



DESK TOP STUDY REPORT

Site Address:	Hillcrest and Tussocks, The Causeway, Therfield, Royston, SG8 9PP
Report Date:	August 2023
Project No.:	18232
Prepared for:	Hanson Services Ltd
Planning Application	North Herts Council



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LIST OF ABBREVIATIONS

BGS	British Geological Society
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
EHO	Environmental Health Officer
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 Envirocheck 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

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- 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.
- Non-Licensed Work with Asbestos Including>NNLW.
- Site Supervisors Safety Training Scheme, (SSSTS).
- First Aid Course in Construction – 3 Day Course – 3 years.
- CSCS Labourer Card.

Document Status and Approval Schedule

<i>Issue No</i>	<i>Status</i>	<i>Date</i>	<i>Prepared by: Rebecca Chamberlain Signature / Date</i>	<i>Technical review by: Chris Gray Signature / Date</i>
1	Final	August 2023		

SUMMARY

Client	Hanson Services Ltd		
Site Location	Hillcrest and Tussocks, The Causeway, Therfield, Royston, SG8 9PP		
Existing Development	Two residential dwellings		
Proposed Development	New residential dwellings		
Site Settings and Previous Uses	The site area is recorded as having a dwelling within the north of the site from the earliest map reference, open land was recorded within the south until about 1975 when a dwelling is also recorded in place with the garden forming part of the site area. These remain in place to date.		
	Surrounding the site to the east open agricultural land is in place, to the north and south of the site residential land is in place and remains in place. To the west from 1994 residential dwellings were developed. Further from the site to the south east, 20m, a burial ground is in place from the earliest map reference to present day. To the north west of the site area there was a chalk pit in place about 120 meters from the site, in a similar location a landfill site was also noted in place.		
Geological and Hydrological Profile	Geology		Aquifer Classification
	Made Ground	Shallow Made Ground Anticipated	Not Classified
	Lewes Chalk and Seafood Chalk Formation	Nodular Formation and Chalk	Principal Aquifer
Nearest Surface Water Feature	The nearest surface water feature is recorded as 4 meters to the southeast of the site which is recorded as a pond within the garden.		
Groundwater Abstractions	The nearest abstraction well is located 1564 meters to the north of the site which is recorded as an Environmental: Transfer between sources. No Potable Water Supplies are recorded within 1 km of the site.		
Source Protection Zone	The site lies within a Zone 3 Source Protection Zone.		
Potential Sources of Contamination	Features Off Site		
	Features On Site	• Burial Ground– S 10m • Chalk Pit • Possibly infilled– NW 120m • Historical Landfill Sites– NW 168m • Local Authority Recorded Landfill Sites– NW 174m • Potentially Infilled Land– NW 171m	
Previous Investigations	No reports relating to contaminated land are known to us at the time of writing this report relating to the site.		

Human Health Risk	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. Potential pathways in place within the site area recorded as : - • Dermal Contact. • Inhalation of dust and fibres. • Ingestion of home-grown produce. • Ingestion of dust and fibres • Ingestion of contaminated water through water main pipework. • Inhalation of vapours from soils. • Inhalation of vapours from Groundwater. • Inhalation Asbestos dust and fibres (from Asbestos within the building); • Inhalation Asbestos dust and fibres (from asbestos within the soil).
Ground Water Risk	Considering the Principal Aquifer within the site area there is a potential for groundwater to be in place and to be impacted on by the site area, although risks of contamination within the site area recorded as low, the follow pathways may be in place: - Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well; Leaching, lateral migration of shallow surface water system adjacent to the site.
Surface Water Risk	Considering the nature of the feature surrounding the site, the low risk from on-site sources and lack of controlled water features risk to the feature is reduced. 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.
Vapour Risk	Sources of contamination that may promote a vapour risk are recorded in place as such risk maybe in place. Potential pathways in place within the site area recorded as: - Inhalation of vapours from soils - Visual and chemical tests to be completed initially;
Land Gas Risk	Infilled land is recorded to the northwest of the site area, as well as a burial ground to the southeast. As such, this will have been infilled with potentially waste product and degradable materials and as such, the potential for contamination and land gas risk is in place. Based on this, we would confirm that additional information is needed to complete a risk assessment and a potentially 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.
Recommendations	• 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: - ◦ Install standpipe for the monitoring of both groundwater and land gas / vapour risks. • Targeted and spatial sampling to assess on site source risk. • Consideration through the site assessment as to the presence of Asbestos product within the site and subsoil within the site. • Assess the risk to and from the groundwater - Leachate testing and groundwater sampling if required. • 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. 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.

PRELIMINARY RISK ASSESSMENT – DESKTOP STUDY - PHASE 1 REPORT

1 Context and Objectives of this report

1.1 Introduction

We have been asked by Hanson Services Ltd 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.

The client is proposing to develop residential dwellings with gardens, as such the derivation of risk has been assigned as a 'Residential Land Use with Home-grown Produce'.

1.2 Reference to the Current Planning Application Details

No current application in place for this proposed development.

1.3 Decision Notice Relating to Contaminated Land

No decision notice is in place.

1.4 Report Objectives

The objectives of the project were as follows: -

- A review of the geological, hydrological and hydrogeological setting of the site, and public domain environmental information to build up an understanding of the site and its environmental setting/sensitivity.
- Review of historical land uses for the site and surroundings with a particular emphasis on identifying potential ground hazards and on-site and off-site contamination sources.
- A visual walkover inspection of the site to review current and recent site activities, the condition of the site, potential ground related hazards and activities or areas that might have the potential to cause ground contamination as well as possible indicators of contamination; and
- Preparation of a Conceptual Site Model (CSM) with a view to identifying potentially significant source-pathway-receptor linkages followed by a qualitative risk assessment.

1.5 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.

1.6 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.

1.7 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 residential area of Therfield near Roydon in Hertfordshire, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 2, Sheet 1.

Table 1 Site Detail

Site Address:	Hillcrest and Tussocks, The Causeway, Therfield, Royston, SG8 9PP
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Residential Land
Previous use of site, (if known)	As above
Grid Reference	NGR 533600, 237370
Site Area	0.58 Hectares
Local Authority	North Herts Council
Gradient of the site	The site slopes down to the west.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 4 meters to the east of the site area, where the Tykes Water is recorded as flowing to the north east.

2.2 Existing Site Use

The site area form two residential dwellings with driveways, gardens and outbuildings. Hillcrest in place across the north and Tussocks in place to the south.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

- To the north of the site area residential dwellings are in place.
- To the east of the site area open agricultural land is in place.
- To the south of the site area residential dwellings and a school are in place.
- To the west of the site area The Causeway is in place with residential dwellings beyond.

2.4 Site Reconnaissance

The site walk over visit was undertaken in May 2023 on which the weather conditions were recorded overcast.

Access

Driveways are in place off of The Causeway to the west of the site. These lead up to the dwellings. Once within the site free pedestrian access is in place.

Site Area

Within the north of the site Hilcrest is in place, this forms a two-storey dwelling with some single storey extension and conservatory. To the east of the dwelling a grassed front garden is in place which slopes down to the east. To the south of the dwelling there are some animal pens in place. To the rear, west, of the dwelling a driveway is in place laid to gravel, within this area there is a plastic heating oil tank in place on a concrete base. To the northern and eastern boundary there are out buildings in place forming private garages and storage sheds. These are block work structures with sloped roofs, formed by flat roofs and corrugated sheeting possibly asbestos. The floors of these buildings are concrete. Within the northeast of the site a glass house and storage of some building material is in place.

Within the south of the site area Tussocks is in place. The site area forms a section of the garden area surrounding the dwelling. A tarmac driveway leads on the site and up to the dwelling. The site area forms a grassed lawn area which slopes down to the west, some trees area in place across the area. No other features area in place within the site area.

Vegetation

Vegetation is in place in the form of grassed lawn and some small plant beds and some trees mainly within the southern section of the site. All plants were in a good state of health.

Above or below ground fuel or oil storage tanks

Within the northern section of the site there is a plastic heating oil tank in place on a concrete base, no staining was seen around the feature. To the east of the south section of the site, to the rear of the garage, there is a metal heating oil tank in place on plinths again no staining was seen in place and plant growth around the feature was not impeded. No features are present to suggest that any below ground fuel tanks would be in place within the site area.

Asbestos Containing Materials

Possible asbestos containing materials were reviewed on the outbuildings mainly within the northeast of the site area. We recommend that an asbestos survey of the building be carried out, if not done so already, prior to any further demolition or works on site. A full assessment for asbestos within any made ground will be required to fully consider risk from Asbestos.

Surrounding Area

To the east of the southern section of the site Tussock dwelling is in place, to the north of the dwelling there is a small tarmac and concrete parking area and a private garage in place. To the rear of the garage there is a heating oil tank in place on stilts above the ground. To the southeast of the dwelling there is a pond in place within a grassed lawn area, within the pond vegetation is in place the water was still and clear.

To the north and south of the site residential dwellings are in place, with a school also in place to the south of the site area.

To the east of the site are beyond the Tussock house there is agricultural land in place.

To the west of the site there is a road in place with large dwellings in place.

Site Levels and Ground Cover

The site area slopes down to the west as does the surrounding area.

The majority of the site is laid to soft landscaping grassed lawns, with some area of gravel and tarmac driveways.

Current site activities

The current site use forms residential land.

Effluent, Site Drainage and Services

Drainage and services are in place for the dwellings, although no service search is known to us, therefore the location condition nor status of these services is known.

2.5 Site Reconnaissance – Photos

Print 1



Print 2



Print 3



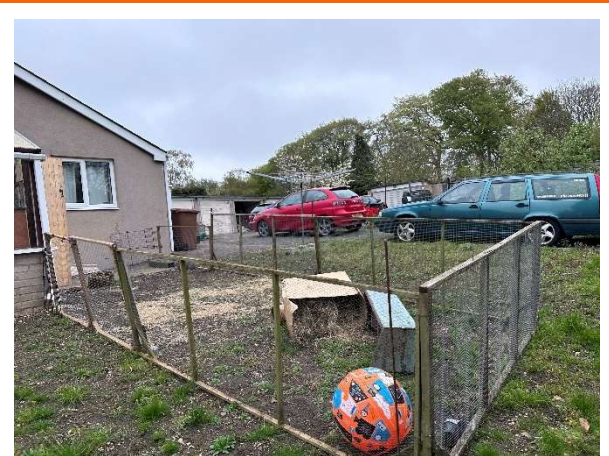
Print 4



Print 5



Print 6



Print 7



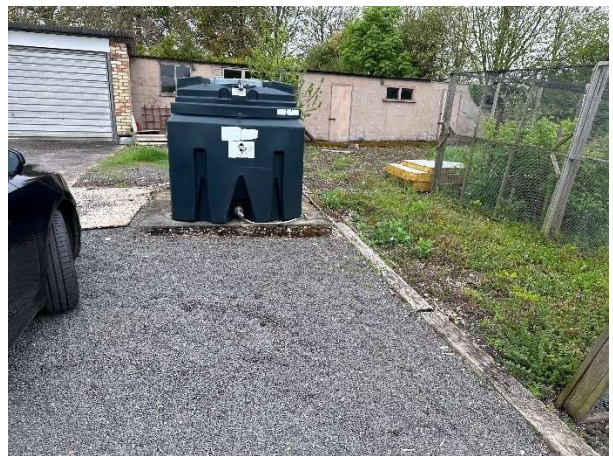
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Print 9



Print 10



Print 11



Print 12



Print 13



Print 14



Print 15



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Print 18



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Print 22



Print 23



Print 24



Table 2 **Walk Over Inspection Risk**

<i>Feature</i>	<i>Location</i>	<i>Elevation</i>	<i>Is Risk Present?</i>	<i>Location to Target</i>
Residential dwellings	On and Off site	At GL.	X	
Driveway	On Site		X	
Out buildings and private garages – possible asbestos	On site	At GL.	✓	
Heating oil tanks	On and Off site	At GL.	✓	

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's 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 Appendix 4. 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.

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**

<i>Date</i>	<i>On Site Feature</i>	<i>On Site Mitigation (considering all possible pathways)</i>	<i>Off Site Feature</i>	<i>Off Site Mitigation (considering all possible pathways)</i>
Date: 1877 Source Map Scale 1:2 500	Open Land - S	No sources	Open Land – E & W	No sources
			Residential land – N & S	Limited sources
			Pond – SE1m	No sources
	Residential land – N	Limited sources	Burial Ground – SE 20m	Possible Land Gas Risk
			School – S	Limited sources
			Chalk Pit – NW 120m	Limited sources
Date: 1882 Source Map Scale 1:10 560				
Date: 1898 Source Map Scale 1:2 500				
Date: 1899 Source Map Scale 1:10 560				
Date: 1924 Source Map Scale 1:2 500				
Date: 1925 Source Map Scale 1:10 560				
Date: 1947 Source Map Scale 1:10 560				
Date: 1960 Source Map Scale 1:10 560				

Table 4 **Historic Map Assessment - Continued.....**

<i>Date</i>	<i>On Site Feature</i>	<i>On Site Mitigation (considering all possible pathways)</i>	<i>Off Site Feature</i>	<i>Off Site Mitigation (considering all possible pathways)</i>
Date: 1975 Source Map Scale 1:2 500	Residential land - S	Limited sources	Dwelling – Tussocks - SE Chalk pit cutting no longer in place – NE 120m	Limited sources Possible Land Gas Risk
Date: 1984 Source Map Scale 1:10 000				
Date: 1993 Source Map Scale 1:2 500				
Date: 1994 Source Map Scale 1:2 500			Residential land – W	Limited sources
Date: 1999 Source Map Scale 1:10 000				
Date: 2006 Source Map Scale 1:10 000				
Date: 2023 Source Map Scale 1:10 000				

Table 5 **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 – S Off site – E & W	Pre 1877 – 1939 Pre 1877 – Present	X			No Source
Residential land	On Site – N - S Off site – N & S - W	Pre 1877 – Present 1975 – Present 1994 – Present	X			Limited Source
Pond	Off site – SE1m	Pre 1877 – Present	X			No sources and the feature remains' in place to date and may form a receptor
Burial Ground	Off site – SE 20m	Pre 1877– Present	✓	Possible Land Gas Risk	Risk Assessment Install Standpipes Land Gas / Vapour Assessments	This looks to be a well-established area, so depending on the time that has passed since the last burial and the number, risk of land gases may be in place.
School	Off site – S 1m	Pre 1877– Present	X			
Chalk Pit Possibly infilled	Off site – NW 120m	Pre 1877 – 1975 1975 – Present	✓	Possible Land Gas Risk	Risk Assessment Install Standpipes Land Gas / Vapour Assessments	The distance to this feature from the site and the time that has passed will reduce the risk.

5 *Details of the Intended Future Use of the Site*

The proposal for the site is to develop residential dwellings (8 no) across the site area with a main driveway and parking area to the centre of the site. Private gardens and soft landscaping is also proposed.

6 *References of Planning Applications*

No current planning application is in place for the site area.

From a review of the North Herts Council website historical applications are in place mainly for felling of trees, and the extensions added to Hillcrest within the north of the site, submitted in 1987 and 2006 No additional information is recorded online.

7 *Discussion with Local Authority*

No discussion with the Local Authority has been completed.

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*

Limited consultation with the Local Authority has taken place a review of the online planning files has been made. No other local sources of information were available at the time if the walk over. This forms the level of assessments made.

10 *Previous Reporting*

No previous reports are known to us at the time of writing this report.

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 of Lewes Nodular Chalk Formation and Seaford Chalk Formation. No superficial deposits are recorded within the site area.

11.2 *BGS Boreholes*

No BGS Boreholes are reported surrounding the site.

Table 6 **Geological Information**

<i>Geological Unit</i>	<i>Brief Description</i>	<i>Anticipated thickness, (m)</i>	<i>Aquifer Type</i>
Superficial Deposits/Drift On Site			
Filled/Re-worked ground	Made Ground, (Potentially Contaminated Stratum).	0.5-1.00 meters+	Not Classified
Solid Geology Deposits			
Lewes Formation Chalk Formation	Nodular and Seaford Chalk	15m +	Principal Aquifer

11.3 Hydrology

The nearest surface water feature is recorded as 4 meters to the southeast of the site which is recorded as a pond within the garden.

No controlled surface water features are recorded within 500 meters of the site.

A discharge consents is recorded within the site area until 1996 for Sewage Discharges - Final/Treated Effluent - Not Water Company.

No pollution incident to controlled waters are recorded within 800 meters of the site area.

11.4 Hydrogeology

The published Environment Agency Groundwater Vulnerability Map of the area indicates the site to be located within an area classified as a principal aquifer within the chalk.

Principal aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands.

The nearest abstraction well is located 1564 meters to the north of the site which is recorded as a Environmental: Transfer between sources. No Potable Water Supplies are recorded within 1 km of the site.

The site lies within a Zone 3 Source Protection Zone.

11.5 Implication of groundwater

Considering the underlying principal aquifer, groundwater links are possible and therefore some degree of assessment will be required to classify the extent of risk to a groundwater system, as well as abstraction wells, surface water features and source protections zones surrounding the site area.

In accordance with Environment Agency guidance document: -

- The Environment Agency's approach to groundwater protection, Version 1.2, (February 2018).

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 takes into account 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 Low.

11.6 Flooding

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

11.7 Landfill Sites

A historical landfill site is recorded 165 meters to the northwest of the site area limited information is recorded about the time scales and input waste.

Potentially Infilled land has been identified as in place some 174 meters to the northwest from 1984 of the site which may relate to the chalk pit noted within the historical maps.

11.8 Environmentally Sensitive Sites

Surrounding the site area, no environmentally sensitive receptors are recorded in place.

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

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Principal Aquifer	Low	Possible ground water in place within the chalk, although likely to be at depth.
Water Abstraction	Environmental: Transfer between sources	Low	The nearest abstraction well is located 1564 meters to the north of the site which is recorded as Environmental: Transfer between sources. No Potable Water Supplies are recorded within 1 km of the site.
Source Protection Zone	Zone 3	Low	
Surface Water	Pond	Low	The nearest surface water feature is recorded as 4 meters to the southeast of the site which is recorded as a pond within the garden.
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 Envirocheck data provided within Appendix 5. The salient points recorded within this data are re-created below.

Table 8 **Summary of Regulatory Data - Sources**

<i>Data Sources</i>	<i>On Site</i>	<i>Off Site</i>	<i>Distance from site.</i>	<i>Is potential risk in place?</i>
Discharge Consents	Sewage Discharges - Final/Treated Effluent - Not Water Company – inactive		On site	X
Historical Landfill Sites	None	Therfield Tip, Hitchin, Hertfordshire	NW 165m	✓
Local Authority Recorded Landfill Sites	None	Therfield Tip, Hitchin, Hertfordshire	NW 168m	✓
Potentially Infilled Land	None	Unknown Filled Ground (Pit, quarry etc)	NW 174m	✓
BGS Recorded Mineral Sites	None	Opencast - White Chalk Subgroup	NW 171m	X
Radon Potential - Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions			X

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

<i>Data Receptors</i>	<i>On Site</i>	<i>Off Site</i>	<i>Distance from site.</i>	<i>Is potential risk in place?</i>
Nearest Surface Water Feature	None	Pond	SE 4m	✓
Water Abstractions	None	Environmental: Transfer between sources	N 1564m	X
		Domestic & Agriculture	W 1780m	X
OS Water Network Lines	None	Inland river	S 238m	X
Source Protection Zone	Zone 3		On Site	✓

Table 10 **BGS Estimated Chemistry Data**

<i>BGS Estimated Soil Chemistry Pollutant</i>	<i>BGS Estimated Soil Chemistry</i>
Arsenic	<15
Cadmium	<1.8
Chromium	60-90
Lead	<100
Nickel	30-45

Considering the background concentrations present, Potential for human health risk is not anticipated within this area.

Table 11 Geological Hazards

<i>Geological Hazard</i>	<i>Distance & Direction</i>	<i>Feature</i>	<i>Risk Assessment Required</i>
Non-Coal Mining Areas of Great Britain	On Site		Rare
Natural Cavities	Off site – 173m	Solution Pipe x 6	Solution feature report is recommended
Collapsible Ground	On Site		Very Low
Compressible Ground	On Site		Negligible
Ground Dissolution Features	On Site		Very Low
Landslide	On Site		Very Low
Running Sand	On Site		Very Low
Shrinking or Swelling Clay	On Site		Low

Table 12 Summary of Contemporary Trade Entries

<i>Trade Name</i>	<i>Trade Use</i>	<i>Distance & Direction from Site</i>	<i>Is potential risk in place?</i>	<i>Comment</i>
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No trades are recorded surrounding the site (See Envirocheck Data)

*NB 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 14: -

Table 13 Table of Source Risk

Risk Assessment	Source Risk	Source of Information	Location	Date	Considering Site Specific Pathways	
					Assessment Required.	Method of Assessment
A	On Site Features					
	Out buildings and private garages – possible asbestos	Walk Over Survey	On Site		Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments
	Heating oil Tank	Walk Over Survey	On Site			
B	Off site Features					
	Burial Ground	Historical Maps	Off site – S 1m	Pre 1877– Present		
	Chalk Pit Possibly infilled	Historical Maps	Off site – NW 120m	Pre 1877 – 1975 1975 – Present		
	Historical Landfill Sites	Envirocheck Data	Off site – NW 168m		Possible Land Gas Possible Vapour Risk	Install Standpipes Land Gas Assessment Vapour Assessments
	Local Authority Recorded Landfill Sites	Envirocheck Data	Off site – NW 174m			
	Potentially Infilled Land	Envirocheck Data	Off site – NW 171m			

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
Out buildings and private garages – possible asbestos Heating oil Tank	TPH'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	
			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	Unlikely	Low	No sources in place	
			Inhalation of vapours through contaminated ground waters	Medium	Low Likelihood	Moderate / Low	Limited risk in place	
		Adjoining Landowners	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	Low Likelihood	Moderate / Low	Limited risk in place
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Low Likelihood	Moderate / Low	Limited risk in place	
		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	Low Likelihood	Moderate / Low	Limited risk in place	
	Ground Water. Abstraction Well.		Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Low Likelihood	Moderate / Low	Limited risk in place	
	TPH's	Buildings. Construction Materials. Services	Direct contact with contaminated soils;	Medium	Likely	Moderate	Possible risk in place	
			Direct contact with contaminated groundwater	Medium	Low Likelihood	Moderate / Low	Limited risk in place	

Table 16 Risk Assessment B

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Proposed Site Use Risk Assessment		
					Likelihood of occurrence	Potential Risk	Notes
Off site Burial Ground– S 10m Chalk Pit Possibly infilled– NW 120m Historical Landfill Sites– NW 168m Local Authority Recorded Landfill Sites– NW 174m Potentially Infilled Land– NW 171m	TPH's Land Gases CO ₂ & CH ₄	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact	Medium	Unlikely	Low	Distance from the site reduces risk
			Ingestion of home-grown produce	Medium	Unlikely	Low	Distance from the site reduces risk
			Ingestion of contaminated water through water main pipework	Medium	Unlikely	Low	Distance from the site reduces risk
			Inhalation of vapours	Medium	Low Likelihood	Moderate / Low	Possible risk in place
			Inhalation of land Gases	Medium	Low Likelihood	Moderate / Low	Possible risk in place
		Adjoining Landowners	Inhalation of vapours through contaminated ground waters	Medium	Low Likelihood	Moderate / Low	Possible risk in place
			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.	Medium	Unlikely	Low	No Action
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
		Flora	Plant Uptake Direct Contact				
		Asbestos	Inhalation dust and fibers (from Asbestos within the building)	Severe	Unlikely	Moderate / Low	No buildings in place
			Inhalation dust and fibers (from asbestos within the soil)				No Action - Distance removes risk
	Metals Metalloids PAH's	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact;	Medium	Unlikely	Low	Distance from the site reduces risk
			Ingestion of home-grown produce	Medium	Unlikely	Low	Distance from the site reduces risk
		Controlled Surface Water; Ground Water. Abstraction Well.	Leaching, lateral migration of shallow groundwater to a target receptor.	No liability from third parties			
			Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
	TPH's Naphthalene	Buildings. Construction Materials. Services	Direct contact with contaminated soils;	Medium	Unlikely	Low	Distance from the site reduces risk
			Direct contact with contaminated groundwater	Medium	Unlikely	Low	Distance from the site reduces risk

Table 17 Overview of Risk Assessments - Proposed Site Use

		A	B
Receptors	Pathways		Off site Burial Ground– S 10m On site Chalk Pit Possibly infilled– NW 120m Out buildings and private garages – possible asbestos Historical Landfill Sites– NW 168m Heating oil Tank Local Authority Recorded Landfill Sites– NW 174m Potentially Infilled Land– NW 171m
	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	✓	✓
Site Users	Inhalation of vapor from contaminated ground waters	✓	✓
	Inhalation of land gas vapours	X	✓
	Inhalation Asbestos dust and fibers (from Asbestos within the building)	✓	X
	Inhalation Asbestos dust and fibers (from asbestos within the soil)	✓	X
Adjoining Owners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	✓	No Liability from third parties
	Ingestion of home-grown vegetation	✓	
	Ingestion of contaminated water through water main pipework	✓	
	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.	✓	No Liability from third parties
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ	✓	
Buildings	Direct contact with contaminated soils.	✓	X
	Direct contact with contaminated groundwater	✓	✓

*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

Risk Assessment	Land Use	Pollutant
Soil, Groundwater & Vapour Risk		
A	Out buildings and private garages – possible asbestos	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), CO ₂ , CH ₄ .
	Heating oil Tank	
Soil Sampling Groundwater & Vapour Assessment		
B	Off site	
	Burial Ground– S 10m	Groundwater & Vapour Risk
	Chalk Pit	
	Possibly infilled– NW 120m	Speciated PAH's, (EPA Priority 16), Phenols, Asbestos, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band), Naphthalene, CO ₂ , CH ₄ .
	Historical Landfill Sites– NW 168m	
Spatial Sampling, (General Assessment)	Local Authority Recorded Landfill Sites– NW 174m	Groundwater & Vapour Assessment
	Potentially Infilled Land– NW 171m	
		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. BS3882:2015
		25-meter Centres In accordance with BS10175: 2011+A2:2017.
		5-10-meter Centres In accordance with BS10175: 2011+A2:2017.
		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.

The assessment of the site proposed in this report and the following recommendations which are detailed below have been prepared in accordance with key guidance documents as follows: -

- National Planning Policy Framework.
- British Standards 10175:2011+A2:2017
- Land contamination risk management (LCRM)
- Contaminated Land Report, (CLR11) 11, 'Model Procedures for the Management of Contaminated Land', (2004).
- DEFRA: Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, (April 2012)
- Environment Agency, (2010) GPLC1 Guidance Principles for Land Contamination.

The investigation is proposing to undertake the following at the site: -

- Determine the ground and groundwater conditions.
- Determine if there are any obstructions such as old service and foundations, buried tanks, etc.
- Complete a land gas risk assessment using RB17 A Pragmatic Approach to Ground Gas Risk Assessment (2012).
- Install gas, vapour and groundwater monitoring well installations and monitor the levels of groundwater, gas and vapours, if required.
- Obtain samples of the made ground, natural soils and groundwater for contamination testing at targeted site-specific designed locations. Test soil and groundwater samples for a range of contaminants, as identified in Table 18.
- Obtain samples of soil to test for vapours contaminants, as identified in Table 18.
- Visually appraise soils to consider olfactorily or visual presence of contamination factors, risk, vapours or fragments.
- All laboratory testing should be completed to MCERT/UKAS accredited standard.
- All detection limits provided by chemical laboratories must fall below the set screening values

17.1 Soil Assessment

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.

Based on the site area and size of the site, (approximately 5800 m²), we would recommend that the site should be subjected to a sampling density of between 15-20 meter grid pattern or moderate risk pollutants which is broadly in line with that proposed by 10175:2011+A2:2017 and offers a greater density sampling pattern of 10-15 meter grid pattern for high risk pollutant such as Asbestos. As such, we can confirm that a likely 14-23 samples will be required across the site to provide a 'good' spatial density and an additional 35 - 44 sample locations being tested for Asbestos.

Having note the above the majority of the site was recorded as open land and then residential with no features in place. The risks within the site are targeted as noted below and therefore the density of testing could be reduced in area where no risk are in place.

Table 19 **Soils Assessment - Targeted Sampling**

<i>Feature</i>	<i>Contaminant</i>	<i>Method of Investigation</i>
Out buildings – possible asbestos sheeting	Metals, Semi Metals, PAHs, TPHs, Asbestos	Window Sampler Boreholes Hand Auger Boreholes
Heating oil Tanks	TPHs	Trial Pits

Table 20 **Soils Assessment – Spatial Sampling**

<i>Feature</i>	<i>Contaminant</i>	<i>Method of Investigation</i>
Made Ground	Metals, Semi Metals, PAHs, TPHs, Asbestos	Window Sampler Boreholes Hand Auger Boreholes Trial Pits

Upon completion of on-site sampling and the associated chemical analysis, the soil data will be compared against the Generic Assessment Criteria derived by AtRisk Soils which has been purchased as a reviewing standard. This has been prepared by Atkins as Soil Screening Values, (SSV's). Additionally, values will be adopted for screening values using LQM / CIEH – Sutable 4 Use Levels in the absence of Atkins adopted values.

17.2 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: -

The Geology within the site should be confirmed.

- The depth of the Geology within the site should be assessed and if ground water is encountered or has the potential to be in place, some assessment of the risk to groundwater and surface water features should be carried out as well as potential human health risk from vapours.
 - Considering the size and nature of the site, the groundwater elevation may be perched at locations and as such, strikes may be local to lenses or pockets of more permeable ground in order to provide surface water runoff.

Standpipes should be installed across the site, in order to orientate the groundwater table to identify groundwater flow direction. Three standpipes should be installed for groundwater assessment such that orientation of the groundwater table can be undertaken.

- We would recommend that the installation of the boreholes at the site should be completed in order to determine the groundwater elevation. The boreholes should be left for a minimum period of one week in order to allow the groundwater to reach equilibrium at which time, purging of the standpipe well should be completed to consist of a minimum of 3 well volumes removed from the standpipes prior to samples being recovered. Sampling of the groundwater can be completed and retained in appropriate containers dependent upon the analysis proposed. The sample should then be sent to the analytical chemist for assessment in appropriate transport conditions.

- It is possible that groundwater assessments may require extending the standpipes through any superficial deposits suggested by the Envirocheck report. The Chalk aquifer is the principal aquifer in which assessments should be completed.
- Considering the size and nature of the site should ground water risk be recorded within the site area each borehole should be sampled and tested for the range of pollutants as identified within this report. The potential risks should be initially assessed against the UK Drinking Water standard as a Tier 1 assessment Criteria with possible further assessments required where heavy contamination or risk deemed in place. Groundwater samples should be compared against the EQS standards, (Environmental Quality Standards).
- The assessment of groundwater will also be used to consider the risks to surface water features and whether the site may impact of this feature.
- Risk assessments A, should be tested for so the extent of pollutants can be identified within the groundwater sample.

17.3 Land Gas Assessment

Considering the potential for Land Gas risks due to the potential infilled chalk pit with the north west of the site 120 meters and the burial ground to the south east of the site, 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

Feature	Targeted Response Zone	Location to Target	Gas risk
Burial Ground– S 10m	Made Ground	Site Wide	Land Gases - CO ₂ , CH ₄ .
Chalk Pit Possibly infilled– NW 120m	Made Ground / Chalk	Site Wide	Land Gases - CO ₂ , CH ₄ .
Historical Landfill Sites– NW 168m	Made Ground / Chalk	Site Wide	Land Gases - CO ₂ , CH ₄ .
Local Authority Recorded Landfill Sites & Potentially Infilled Land– NW 171m	Made Ground / Chalk	Site Wide	Land Gases - CO ₂ , CH ₄ .

Infilled land is recorded in place off site, although, we would suggest that an assessment of risk could be completed using RB17 A Pragmatic Approach to Ground Gas Risk Assessment (2012). The surrounding land is primarily residential and as such, a pragmatic approach is deemed most suitable for the site and if risk confirmed, additional more intrusive assessments completed.

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**

<i>Feature</i>	<i>Targeted Response Zone</i>	<i>Location to Target</i>	<i>Vapour risk</i>
Heating oil Tank	Made Ground	Around the feature	TPH's, Naphthalene, PCB's, BTEX. MTBE, VOC's
Infilled land	Made Ground / Chalk	Migration onto the site	TPH's, Naphthalene
Burial Ground	Made Ground / Chalk	Migration onto the site	TPH's, PCB's, VOC's

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
	Assessment of: Soils	Vapour and Gas	Ground Surface Water and		
Human Health	✓	✓	✓	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 GQRA Assessment. Reporting
Surface Water	✓	✓	✓	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 GQRA Assessment. Reporting
Ground Water	✓	✓	✓	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 GQRA Assessment. Reporting
Services & Building	✓	✓ #	X	Window Sampling - Soil sampling	Recover samples of the made ground. Vapour Risk Assessment. Groundwater Assessment. Analysis of soil samples for GQRA Assessment. Reporting
Geotechnical Assessment	✓	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.

APPENDIX ONE

CONCEPTUAL MODEL

Hillcrest & Tussocks, The Causeway, Therfield, Royston, SG8 9PP

Site Conceptual Model - Proposed Site Plan

Potential Pathways

Human Health

- 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 Gases / Vapours From Soils
- ⑦ Inhalation of Vapours from Groundwater
- ⑧ Migration to off site Adjoining Land Owners

Flora

- ⑨ Plant uptake & direct contact with soil

Controlled Surface Water, Ground Water & Abstraction Well

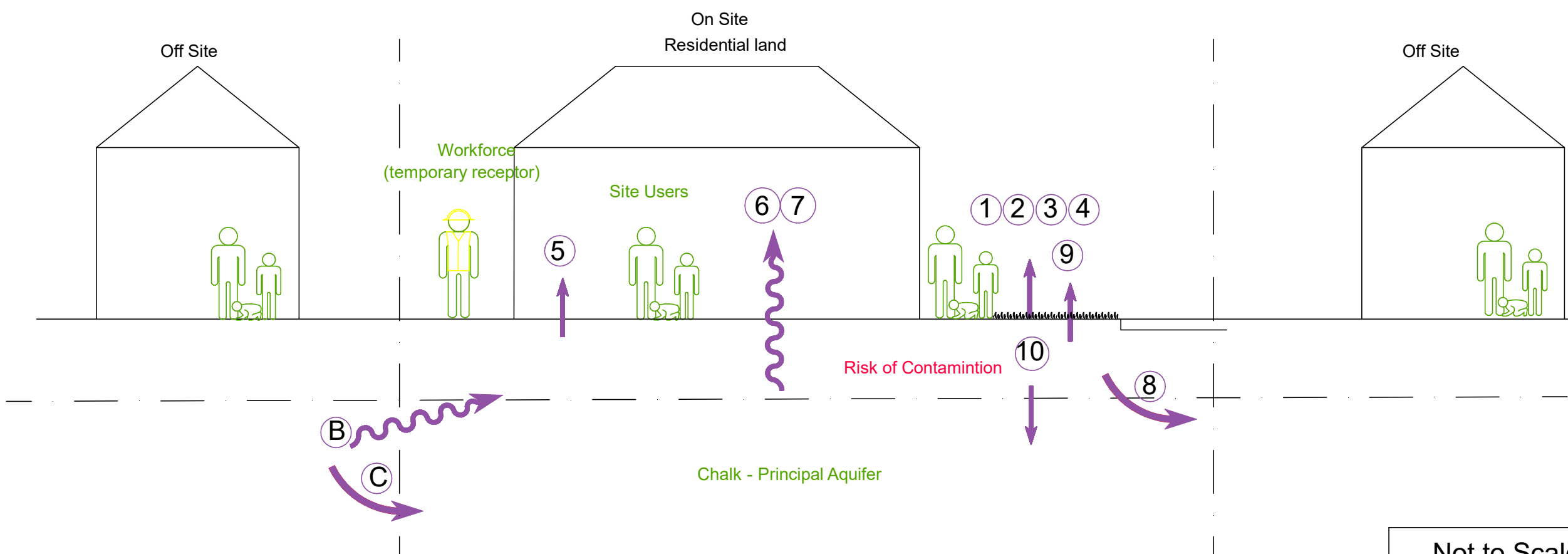
- ⑩ Leaching, lateral migration of shallow groundwater to a target receptor

Off Site Sources

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

Key

Purple =Possible pathways
Green =Possible receptors
Red =Possible sources



Not to Scale
Sketch No. : DTS / 18231 / 01 / 01

APPENDIX TWO

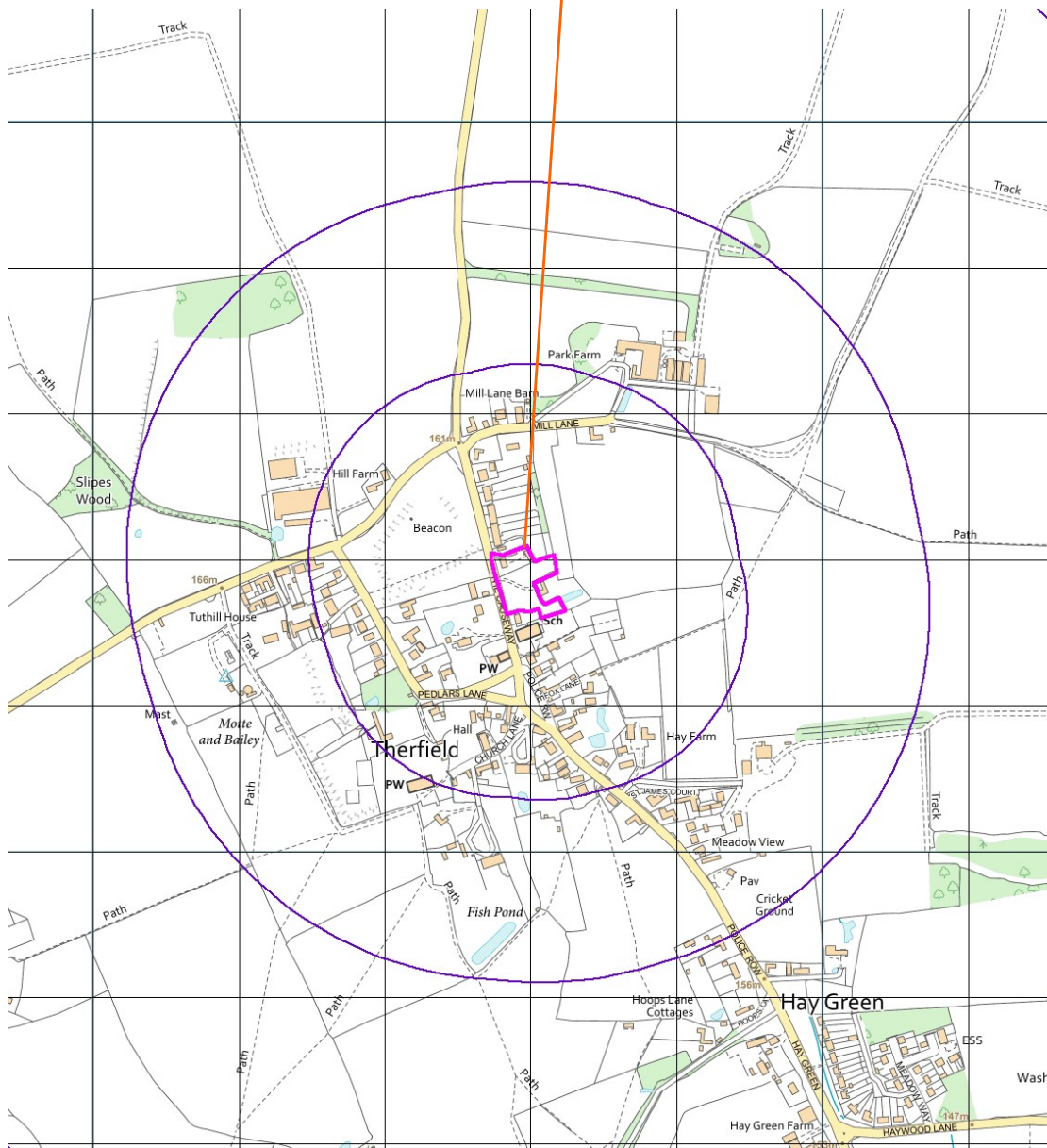
SITE PLANS

Hillcrest & Tussocks, The Causeway, Therfield, Royston, SG8 9PP

Location Plan

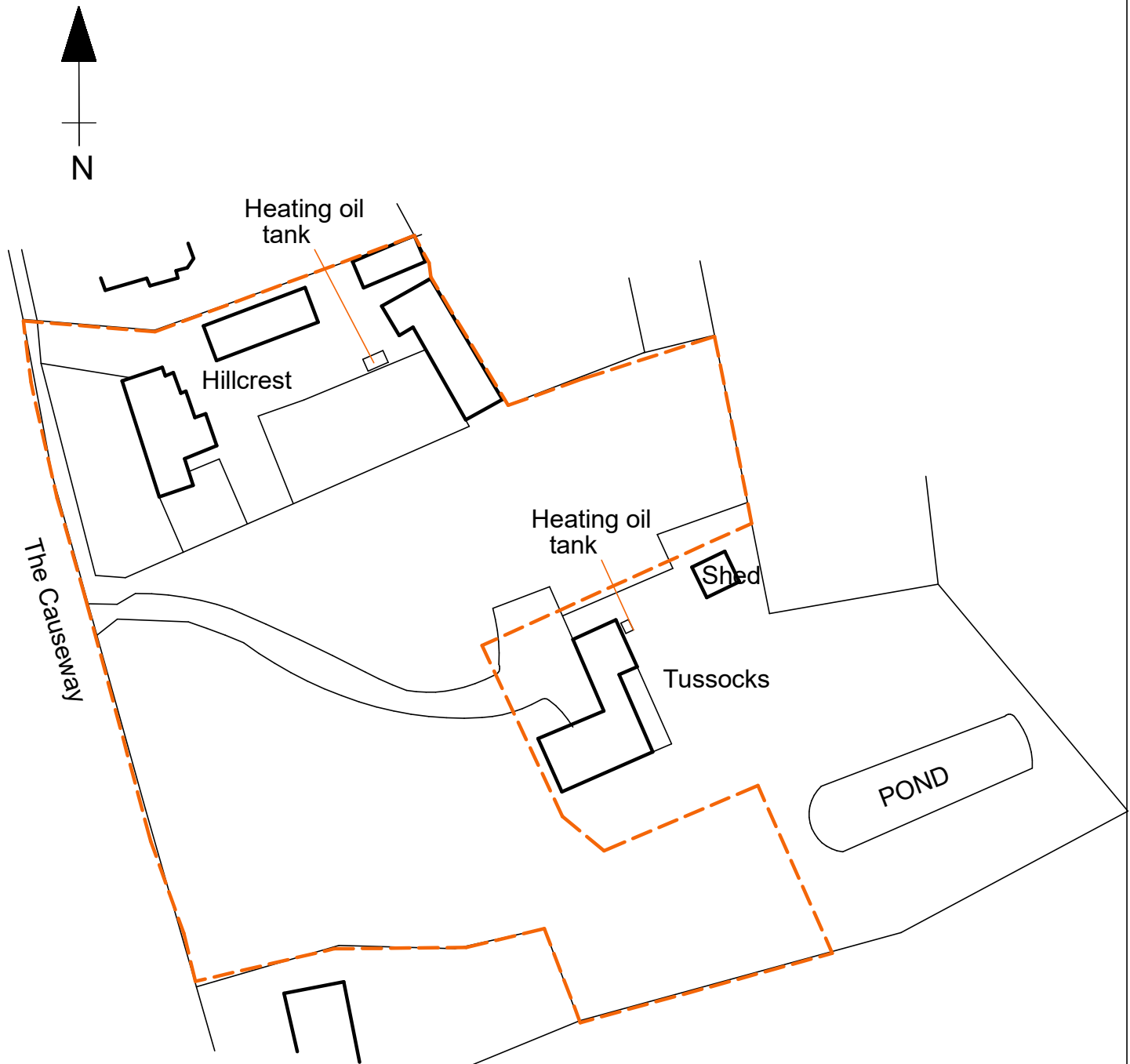


Site Plan



Hillcrest & Tussocks, The Causeway, Therfield, Royston, SG8 9PP

Existing Site Plan



Hillcrest & Tussocks, The Causeway, Therfield, Royston, SG8 9PP

Proposed Site Plan

