GROUND CONTAMINATION INVESTIGATION AND ASSESSMENT

PHASE 1 - DESK STUDY

at

77 Woodgate Road,
Moulton Chapel
PE12 0XF



frontispiece – view from road with house on left and greenhouse on right

Planning Authority:	South Holland DC
Planning Application No.:	H13-0162/14
LSCo Project Number:	61 023
Status of Report:	FINAL
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Report on:	Phase 1 Desk Study
Report at:	77 Woodgate Road, Moulton Chapel PE12 0XF
Report for:	Ricky Baker, 1a Willesby Road, Spalding PE11 2AX
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EXECUTIVE SUMMARY

LSCo Project:	61 023
Planning reference:	
Site:	77 Woodgate Road, Moulton Chapel PE12 0XF [5]29205 [3]17690
Dimensions and area:	25 m fronting on east side onto road, back by 40 m
Geographical location:	On flat ground
Geology and hydrogeology:	Tidal Flat Deposits
Hydrology:	Ditch along west boundary
Current description:	Unoccupied house and garden with large greenhouse and metal-clad shed
Former use:	Residential with large greenhouse for commercial growing
Proposed use:	Residential with gardens
Work undertaken:	Phase1 Desk Study
Sources:	Heating oil AST nearby, no ash, no asbestos/cement roofing, no chemical stores, no fly-tipping
Receptors:	Residents with vegetable uptake
Pathways:	Generic direct exposure, no sub-surface migration
Recommendations:	None required

1. INTRODUCTION

1.1 Background

It is proposed to redevelop the garden of 77 Woodgate Road, Moulton Chapel, with two detached residences.

The Environmental Protection Act 1990 stated that any site that has the potential to be contaminated from current or previous use should have that potential assessed with respect to causing harm to human health or controlled water.

The property has been used for commercial growing (*i.e. Small Holding*), which is classified as an industrial site and therefore has the potential to cause contamination. Condition 6 of the planning permission given (H13-0162-14) specified that the risk of contamination be assessed.

At the request of Mr. R. Baker, developer, a contaminated land investigation was undertaken to assess the potential for contamination at the site that could affect the proposed development.

1.2 Objectives

The method of risk assessment that is consistent with the UK environmental legislation and policies, including the planning process, is set out in the CLR11 document and comprises of three stages of increasingly detailed and therefore, more site specific, risk assessment:

- Preliminary;
- Generic quantitative; and then
- Detailed quantitative.

This report contains the findings from the Phase 1 - Desk Study, undertaken as part of the Preliminary Risk Assessment and following the guidance notes and to the standards set out in references below.

The factors that can affect the condition of the ground at the site are considered in sections 2 and 3. They are brought together in section 4 and are represented by constructing a preliminary site-specific Conceptual Exposure Model (CEM) which is then be used in section 5 to make a Qualitative Risk Assessment (QIRA) for the proposed development.

1.3 Limitations

LSCo Geo Consulting has prepared this report solely for the use of the client and/or his agent on the basis of exchange of proposals and instructions, and LSCo Geo Consulting accepts no responsibility or liability for use of this report by any party other than the person for whom it was commissioned, or for the consequences of the report being used for any other purpose other than that for which it was commissioned.

Should any third party wish to use or rely on the contents of the report, written approval should be sought. It is strongly recommended that independent advice is sought by that third party with respect to its specific proposals or requirements.

The conclusions and recommendations in this report represent our professional opinion, derived from currently accepted industry practices, exercising all reasonable skill and care to be expected of a professional engineering and environmental consultancy of similar size and experience. The assessments and judgements given in this report are directed by both the finite quantity of data on which they are based and the proposed works to which they are addressed, taking account of the resources devoted to it by agreement with the client or agent, whether in writing or subsequent verbal instructions.

Environmental Desk Studies comprise a study of readily available information obtained from various identified sources, authorities and parties. The information reviewed is not exhaustive and is accepted in good faith as providing representative and true data pertaining to site conditions.

Any identified risks in Desk Study reports are 'perceived risks' based on the information available at that time. Actual risks can only be assessed after carrying out a physical intrusive investigation.

1.4 Information sources used

The following sources of information were used to compile this report:

- in-house research procedures;
- interviews with current and former owners; and
- local and archive knowledge.

1.5 References

BS10175:2011	*Investigation of contaminated land*
BS5930:1999	*Code of practice for site investigations*
EA P5-065/TR:2000	*Technical aspects of site investigation*
EA P5-066/TR:2000	*Secondary model procedure for the development of appropriate soil sampling strategies for contaminated land*
EA TR20:1999	*Methodology for the development of remedial targets for soil and groundwater to protect water resources*
EA/NHBC R&D Report 66:2000	*Guidance for the safe development of housing on land affected by contamination*
EA TR P336 (BR414)	*Protective measures for housing on gas-contaminated land*
EA R&D Publication 8:1997	*The physical properties of major aquifers in England and Wales*
EA R&D Publication 68:1997	*The physical properties of minor aquifers in England and Wales*
DEFRA CLR 1-12	*CLR reports*
DEFRA TOX1-10	*Toxicology reports*
CIRIA SP103:1995	*Remedial treatment for contaminated land - site investigation and assessment*
DoE Profiles:1995	*Guidance on industry specific contaminants*
Inst. Petroleum 1998	*Guidelines for the investigation and remediation of petroleum retail sites*
BR211:1999	*Radon: guidance on protective measures for new developments*
BR212:1991	*Construction of new buildings on gas contaminated land*
LQM:2002	*Contaminated land management*
QRA field guides	*Descriptions of shallow soil environments*

1.6 Definition of terms

AST/UST:	Aboveground/Underground Storage Tank
Bgl:	below ground level
Conceptual Model:	Textual and/or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the Preliminary Investigation and refined during subsequent phases of the investigation which is an essential part of the \Risk Assessment.
Contamination:	The presence of a substance which is in, or under land, and which has the potential to cause harm or to cause pollution of controlled water
Controlled Water:	Inland freshwater (any lake, pond or water course above the freshwater limit, water contained in underground strata and any coastal water between the highest tide or freshwater limit to the three mile limit of territorial waters.
Harm:	Adverse affect of the health of living organisms, or other interference with ecological systems of which they form part, and, in the case of humans, including property
Hazard:	Inherently dangerous quality of a substance, procedure or event.
Pathway:	Mechanism or route by which a contaminant comes into with, or otherwise affects, a receptor
Pollution linkage:	A complete source/pathway/receptor scenario
Receptor:	Persons, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by the contaminants.
Risk:	Probability of the occurrence of, and magnitude of the consequences of, an unwanted adverse affect of the receptor
Risk Assessment:	Process of establishing, to the extent possible, the existence, nature and significance of the risk
Significant harm:	Defined in Draft Circular on Contaminated Land, DETR 2000
Source:	Location from which contamination is, or was, derived

2. SITE PERSPECTIVE

2.1 Location

Moulton Chapel is a Fenland village located along the B1357 Roman Road, some 3 km east of Cowbit and 6 km southeast of Spalding.

The region is one of open flat farmland, crossed by drainage dykes and ditches.

The site is centred on OS Coordinates $^{5}29205$ $^{3}17690$ and is on flat land at approximately 2.8 m AOD.

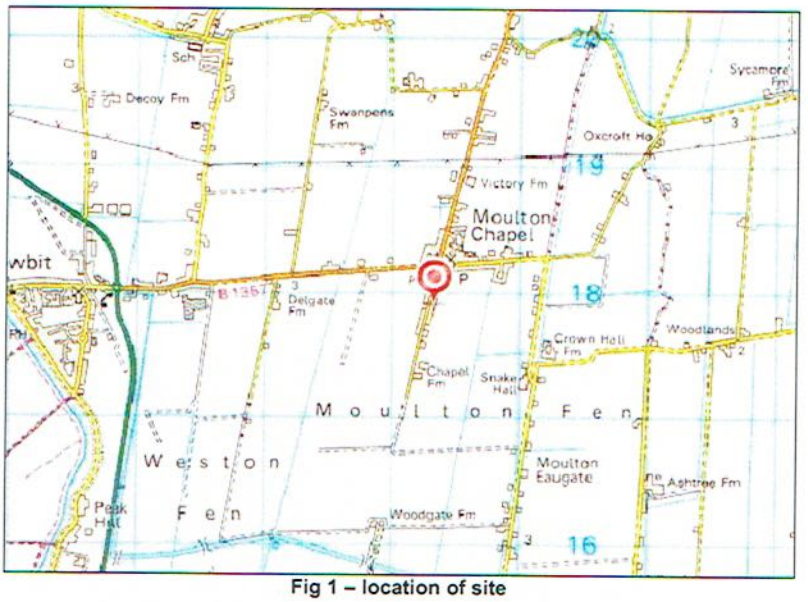


Fig 1 – location of site

Woodgate Road extends south from the village, towards open fields, and No. 77 is located on the west side of the lane some 200 m south of the village centre.

The road is lined with detached and semi-detached residences, with the building style on either side of the road showing the time of development, with the more recent houses along the east side.

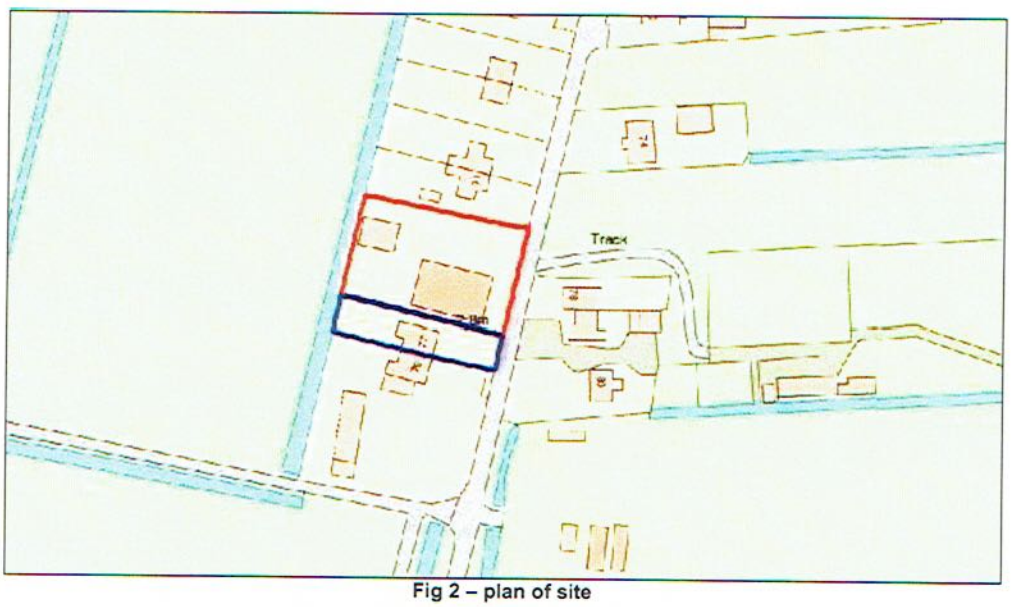


Fig 2 – plan of site

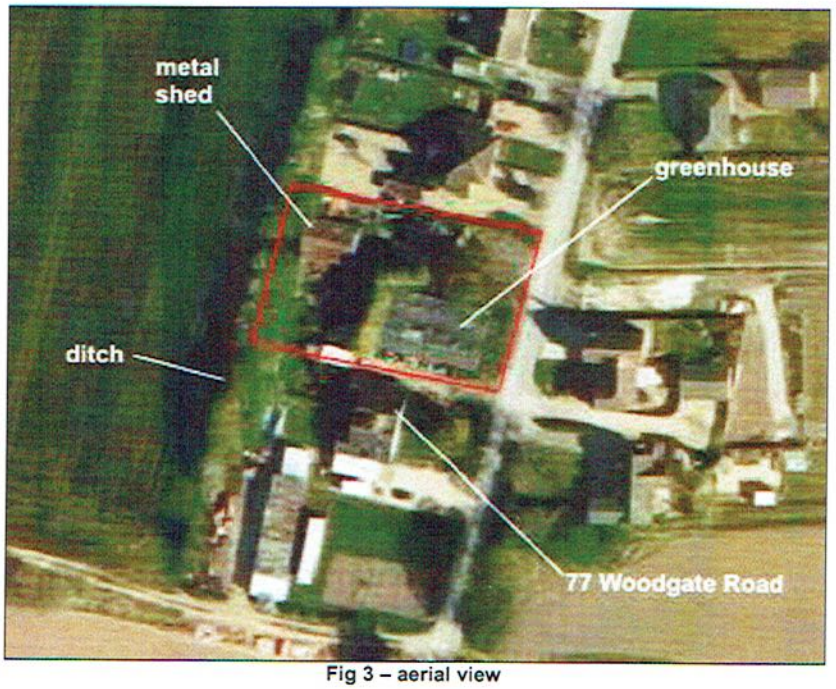


Fig 3 – aerial view

2.2 Description

77 Woodgate Road is an east-facing semi-detached two-storey brick-built residence set on an overall plot that is almost 40 m square, with the house on the south side of the plot.

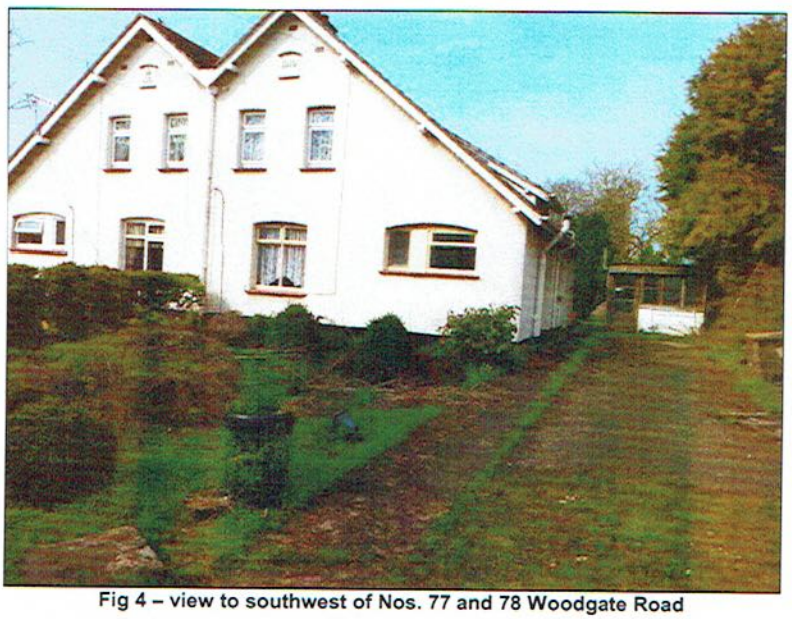


Fig 4 – view to southwest of Nos. 77 and 78 Woodgate Road

The development site comprises of the garden on the north side of the house, an area of 25 m x 40 m, that includes a large greenhouse and metal-clad shed but not the existing residence.

The house has an integral coal cellar and an old unbunded 100 gallon metal heating oil AST to the rear.

No ash pit was encountered in the garden.

The tank was empty but has been used. There were no odours or staining on the ground to suggest that there had been any leaks or spills. The healthy undergrowth attests to the lack of contamination.

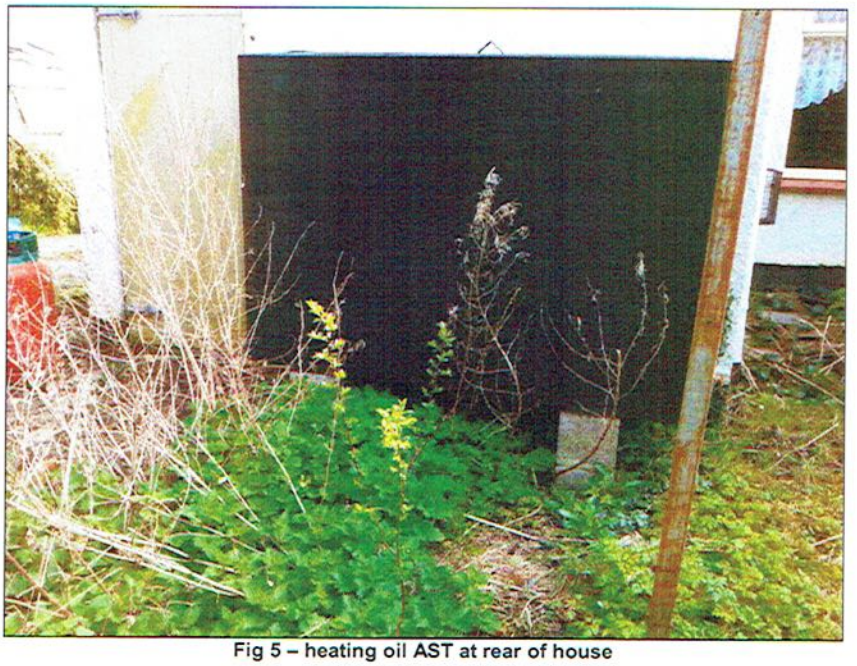


Fig 5 – heating oil AST at rear of house

The greenhouse is built to commercial proportions using glass and wood.

A piped sprinkler system remains within the greenhouse.

There is no evidence that any heating system was installed (*e.g.* radiators, blowers etc).

The interior is unblemished, with no staining, and the floor is dry soil.



Fig 6 –view to west along south boundary of development site, with greenhouse to the right

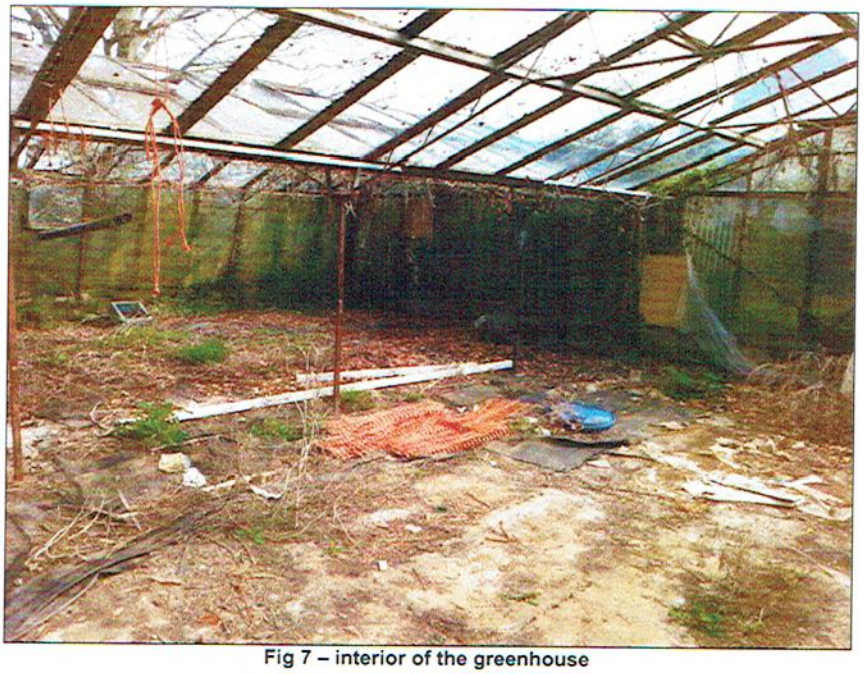


Fig 7 – interior of the greenhouse

The garden is very overgrown, with a line of fir trees (C. *leylandii*) abutting the west side of the greenhouse.

Further back in the garden is another shed, on a concrete slab with a wooden frame and corrugated metal cladding.

The interior is strewn with pieces and fitting of finished wood. There was no evidence of any oils or wood preservative, from odours to staining.

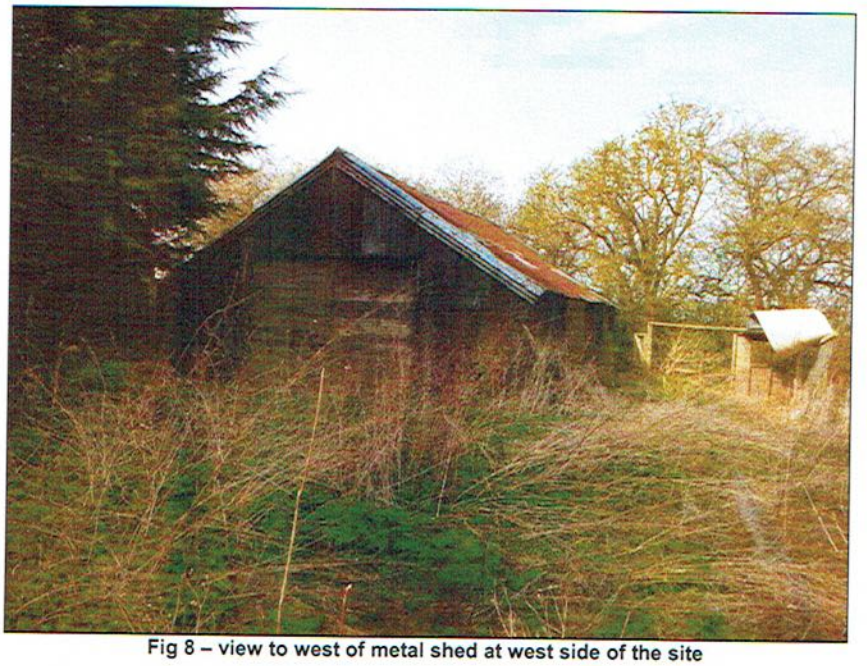


Fig 8 – view to west of metal shed at west side of the site

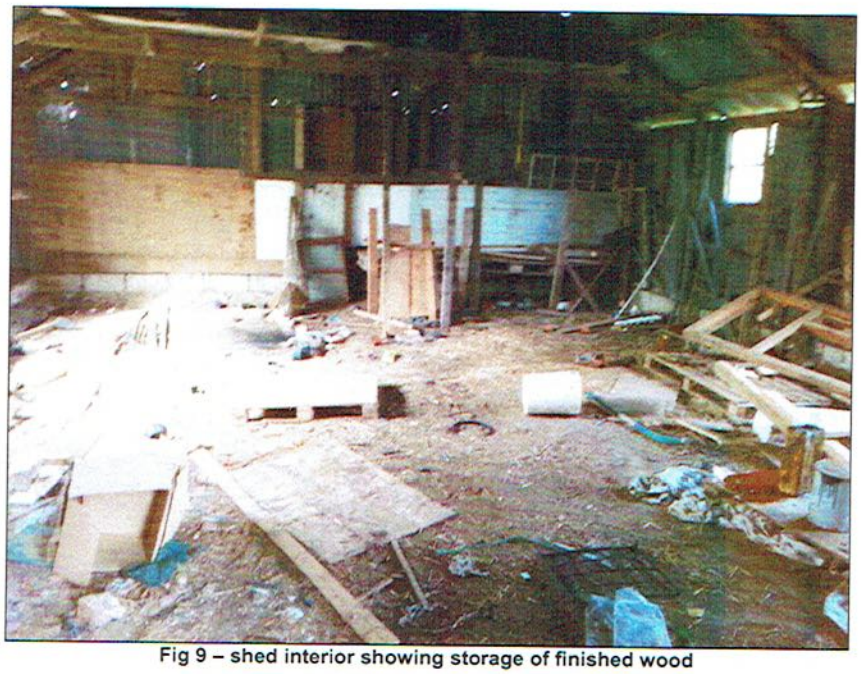


Fig 9 – shed interior showing storage of finished wood

At the rear (west) of the site is a shallow drainage ditch which, at the time of this report, was dry and overgrown and with no indication that it ever carries water.

2.3 History

Prior to any development along Woodgate Lane the land was open fields.

The village attracted no industry, other than a Windmill.

Nos. 72-77 Woodgate Lane were built by the Crown Estate in 1910 for letting to agricultural tenants.

It is understood that a condition of the tenancy for No. 77 was that the Greenhouse adjacent to the house should be used for growing and this was for tulips.

Other than some infilling, with detached houses, along the east side of the lane, the site and immediate area has not changed since that time.

2.4 Potential contamination sources from current and previous use

The site is particularly benign with no potential for contamination from any current or historical use.

Long-lasting herbicides and pesticides are not used within greenhouses and there are no other sources of contamination from the greenhouse or gardens.

The metal-clad shed gives no indication that the contents could contaminate the ground or that any contamination had taken place.

The heating oil AST is a potential source of contamination but is not plausible because:
- there is no evidence that the AST had leaked; and
- the natural silty Clay soil would strongly attenuate any lateral or vertical migration of any oil.

3. ENVIRONMENTAL CONDITIONS

3.1 Geology

The geology of the region comprises the bedrock Jurassic West Walton beds of the Ampthill Clay group (AmG), overlain by Quaternary Glacial Till (Boulder Clay) and then the Recent Tidal Flat Deposits

3.1.1 Ancholme Clay Group (AmG) (152-135 Mya)

The AmG comprises of over-consolidated, fissured, laminated, silty clays. These clays comprise, in ascending order, 55 m of the Oxford Clay Formation (OxC), 25 m of the West Walton Formation (WW), 90 m of the Ampthill Clay Formation (AmC) and up to 70 m of the Kimmeridge Clay Formation (KC). Beds of fine grained clayey limestone, or siltstone, and sandstone such as the Elsham Sandstone, varying in thickness from a few centimetres to a metre or so and elsewhere calcareous nodules, may be found through the sequence. The calcareous nodules can grow to a significant size – one the size of a car has been observed at South Ferriby quarry.

The clays weather readily and reduce in consistency to firm or even soft. At the scale of most sites the material is homogenous, with any variation generally being related to the development of its weathered profile.

3.1.2 Quaternary Glacial Till (2.5 – 0.0.1 Mya)

Glacial Till mostly comprises clay derived from the Ice Sheets as they retreated. It contains abundant granular material as a result of mixing with harder bedrock and is often characterised by a varying content of that debris, giving the name Boulder Clay. Overall Glacial Till is generally stiff with apparent high degrees of over-consolidation although it may contain, or overlie, other glacial materials that can be much softer. Boulder Clay is typically *low to intermediate plasticity* with a *low to medium shrinkage potential*.

Glacial materials are irregular in deposition so that extrapolation is not always reliable. They are also associated with thin (0.2 - 2.0 m thick) sand and gravel lense which may be found beneath or within the general sequence and can often be water bearing. Peat may also be present.

3.1.3 Recent Tidal Flat Deposits (11 kya – present)

The Tidal Flat Deposits have been laid down since the end of the Pleistocene some 11,000 years ago following the end of the last Ice Age and associated general rise in sea level.

It is typically normally consolidated and therefore in a *soft* condition, but at the surface the effects of intermittent drying by weather and vegetation often produces a firmer crust.

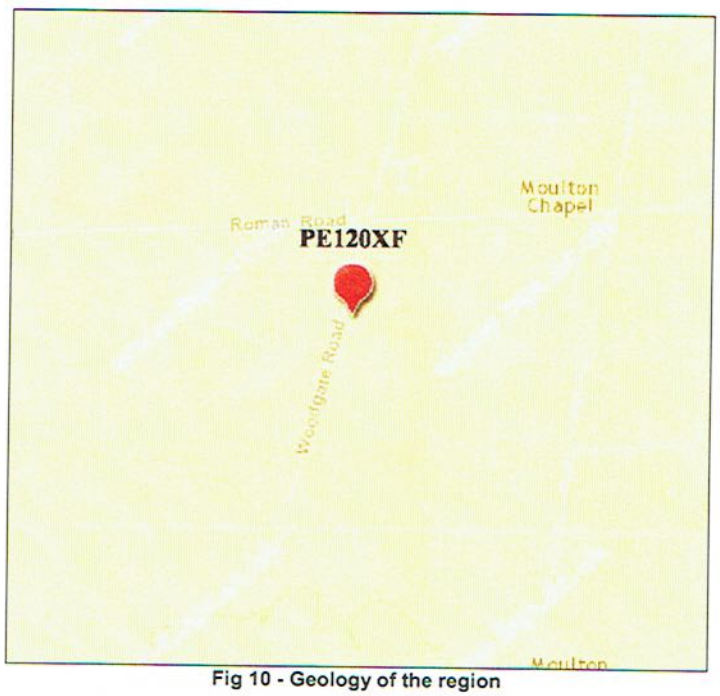


Fig 10 - Geology of the region

3.2 Hydrogeology and hydrology

The bedrock is exposed at the surface and is impermeable.

According to the Environment Agency there is a no risk of flooding from rivers or surface water.

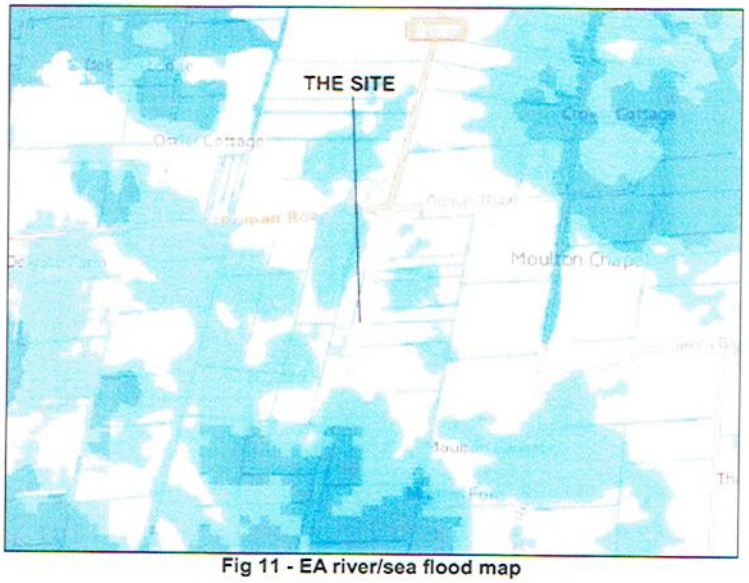


Fig 11 - EA river/sea flood map

Site	77 Woodgate Road, Moulton Chapel PE12 0XF
River and/or Sea flooding	Locally but not at site
Surface water flooding	None
Groundwater	None
Nitrate Vulnerable Zone	None
Water abstraction licences 200 m radius	None
Landfill sites 200 m radius	None
Pollution incidents 200 m radius	None

Fig 12 – EA hazard assessment

3.3 Assessment of environmental conditions

There are no natural sources of contamination at, or near to, this site.

4. CONCEPTUAL EXPOSURE MODEL

4.1 Sources

There are no plausible sources of contamination that could affect the ground at this site.

4.2 Receptors

The site is currently private property in an isolated region so that the site is not attended by the general public.

4.3 Pathways

Based on the CLEA human health risk assessment models, the generic pathways for human receptors are:
- Indoor and Outdoor inhalation of soil vapour and fugitive dust;
- Ingestion of home grown vegetables and of soil attached to the vegetables;
- Outdoor exposure to soil through skin; and
- Indoor and Outdoor ingestion of contaminated dust and soil.

Potential pathways for contamination of controlled waters are via:
- Surface water run-off; and
- Infiltration through the un-saturated and saturated zones.

It is very likely that some or the majority of the pathways are not relevant.

5. RECOMMENDATIONS

5.1 Proposed development

It is proposed to redevelop the site with a new care home.

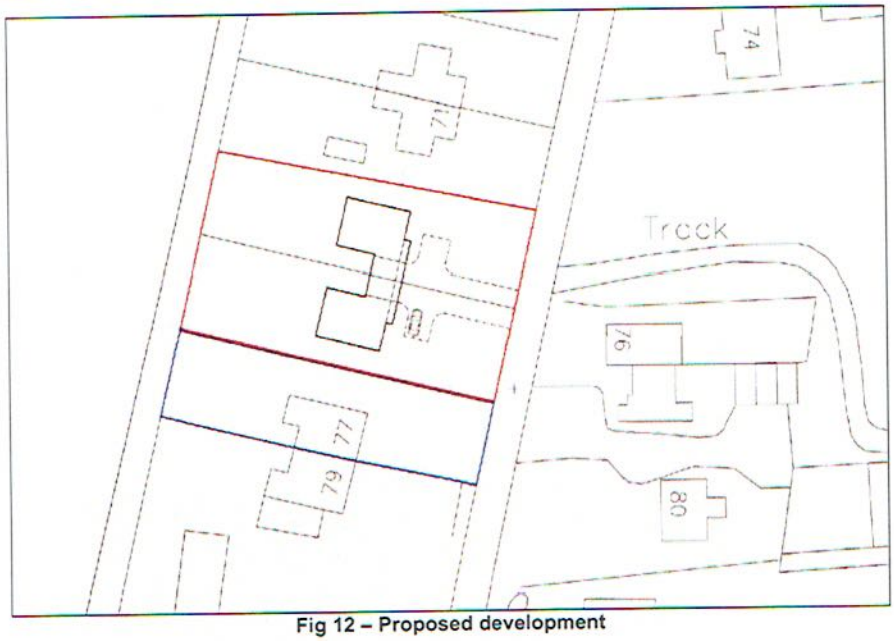


Fig 12 – Proposed development

5.2 Qualitative risk assessment for the proposed development

5.2.1 Sources

There are no plausible sources of contamination.

5.2.2 Receptors

The proposed development will introduce sensitive Receptors to the site, as:
- site workers; and, subsequently
- residents, with gardens and vegetable uptake.

5.2.3 Pathways

The generic pathways given in § 4.3 apply.

5.3 Recommendations for remediation and validation

There is no potential for contamination to be present at, or near to, the site that could be harmful to Human Health or Controlled Waters.

No remediation will be required.

<< END >>