified on the northern side of the access road which were identified as conifers in general. Across the main site, limited growth of vegetation is identified with the exception of

Above or below ground fuel or oil storage tanks

No above or below ground fuel tanks are identified in place. No vent pipes, in line manholes or petrol interceptors have been recorded within the walk over survey element.

Asbestos Containing Materials

From our brief review of the site through an inspection, no obvious signs of Asbestos were recorded. We would suggest that a pre-commencement of construction refurbishment / demolition survey should have been completed to remove any and all source of Asbestos prior to the start of construction of the site. Additionally, a subsoil survey should be completed to consider any historic presence of Asbestos which may have fallen onto or into the ground.

Any Other Pollutive Features

We can confirm that no other pollutive features or substances identified at the site. Japanese Knotweed has not been recorded on site based on a short-term assessment of the site.

Surrounding Area

Surrounding the site, open land or grazing land is in place to the north of the site. Residential land is in place to the south of the site and also the south west where the gardens extend around to the west.

To the east of the site, open land is in place in the form of grazing land.

Site Levels and Ground Cover

The site has only one element where the site drops in elevation which is located between the main stable block and the grazing land. This forms a drop of approximately 0.30-0.60 meters. From the front of the site by Mott Street, the site has a general gradient down from the main road to the rear of the site.







Current site activities

The current use of the site is identified as stables and grazing land.

Effluent, Site Drainage and Services

Drainage and services have not been reviewed as part of the site inspection or review of the site condition.

2.5 Site Reconnaissance – Photos

Print 1	Access viewing South.	Print 2	Access route to the north west viewing adjacent property.
			
Print 3	View of the main access to the north.	Print 4	View of Manor Farmhouse at the front of the site.
			
Print 5	View of the stable block facing east.	Print 6	View of a stable block facing west.
			

Print 7	View of the main storage building for farm machinery.	Print 8	View internally of the farm machinery building.
			
Print 9	View facing out from the farm machinery building.	Print 10	View facing the main access into the site and stable block.
			
Print 11	View facing south west of the main stable block	Print 12	View of the variation in level between the stable block and grazing land.
			







Print 13	View facing south west	Print 14	View facing north west
			
Print 15	View of container units	Print 16	View of ménage and stable block
			
Print 17	View of Ménage	Print 18	View of storage containers
			

Table 2 **Walk Over Inspection Risk**

Feature	Location	Elevation	Is Risk Present?	Location To Target
Stable Blocks	South	At GL.	✓	Within and Around buildings
Machinery Building	West	At GL.	✓	
Manure and Made Ground	Site Wide	At GL.	✓	Site Wide
Crushed concrete area	West	At GL.	✓	West behind machinery building
Ménage	East	At GL.	✓	East behind stables.

3 **Details of Searches Undertaken**

Within this report, various searches have been undertaken in order to assess the risk associated with the development of the site from the historical and current use of the site and surrounding area. These include: -

- Environmental Data Search 1: 10,000;
- Environmental Data Search 1: 2,500;
- Site Sensitivity Maps and Data Sheets;
- Historical Maps;
- Internet Search;
- Local Authority Search – Planning Files;
- Consultation with Site Owner / Architect.

4 **Information on Historical and Current Activities on the Site and Surrounding Area**

The history of the site and former land-use and development from Victorian times onwards has been researched from Ordnance Survey, (O.S.) maps. Extracts of the O.S. Maps and plans are presented in Appendices of this report. Reference to historical maps provides invaluable information regarding the land use/history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive map references. The maps have been provided by Envirocheck Ltd.

4.1 **Discussion of the Development History**

A summary of the historical development of the site and surrounding area based on the information obtained from the above sources is provided in Table 3. It should be noted that these maps are only a small section of time and represent the timescales given in each of the map records. It is highly possible that development or features may have been developed within or surrounding the site which may influence the site, and this should be born in mind when assessing the history of the site.

Table 3 Historic Maps Assessment

Date	On Site Feature	On Site Mitigation (considering all possible pathways)	Off Site Feature	Off Site Mitigation (considering all possible pathways)
1870 Source Map Scale 1:2,500	Open Land & Pond, NE corner	No Source	Manor Farm, 20m, S	Possible Vapour Risk Possible GW Risk
	Ditches running across site	No Source		
1881 Source Map Scale 1:10,560				
1887 Source Map Scale 1:10,560			Pond, 80m, NE	No Source
1896 Source Map Scale 1:2,500				
1898 Source Map Scale 1:10,560				
1920 Source Map Scale 1:2,500				
1920 Source Map Scale 1:10,560				
1921 Source Map Scale 1:10,560				
1935 Source Map Scale 1:10,560				
1935 Source Map Scale 1:2,500	Pond Infilled, NE Corner	Possible Soil Risk Possible Vapour Risk Possible GW Risk		

Table 3a **Historic Map Assessment - Continued.....**

Date	On Site Feature	On Site Mitigation (considering all possible pathways)	Off Site Feature	Off Site Mitigation (considering all possible pathways)
1938 Source Map Scale 1:10,560				
1945 Source Map Scale 1:10,560				
1953 Source Map Scale 1:10,560				
1960 Source Map Scale 1:10,000				
1966 Source Map Scale 1:10,000				
1971 Source Map Scale 1:2,500			Additional Farm Buildings Shown, 20m, S	Possible Vapour Risk Possible GW Risk
1974 Source Map Scale 1:10,000				
1980 Source Map Scale 1:10,000			Paddocks, 20m, W	No Source
1985 Source Map Scale 1:25,000				
1990 Source Map Scale 1:10,000				

Table 3b Historic Map Assessment - Continued.....

Date	On Site Feature	On Site Mitigation (considering all possible pathways)	Off Site Feature	Off Site Mitigation (considering all possible pathways)
1992 Source Map Scale 1:2,500	Stables Shown	Possible Soil Risk Possible Vapour Risk Possible GW Risk		
1999 Source Map Scale 1:10,000				
2016 Source Map Scale 1:10,000			Manor Farm Removed, 20m, S	Source Removed
			Housing Developed, 20m, S	No Source
2018 Source Map Scale 1:10,000	Additional Stable Added	Possible Soil Risk Possible Vapour Risk Possible GW Risk		

Table 4 Overview of Historic Map Assessment Risk

Identified Risk	Distance & Direction	Year	Is risk in place?	Considering All Pathways		Justification
				Assessment Required.	Method of Assessment	
Open Land	On Site	1870 - 1992	X	No Source	None Required	No obvious land uses which would promote a risk.
Stables	On Site	1992 - Present	✓	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments	Possible reworking of the site levels. Possible Asbestos Cladding.
Pond Infilled, (NE Corner)	On Site	1935 - Present	✓	Possible GW Risk Possible Vapour Risk	Install Standpipes GW & Vapour Assessments	Unknown filling of the pond may include contaminated soils
Additional Stable Added	On Site, E	2018 - Present	✓	Possible GW Risk Possible Vapour Risk	Install Standpipes GW & Vapour Assessments	Possible reworking of the site levels. Possible Asbestos Cladding
Manor Farm	Off Site, 20m, S	1870 - 2016	✓	Possible GW Risk Possible Vapour Risk	Install Standpipes GW & Vapour Assessments	Possible Source Risk from general farming activities
Additional Farm Buildings	Off Site, 20m, S	1971 – 2016	✓	Possible GW Risk Possible Vapour Risk	Install Standpipes GW & Vapour Assessments	Possible Source Risk from general farming activities
Paddocks	Off Site, 20m, W	1980 - Present	✓	Possible GW Risk Possible Vapour Risk	Install Standpipes GW & Vapour Assessments	Possible reworking of the site levels.
Housing	Off Site, 20m, S	2016 - Present	X	No Source	None Required	No obvious land uses which would promote a risk.

5 Details of the Intended Future Use of the Site

Demolition of existing buildings and construction of 2 x 2 bed, 2 x 3 bed and 2 x 4 bed dwellings and associated amenity space, parking and landscaping.

6 References of Planning Applications

6.1 Planning Application's

From a review of Epping Forest District Council planning portal, we can confirm that the site has an invalid application in place.

Application Number: EPF/3187/18.

Proposal: Demolition of existing buildings & construction of x2 no. two bedroom, x2 no. three bedroom & x2 no. four bedroom dwellings with associated amenity space, car parking & landscaping.

Decision: Invalid Application

6.2 Microfiche Files

Application Number	Site Address	Development Description	Status	Date Registered	Decision
EPF/3187/18	Manor Farm Mott Street Waltham Abbey IG10 4AP	Demolition of existing buildings & construction of x2 no. two bedroom, x2 no. three bedroom & x2 no. four bedroom dwellings with associated amenity space, car parking.& landscaping.	INVALID	--	
EPF/1100/12	The Barn Manor Farm Mott Street Waltham Abbey Essex IG10 4AP	Certificate of lawful development for an existing use of former farm building as a single dwelling house and curtilage.	FINAL DECISION	12-06-2012	Lawful
EPF/0833/11	Manor Farm Mott Street Waltham Abbey Essex IG10 4AP	Agricultural determination for an agricultural barn.	FINAL DECISION	27-04-2011	Prior Approval Not Required
EPF/0175/11	Land At Manor Farm Mott Street High Beech Waltham Abbey Essex IG10 4AP	Extension of time limit on EPF/0452/08 (New single detached dwelling as previously approved but with the addition of basement -amended application).	FINAL DECISION	02-02-2011	Grant Permission (With Conditions)
EPF/0452/08	Land At Manor Farm Mott Street High Beech Waltham Abbey Essex IG10 4AP	New single detached dwelling as previously approved but with the addition of basement (amended application).	FINAL DECISION	28-03-2008	Grant Permission (With Conditions)
EPF/2320/07	Manor Farm Mott Street Waltham Abbey Essex IG10 4AP	Reserved matters application for the erection of a single dwelling house following outline approval EPF/1098/04.	FINAL DECISION	12-11-2007	Grant Permission (With Conditions)
EPF/1280/07	Land at Manor Farm and Land adj to High Beech Primary School Mott Street High Beach Loughton Essex IG10 4AP	Outline application for 12 no. affordable houses and 12 no. private houses on land at Manor Farm, new vehicle access to school and car park. (Revised application)	FINAL DECISION	02-07-2007	Refuse Permission

EPF/1098/04	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Outline application for the removal of former farm buildings and stables complex and replacement with single dwelling house.	FINAL DECISION	04-06-2004	Grant Permission (With Conditions)
EPF/0132/04	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Change of use of former barn from office and ancillary use with flat over, to two dwellings with garage/store.	FINAL DECISION	09-02-2004	Withdrawn
EPF/0864/02	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Alterations and change of use of existing outbuilding to 3 self contained residential units. (Amendment to planning consent EPF/111/98).	FINAL DECISION	15-05-2002	Grant Permission (With Conditions)
PF/0174/02	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Amendment to existing consent for new dwelling, to install front and rear dormer windows and erect a triple garage.	FINAL DECISION	29-01-2002	Grant Permission (With Conditions)
RES/EPF/1051/01	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Reserved matters application, (siting, design, external appearance and landscaping) for erection of a single dwelling.	FINAL DECISION	13-07-2001	Grant Permission (With Conditions)
RES/EPF/2087/00	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Reserved matters application for erection of replacement dwelling. (Siting, design external appearance and means of access.)	FINAL DECISION	15-12-2000	Grant Permission (With Conditions)
EPF/0700/00	MANOR FARM, MOTT STREET, WALTHAM ABBEY	Outline application for replacement of existing dwelling. (2070m3).	FINAL DECISION	17-04-2000	Grant Permission (With Conditions)
EPF/0699/00	MANOR FARM, MOTT STREET, WALTHAM ABBEY	Outline application for erection of one residential dwelling and removal of existing B1, B2, B8 uses, livery stables, ménage, storage barns, retail sales area and commercial storage and restoration of land for open parkland and domestic garden.	FINAL DECISION	17-04-2000	Grant Permission (With Conditions) Subject to Legal Agreement
EPF/0124/00	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Demolition of lean-to and erection of new extension to provide rest room and toilet facilities.	FINAL DECISION	27-01-2000	Grant Permission (With Conditions)
EPF/1138/99	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Change of use of cattery building to (B1) business use.	FINAL DECISION	22-09-1999	Grant Permission (With Conditions)
EPF/1139/99	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Outline application for removal of 4 buildings and erection of residential unit.	FINAL DECISION	22-09-1999	Withdrawn

EPF/0111/98	MANOR FARM, MOTT STREET, HIGH BEACH, WALTHAM ABBEY	Change of use of existing outbuildings into 3 self contained residential units.	FINAL DECISION	12-02-1998	Grant Permission (With Conditions)
EPF/1564/96	MANOR FARM, MOTT STREET, HIGH BEECH, WALTHAM ABBEY, ESSEX, IG1	New dormer windows in former barn.	FINAL DECISION	19-12-1996	Grant Permission (With Conditions)
F/0447/96	MANOR FARM, MOTT STREET, HIGH BEECH, WALTHAM ABBEY	Change of use, extension and alterations to existing stables to create new business units (Class B1).	APPEAL DECIDED	03-04-1996	Refuse Permission
EPF/0145/96	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Extensions of former barn to provide toilets, lobby hall, carports, staircase and cloakroom/toilet.	FINAL DECISION	02-02-1996	Grant Permission (With Conditions)
EPF/0846/95	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Fence along frontage.	FINAL DECISION	25-08-1995	Grant Permission (With Conditions)
EPF/0585/95	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Removal of garages and workshop and construction of new four car garage and tool store and pool building.	FINAL DECISION	13-06-1995	Grant Permission (With Conditions)
EPF/0485/93	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Construction of a ménage.	FINAL DECISION	28-05-1993	Grant Permission
EPF/0302/92	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Alterations to elevations and change of use of ground floor office, tack room, garage and front floor flat to dwelling house.	APPEAL DECIDED	30-03-1992	Refuse Permission
EPF/1954/88	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Alterations and change of use of existing barn to dwelling- house.	FINAL DECISION	14-12-1988	Refuse Permission
EPF/1711/88	MANOR FARM, MOTT STREET, HIGH BEACH, LOUGHTON, ESSEX, IG1	Change of use barn to house, extensions and detached garages.	FINAL DECISION	22-08-1988	Refuse Permission
EPF/0297/86	Over land at, Manor Farm, Mott Street, Waltham Abbey	Erection of 11,000 volt overhead electricity line.	FINAL DECISION	06-03-1986	Grant Permission
EU/EPF/000 5/80	Manor Farm, Mott Street, Waltham Abbey	Application for Established Use Certificate for 1) grazing, keeping, schooling and exercising of horses, ponies and cattle and 2) Storage and sale of straw, hay and manure.	FINAL DECISION	06-11-1980	Approved (Conditions Unknown)
WHX/0004/7 4	MANOR FARM, MOTT STREET, HIGH BEACH, ESSEX, IG10 4AP	UNDERGROUND PETROL STORAGE TANK FILE D	FINAL DECISION	01-01-1974	Grant Permission (With Conditions)

Additional files are available on line, although, these have been refused as applications and therefore not moved forward or relate to relatively inert based applications.

6.3 Conclusions of the Microfiche files Assessment

Based on the above, we would confirm the following risks can be brought forward.

Table 5 Overview of Microfiche Files

<i>Location</i>	<i>Date</i>	<i>Site Use</i>	<i>Risk In Place</i>
Manor Farm, Motts Street, High Beach, Loughton	Various	Various applications relating to farming activities on site, Including :- EPF/0833/11, EPF/0699/00, EPF/0124/00, EPF/1138/99, F/0447/96, EPF/0302/92, EU/EPF/0005/80.	✓
Manor Farm, Motts Street, High Beach, Loughton	Jan 1974	WHX/0004/74 - Underground petrol storage tank filled. No Detail Shown.	✓

* It should be noted that these trades have already been identified as a risk within the Historic Map search and detailed review of files.

7 Discussion with Local Authority

No discussion has been completed with the Local Authority in relation to the development of the site at this stage. Whilst this is the case, a review of the planning files has been completed to confirm the historical uses of the site which may be of importance in relation to the assessment of contamination at the site.

8 Consultation with Environment Agency

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

Should heavy or persistent contamination be identified within any main intrusive investigation, consultation will be required with associated risk assessments completed.

9 Consultation with Appropriate Bodies/Local Sources

Consultation with the Local Authority has not been made at this time.

10 Previous Reporting

We have completed a review of the site and historical works completed at the site and can confirm that at this stage, no historical reporting has been identified at the site location.

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 defined as a Claygate Member.

11.2 BGS Boreholes

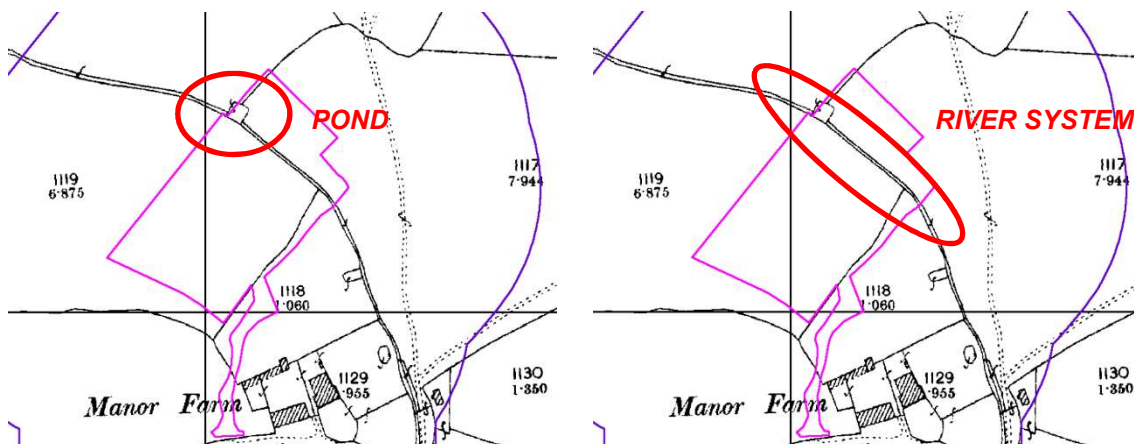
No BGS Boreholes have been recorded surrounding the site.

Table 6 Geological Information

Geological Unit	Brief Description	Anticipated thickness, (m)	Aquifer Type
<i>Superficial Deposits/Drift</i>			
<i>On Site</i>			
Filled/Re-worked ground	Made Ground, (Potentially Contaminated Stratum).	0.5-1.00 meters+	Not Classified
<i>Solid Geology Deposits</i>			
Claygate Member	Clay	10m +	Unproductive Stratum

11.2 Hydrology

The nearest surface water feature is recorded as on site which from historic and current map records is identified on site as is identified on site and as such, this may form a culverted ditch.



The nearest discharge consent is identified as 90 meters to the south east of the site. From the information gained, this is Sewage Discharge – Final Treated Effluent. Further discharge consents extend away from the site.

The nearest pollution incident to controlled waters is identified as 595 meters to the north east of the site which is identified as a Minor Incident from Minor Agricultural pollutants.

The nearest substantiated pollution incident register identifies a significant land impact and minor air impact some 769 meters to the west of the site from construction and demolition materials.

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 an Unproductive Stratum which is formed by Claygate Member Group.

The nearest abstraction well is located 1286 meters to the north west of the site which is identified as an agricultural – horticultural purposes.

The site does not lie within a Source Protection Zone.

11.4 Implication of groundwater

Considering the underlying Unproductive Stratum underlying the site, groundwater links are unlikely. Based on London Clay underlying the site, migration potential off site is significantly limited as well as the movement of soils from off site sources to the site area.

Whilst this is the case and in accordance with Environment Agency guidance document: -

- Groundwater Protection: Principles and Practice (GP3) Part 5 – Remedial Targets Methodology.

The document confirms:-

- “Selecting compliance points for use in land contamination risk assessments the distance to a set compliance point should not exceed 50 metres for hazardous substances or a maximum of 250 metres for non-hazardous pollutants unless there are specific physical constraints on the ability to use the groundwater resource. Any increases above these specified distances may be

justified but must be supported by a sustainability assessment that considers environmental, social and economic factors.”

Considering the above, groundwater risk may be in place if significant contamination or a persistent source of contamination are encountered or recorded within the site area, within the information to date risk is considered possible. This is particularly relevant in relation to the presence of a ditch on site which may lead onto controlled water systems.

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. Infilled land is identified 604 meters to the east of the site, although, this is too far from the site to influence the development.

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

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Unproductive Stratum	Low	Limited risk of migration to a lower groundwater system
Water Abstraction	agricultural horticultural purposes.	Medium	The nearest abstraction well is located 1286 meters to the north west of the site
Source Protection Zone	NONE		The site does not lie within a source protection zone
Surface Water	Inland River	Moderate	The nearest surface water feature is located on site and as such, risk is present directly to this feature.
Flooding	NONE		
Ecological	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 7 and 8. This information is recorded in full within the Enviocheck 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?
Sources				
Discharge Consents	None	Sewage Discharges - Final/Treated Effluent - Not Water Company.	90m, SE	X
Pollution Incidents to Controlled Waters	None	Minor Incident – Agriculture - Unknown	595m, NE	X
Substantiated Pollution Incident Register	None	Significant Impact – Land Minor Impact - Air	769m, W	X
Radon Potential - Radon Protection Measures	The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).			X

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

Data	On Site	Off Site	Distance from site.	Is potential risk in place?
Receptors				
Nearest Surface Water Feature	Inland River		ON SITE	✓
Water Abstractions	None	Agriculture – Horticultural Watering	1270m, W	X
Detailed River Network Lines	Inland River		ON SITE	✓
Source Protection Zone	None	None	N/A	X

Table 10 **BGS Estimated Chemistry Data**

BGS Estimated Soil Chemistry Pollutant	BGS Estimated Soil Chemistry
Arsenic	<15
Cadmium	>1.8
Chromium	90-120
Lead	<100
Nickel	15-30

Table 11 **Geological Hazards**

Geological Hazard	Distance & Direction	Feature	Risk Assessment Required
Coal Mining	On Site		No Hazard
Collapsible Ground	On Site		Very Low
Compressible Ground	On Site		No Hazard
Ground Dissolution Features	On Site		No Hazard
Running Sand	On Site		No Hazard
Landslide	On Site		Very Low
Shrinking or Swelling Clay	On Site		Moderate

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 11 :-

Table 12 Table of Source Risk

Source Risk	Additional Features	Source of Information	Location	Date	Considering Site Specific Pathways		
					Assessment Required.	Method of Assessment	
Walk Over Survey							
1	Stables	Stable Blocks	Walk Over Survey	On Site	N/A	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments
		Machinery Building					
		Manure and Made Ground					
		Crushed concrete area					
		Ménage					
2	Farming	Farming	Walk Over Survey				
Historic Maps							
See 2 above	Farming	Stables	Envirocheck Report	On Site	1992 - Present	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments
		Pond Infilled, (NE Corner)		On Site	1935 - Present		
		Additional Stable Added		On Site	2018 - Present		
		Manor Farm		On and Off Site	1870 - 2016		
		Additional Farm Buildings		On Site	1971 – 2016		
		Paddocks		On and Off Site	1980 - Present		
		WHX/0004/74 - Underground petrol storage tank filled.	EFDC Website	Off Site, S	1974	Possible GW Risk Possible Vapour Risk	Install Standpipes GW & Vapour Assessments

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 13 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 14 Risk Assessment 1

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Proposed Site Use Risk Assessment		
					Likelihood of occurrence	Potential Risk	Notes
Stables Walk Over Survey and Historic Maps. On and off site.	TPH's, Naphthalene, VOC's, Pesticides, CO ₂ , CH ₄ .	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	Groundwater is not anticipated
		Adjoining Land Owners	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	Low Likelihood	Moderate / Low	Limited risk in place
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible Risk In Place
		Ground Water; Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Unlikely	Low	Groundwater is not anticipated
		Flora	Plant Uptake Direct Contact	Medium	Likely	Moderate	Possible Risk In Place
	Asbestos	Site Users Construction Workers.	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
	Metals Metalloids PAH's	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
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible Risk In Place
		Ground Water; Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Unlikely	Low	Groundwater is not anticipated
		Buildings; Construction Materials. Services	Direct contact with contaminated soils;	Medium	Likely	Moderate	Possible Risk In Place
			Direct contact with contaminated groundwater	Medium	Unlikely	Low	Groundwater is not anticipated

Table 15 Risk Assessment 2

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Proposed Site Use Risk Assessment		
					Likelihood of occurrence	Potential Risk	Notes
Farming Historic Maps On and off site.	TPH's, Naphthalene, VOC's, Pesticides, CO ₂ , CH ₄ .	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	Groundwater is not anticipated
		Adjoining Land Owners	Direct contact; Inhalation dust and fibers. Dermal contact	No Liability from third parties			
			Ingestion of home grown produce				
			Ingestion of contaminated water through water main pipework				
			Inhalation of vapours				
			Inhalation of vapours through contaminated ground waters				
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.				
		Ground Water; Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
		Flora	Plant Uptake Direct Contact				
	Asbestos	Site Users Construction Workers.	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
	Metals Metalloids PAH's	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
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.	No liability from third parties			
		Ground Water; Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
		Buildings; Construction Materials. Services	Direct contact with contaminated soils;	Medium	Likely	Moderate	Possible Risk In Place
			Direct contact with contaminated groundwater	Medium	Unlikely	Low	Groundwater is not anticipated

Table 16 Overview of Risk Assessments - Proposed Site Use

Receptors	Pathways	Risk Assessment 1	Risk Assessment 2
		Stables	Farming
Site Users Construction Workers	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	✓	✓
	Ingestion of home grown vegetation	✓	✓
	Ingestion of contaminated water through water main pipework	✓	✓
	Inhalation of vapours from soils	✓	✓
	Inhalation of vapour from contaminated ground waters	✓	✓
	Inhalation of land gas vapours	✓	✓
	Inhalation Asbestos dust and fibers (from Asbestos within the building)	✓	✓
	Inhalation Asbestos dust and fibers (from asbestos within the soil)	✓	✓
Adjoining Land Owners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	X	No liability from third parties
	Ingestion of home-grown vegetation	X	
	Ingestion of contaminated water through water main pipework	X	
	Inhalation of vapours from soils	X	
	Inhalation of vapours from contaminated ground waters	X	
Flora	Plant Uptake / Direct Contact	✓	✓
Groundwater; Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.	✓	No liability from third parties
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ	X	
Buildings	Direct contact with contaminated soils.	✓	✓
	Direct contact with contaminated groundwater	X	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 17 Pollutant Risk

Risk Assessment	Land Use	Pollutant
Risk Assessment 1	Historic Maps	Soil, Groundwater & Vapour Risk
	Stables	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, VOC's, CO ₂ , CH ₄ , Pesticides.
	On Site	Soil Sampling Groundwater & Vapour Assessment
Risk Assessment 2	Historical Features & Walk Over Survey	Soil, Groundwater & Vapour Risk
	Farming	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, VOC's, CO ₂ , CH ₄ , Pesticides.
	Off Site, 5m, E	Soil Sampling, Groundwater & Vapour Assessment
Spatial Sampling, (General Assessment)		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

25 meter Centres
In accordance with BS10175: 2011+A2:2017.

5-10 meter Centres
In accordance with BS10175: 2011+A2:2017.

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 18 Soils Assessment - Targeted Sampling

<u>Feature</u>	<u>Method Of Investigation</u>
Soils Risks	
Machinery Shed – On Site	
Infilled Pond – On Site	
Farming Uses – On Site	Window Sampler Boreholes
Underground Fuel Tanks – Off Site	Standpipes & Monitoring
Infilled Pond, (NE Corner)	
Made Ground	

Table 19 Soils Assessment – Spatial Sampling

<u>Feature</u>	<u>Method Of Investigation</u>
General Made Ground	Window Sampler Boreholes
And Farming	Hand Auger Boreholes
Asbestos	Trial Pits

17.2 Groundwater Assessment

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 Claygate Group.

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;
- Consider level and extent of contamination close to underground ditch / culvert – See Section 11.2;
- 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 considered unlikely.

17.3 Land Gas Assessment

Considering the potential for Land Gas risks due to the potential made ground and infilled ground. 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 20 *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 general farming	Made Ground	Site Wide – generic soils	Land Gases - CO ₂ , CH ₄ .
Manure	Made Ground	Site Wide - generic	Land Gases - CO ₂ , CH ₄ .
Infilled pond	Infilled Materials	NE Corner	Land Gases - CO ₂ , CH ₄ , VOC's.

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 21 Vapour Risk Assessment - Response Zone

Feature	Targeted Response Zone	Location to Target	Vapour risk
Machinery Shed – On Site	Made Ground	Site wide	TPH's, Naphthalene, VOC's.
Infilled Pond – On Site			
Farming Uses – On Site			
Underground Fuel Tanks – Off Site		NE Corner	
Infilled Pond, (NE Corner)		Site wide	
Made Ground			

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.

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 22 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		
Human Health	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe	Recover samples of the made ground; Assessment of the underlying natural soils to consider contamination; Install Standpipes – Sample Culvert Water; Land Gas & Vapour Risk Assessment; Analysis of soil samples for GQRA Assessment; Reporting
Surface Water	✓	X	✓	Window Sampling - Soil sampling - Install standpipe	Recover samples of the made ground; Assessment of the underlying natural soils to consider contamination; Install Standpipes – Sample Culvert Water; Analysis of soil samples for GQRA Assessment; Reporting
Ground Water	X	X	X	No Action	
Services & Building	✓	✓#	X	Window Sampling - Soil sampling	Recover samples of the made ground; Land Gas & Vapour Risk Assessment; Analysis of soil samples for GQRA Assessment. Reporting
Geotechnical Assessment	N/A				

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.

APPENDIX ONE

CONCEPTUAL MODEL

Manor Farm Mott Street High Beach Loughton IG10 4AP

Site Specific Source-Pathway-Receptor - Proposed Site Use

Key

Purple

=Possible pathways

Green

=Possible receptors

Red

=Possible sources

Potential Pathways

Human Heath

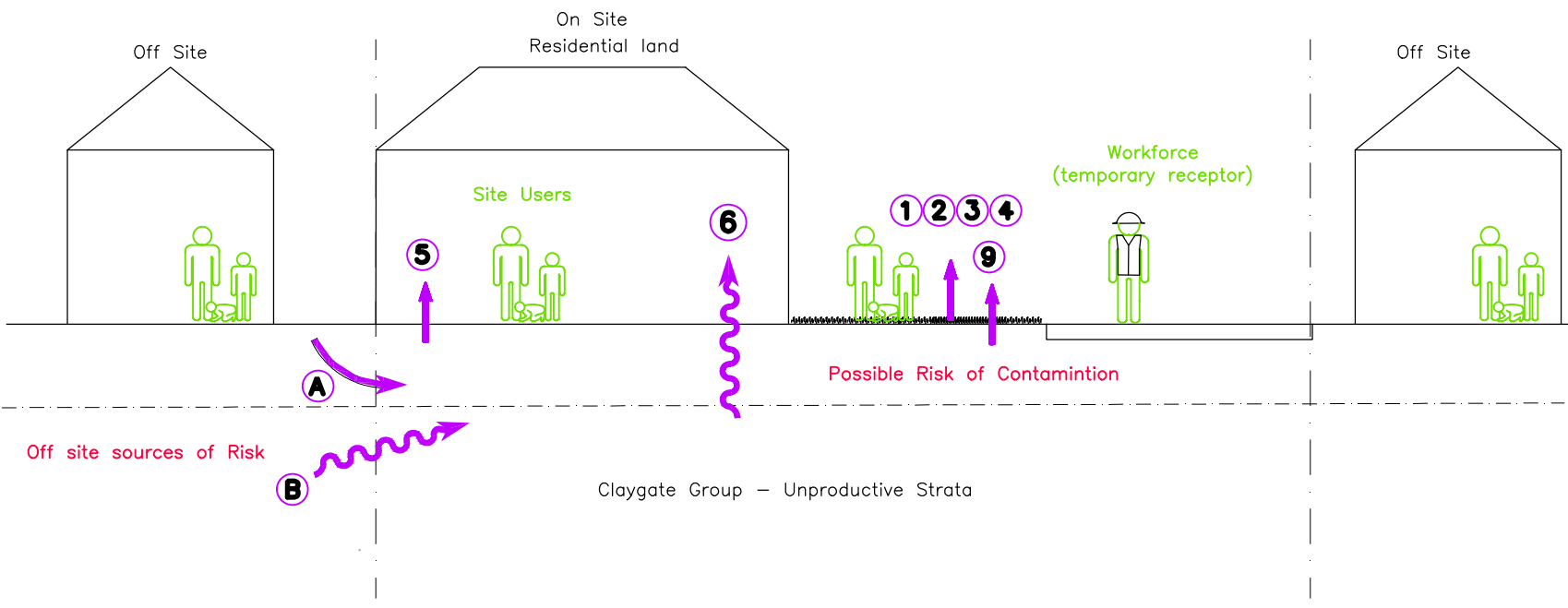
- 1 Direct contact with contaminants in soil/dust or water
- 2 Inhalation of contaminants through soil/dust/particles
- 3 Dermal Contact
- 4 Ingestion of home grown produce
- 5 Ingestion of contaminated water through water main pipework
- 6 Inhalation of Land Gas and Vapours
- 7 Inhalation of Vapours from Groundwater
- 8 Migration to off site Adjoining Land Owners

Flora

- 9 Plant Uptake & Direct Contact with soil
- 10 Leaching, lateral migration of shallow groundwater to a target receptor

Off Site Sources

- A Migration of contamination to the site area
- B Migration of land gases/ Vapours to the site area
- C Migration of contaminated groundwater to the site area



Sketch No: DTS/15147/01/01

APPENDIX TWO

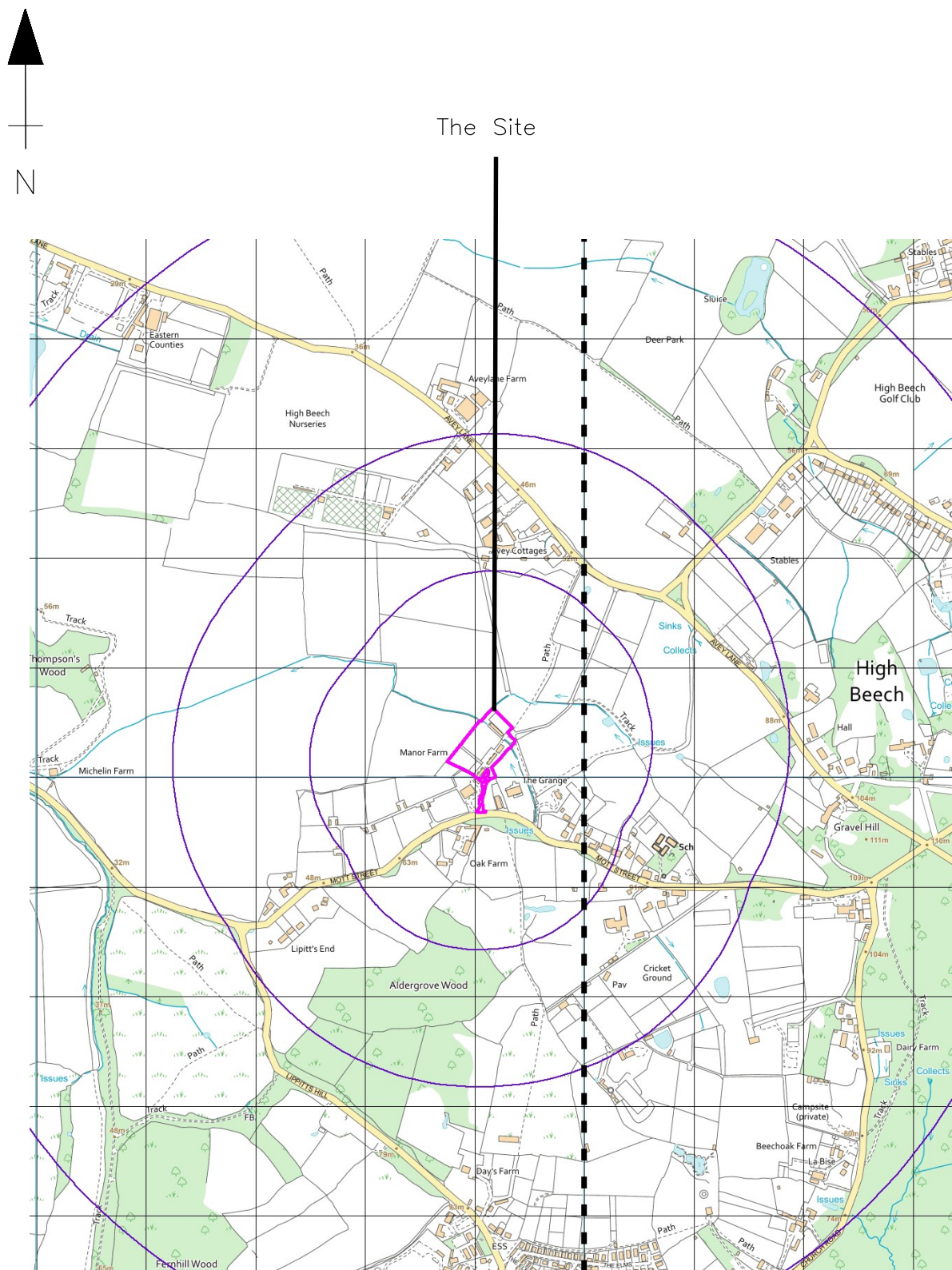
SITE PLANS

**THE OLD POST OFFICE, WELLPOND GREEN,
STANDON, WARE, HERTS, SG11 1NJ**

TELEPHONE 01920 822233
FAX 01920 822200

Appendix No. 2
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Date Jan 2019

Location Plan



Not To Scale
Sketch No: DTS/15147/02/01

HERTS & ESSEX SITE INVESTIGATIONS

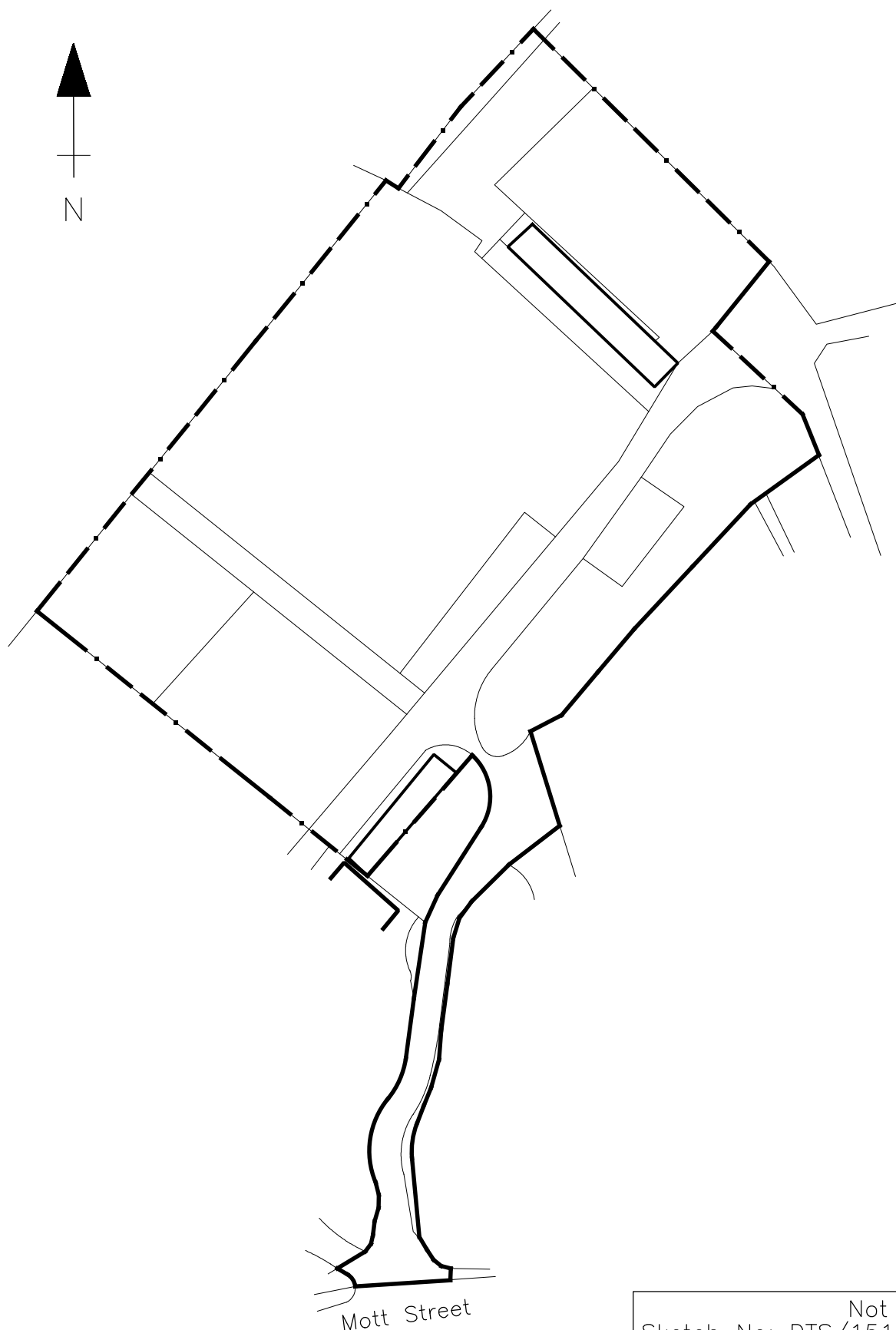
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STANDON, WARE, HERTS, SG11 1NJ

TELEPHONE 01920 822233
FAX 01920 822200

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Existing Site Plan



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HERTS & ESSEX SITE INVESTIGATIONS

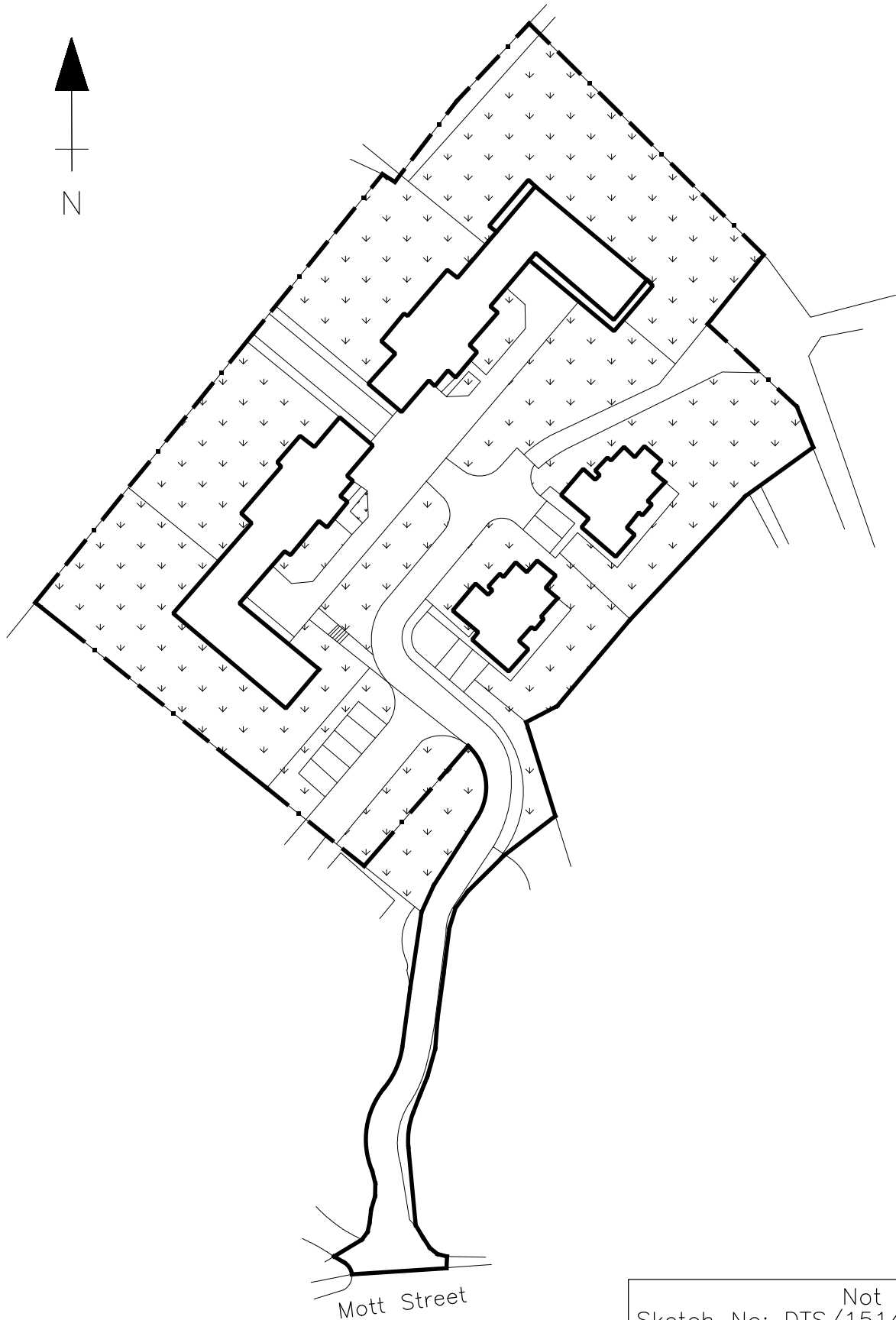
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STANDON, WARE, HERTS, SG11 1NJ

TELEPHONE 01920 822233
FAX 01920 822200

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Proposed Site Plan



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