GROUND CONTAMINATION INVESTIGATION AND ASSESSMENT

PHASE 1 DESK STUDY

Houghton Produce Ltd,
Fengate Road,
Pinchbeck
PE11 3PU

frontispiece **– view to northwest from main road of the Houghton Produce works**

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Report at:	Houghton Produce, Fengate Road, Pinchbeck PE11 3PU
Report for:	Houghton Produce, Fengate Road, Pinchbeck PE11 3PU
Prepared by:	 **T.S. Langdale-Smith MSc C.Geol**
Status:	**FINAL**
Issue list (.pdf copy):	gillhoughton293@gmail.com Michael Orridge <michael@origindesignstudio.co.uk>
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Langdale-Smith and Co Limited,
Wrangham House,
Market Place,
WRAGBY
LN8 5QS
07725278648
geologist@langdalesmith.co.uk
www.langdalesmith.co.uk

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1. INTRODUCTION

1.1 Preamble

It is proposed to redevelop the land to the west of the existing Houghton produce site, which was the location of a former steel-framed warehouse, with residences.

The site was formerly used for a commercial/industrial business and there is potential for contamination from this use.

The Environment Agency Land Contamination: Risk Management (LCRM) guidance prescribes the following three step framework for managing land contamination in England, a policy that is followed by WLDC.

LCRM Framework		Planning Condition
Stage 1	**Risk Assessment**	Site Characterisation
	Tier 1: Preliminary Risk Assessment (PRA)	
	Tier 2: Generic Quantitative Risk Assessment (GQnRA)	
	Tier 3: Detailed Quantitative Risk Assessment (DQnRA)	
Stage 2	**Options Appraisal**	Submission of Remediation Strategy
Stage 3	**Remediation**	
	Tier 1: Develop a Remediation Strategy (RS)	
	Tier 2: Remdiation and Verification	Implementation of Approved Remediation Strategy
	Tier 3: Long term monitoring and maintenance (if required)	

Table 1 – Stages of risk assessment for contaminated land

This report satisfies Stage 1 Risk assessment – Site Characterisation

1.2 Objectives and limitations

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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.

1.3 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*

1.4 Definition of terms

ACM: Asbestos containing material

AST/UST: Aboveground/Underground Storage Tank

Bgl: below ground level

CBA: Cement bound asbestos

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 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

Pinchbeck is a fenland village on the north side of Spalding and Fengate Road is located to the southwest of the village.

The Houghton Produce site is located on the north side of Fengate Road, next to the junction with Millgate Road and the development site is located on the west side of the main works.

The site is centred on OS coordinates [5]23250 [3]24700 and is at approximately 3.6 m AOD on flat land.

The *what-three-words* for the site centre is dabbling.steam.pools.

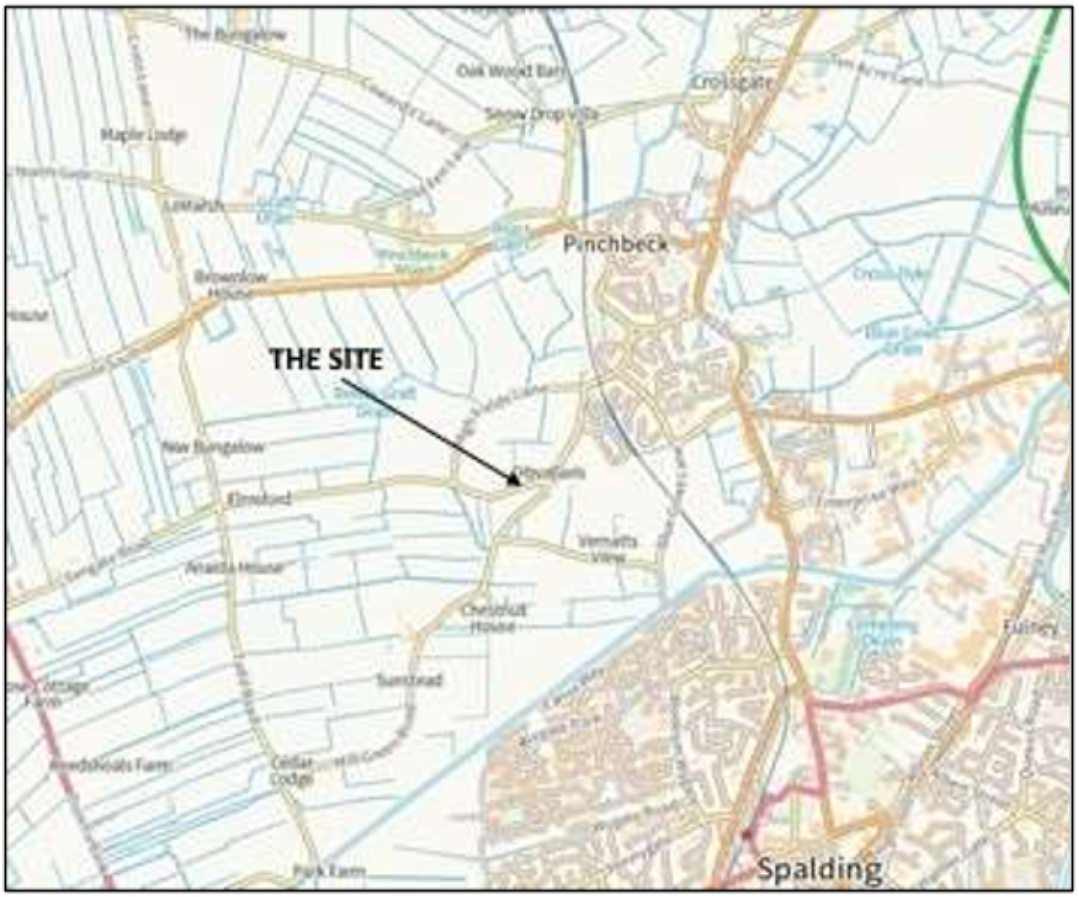

Fig 1 – location of the site

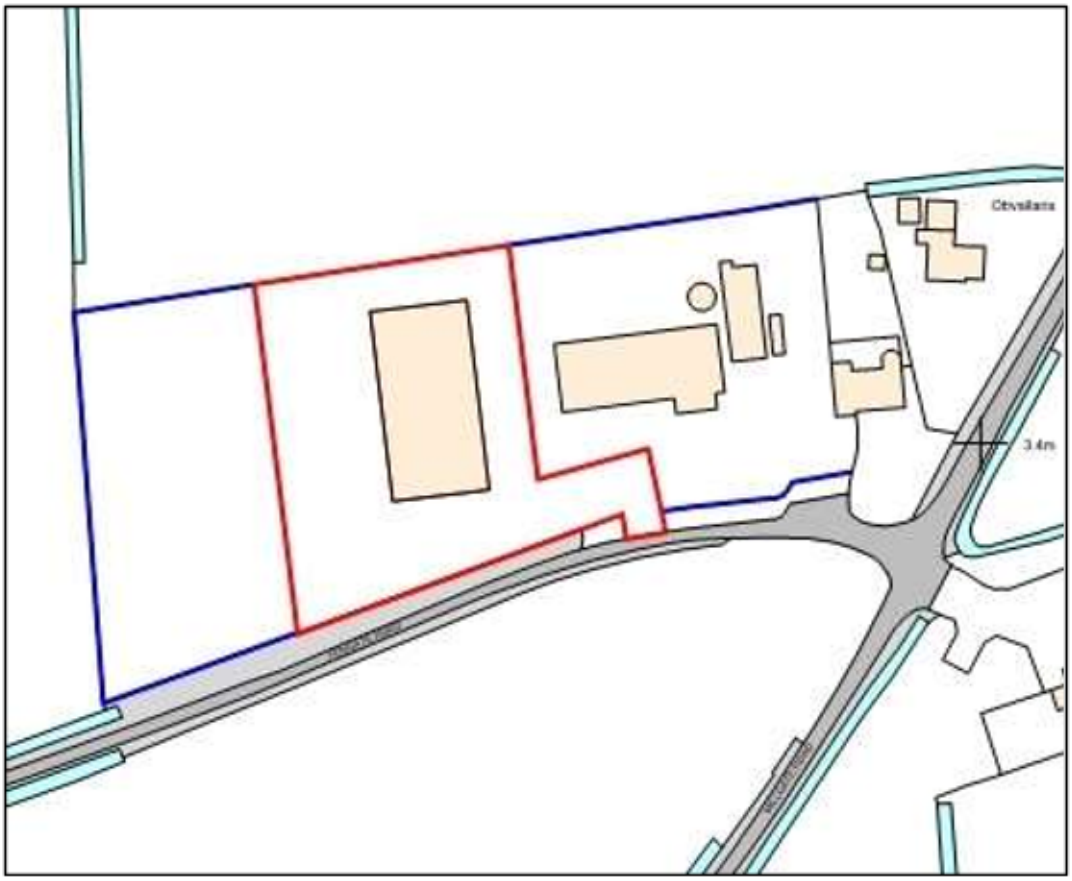

Fig 2 – location of development site

Fig 3 – aerial view in 2021, showing former warehouse (removed 2024)

2.2 Description

The subject site comprises of an approximate 80 m square plot facing, on its south side, onto Fengate Road.

The development site is flat and features the remains of the solid concrete floor of the former warehouse that had been dismantled and removed in 2024.

To the east of the subject site are the buildings used by Houghton Produce for their business of onion and leak preparation.

Both the packing shed and cold store have solid concrete floors.

The AST was for water used to wash the vegetables, with the washings drained directly to the nearby dykes.

Heating was powered by gas and no oil has ever been used on the site or environs.

There are no ACM at the site – all roofs and cladding are metal.

Fig 4 – site master plan (note the adjacent infrastructure is not part of the site)

Fig 5 – packing shed

Fig 6 – the former warehouse, removed in 2024

Fig 7 – washing water AST

Fig 8 – north side of sheds

Fig 9 – base of the former warehouse

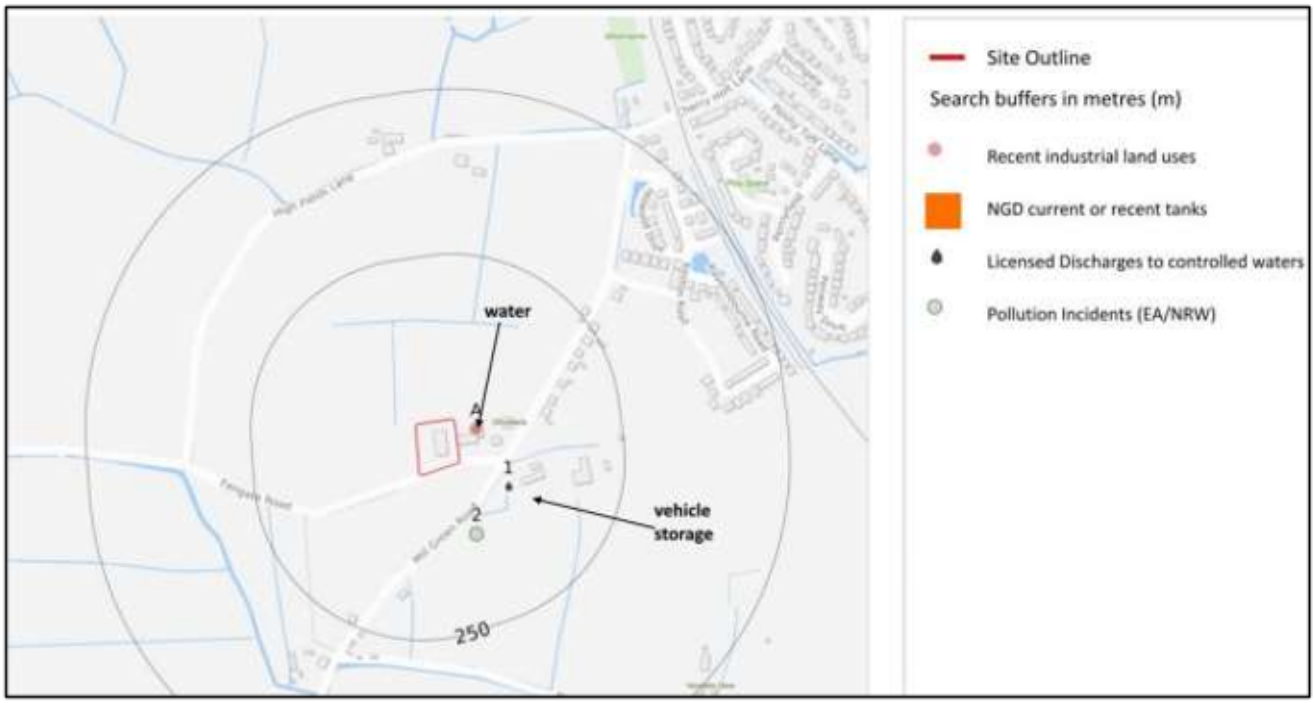

Fig 10 – summary of current land use

2.3 History

Mill Green Nurseries was established on open unused farm land in the 1930s, when a series of glass houses were erected for the production of tulip bulbs.

In the mid-1980s the Nursery was closed and the site was taken over by the current owner, and repurposed as Houghton Produce, for the production of leaks and onions to be supplied to national supermarkets.

The sheds were used for washing, preparation and storage of the foodstuff.

The business prospered until the 2020s when the owner retired and the business closed.

In early 2025 the main warehouse was dismantled and sold to the neighbouring business.

To the southeast of the development site was an abattoir that closed and is now used for the storage of specialist high-value cars.

Period	On site	Off site (50 m)
1889	open fields	
1932	open fields	nursery buildings on east side
1969	no change	abattoir established to the southeast
1986	no change	nuresery closed and repurposed with new warehouse
1999	no change	no change
2009	warehouse built	no change, abattoir closed
2024	warehouse dismantled	business closed, car storage in buildings to southeast

Table 2 – summary of historical development

Fig 11 – extract from 1889 OS 1:2500 map

Fig 12 – extract from 1932 OS 1:2500 map

Fig 13 – 1964 aerial view

Fig 14 – extract from 1969 OS 1:2500 map

Fig 15 – extract from 1995 OS 1:2500 map

Fig 16 – extract from 2007 aerial view

Fig 17 – aerial view 2010

Fig 18 – summary of historical land use

3. ENVIRONMENTAL CONDITIONS

3.1 Geology and hydrogeology

The geological map shows the geology at the site to comprise of the bedrock Upper Jurassic Oxford Clay Mudstone covered with the superficial Recent Tidal Flat deposits.

It is known that beneath the TFd and the bedrock is a layer of Quaternary Glacial Till.

The bedrock dips gently (3-5 deg) to the northeast.

None of the strata can generate radon gas.

3.1.1 Upper Jurassic Oxford Clay (166-157 Mya)

The Jurassic Oxford Clay is a pale or dark grey heavily over-consolidated clay which, in its unweathered state, is *very stiff* and, geologically, it may form a shale or mudstone

Beds of fine-grained clayey limestone varying in thickness from a few centimetres to as metre or so and, elsewhere, calcareous nodules may be found throughout the sequence.

The beds are impermeable and are not water-bearing.

3.1.2 Quaternary Till (1.8 Mya – 11 kya)

The Glacial Till which underlies the Fen Deposits is cohesive in character, having been derived from the local clay bedrock.

The Clay contains abundant granular material as a result of mixing with harder bedrock and is often characterised by a varying content of that debris, hence the name Boulder Clay..

The Clay is usually stiff with apparent high degrees of over-consolidation although it may contain, or overlie, other glacial materials that can be much softer.

The Clay is impermeable and is not water-bearing.

3.1.3 Tidal Flat deposits (11 kya - present)

A complex sequence of deposits, up to 25 m thick, comprising of marine and freshwater clay, silt and sand, interspersed with peat, is present in this part of the Fenland Basin.

This alluvial material has been laid down since the end of the Pleistocene, some 11,000 years ago, as a result of a marine incursion following a general rise in sea level.

They are 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. The beds are not significantly water-bearing.

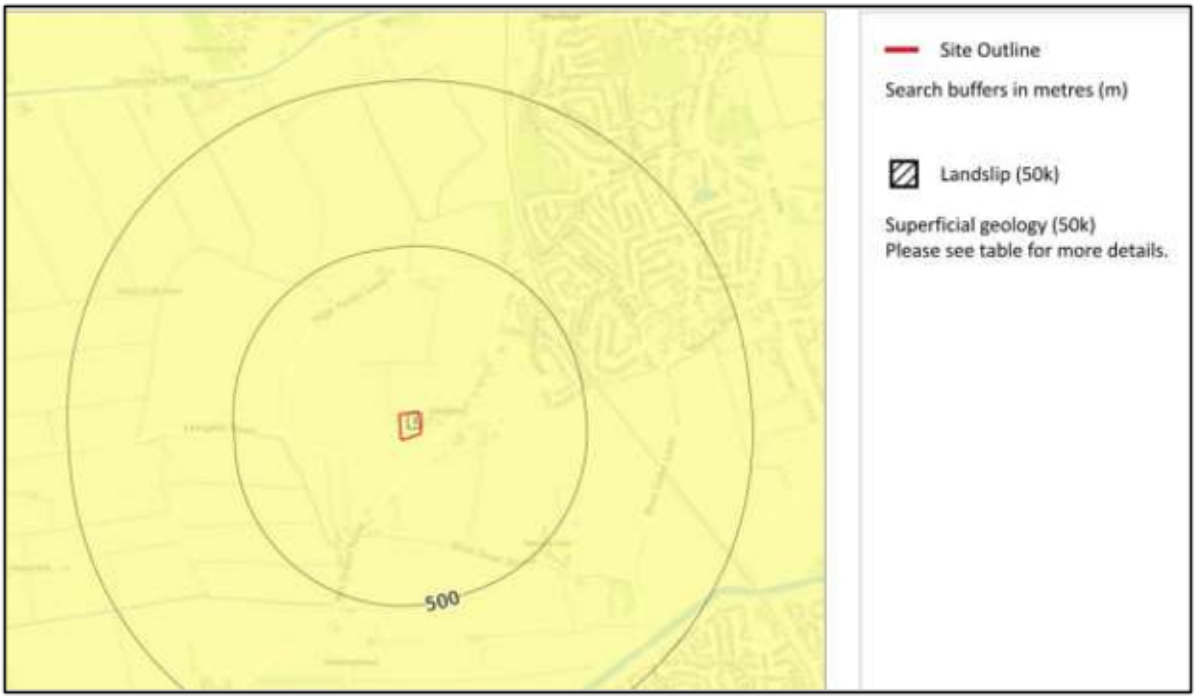

Fig 19 – superficial geology

3.2 Hydrology and flooding

According to the Environment Agency the site, and region, is in Flood Zone 3.

The site is not at risk from surface water flooding.

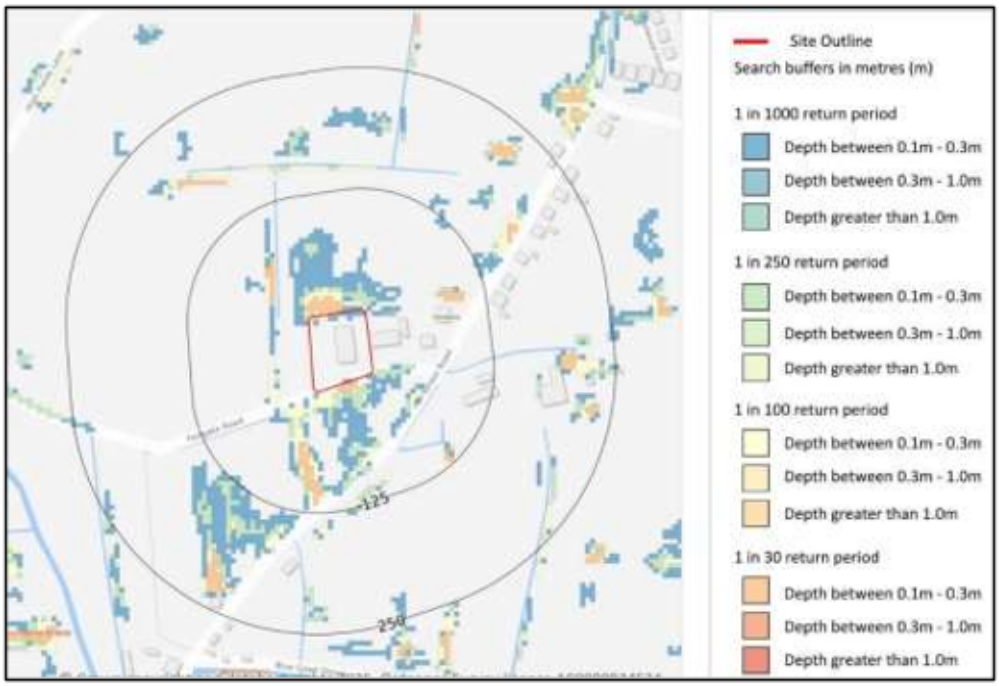

Fig 20 – surface water flooding

4. PHASE 1 CONCEPTUAL EXPOSURE MODEL

For a Source of contamination to be a hazard to a Receptor there has to be a Pathway by which that Source can affect the Receptor - if all three components are present then there is a Pollution Linkage.

A Conceptual Exposure Model is a graphical presentation of the Sources, Pathways and Receptors at a site and can be used to analyse the contamination risks at a site.

The following decision matrices are from CIRIA Report C552 'Contaminated Land Risk Assessment – a guide to good practice' 2001.

Highly likely	very likely short term, inevitable long term or already causing
Likely	possible short term and likely in the long term
Low likelihood	less likely in short term and unlikely in long term
Unlikely	improbable in the long term

Table 3 - definitions of probability of harm being caused (*i.e.* source present)

Severe	acute risk to Human Health likely to result in significant harm, short term risk of pollution to sensitive water courses, ecosystems or organisms that are part of that ecosystem, catastrophic damage to buildings or property
Medium	chronic damage to Human Health, long term risk of pollution to sensitive water resources, significant change in the ecosystems or organisms that are part of that ecosystem
Mild	pollution of non-sensitive water resources, significant damage to crop, buildings, structures, services
Minor	harm, not necessarily significant, that could result in unforseen costs, non-permannent Human Health effects prevented by protective clothing, easily repaired damage to buildings, structures, services

Table 4 - definitions of consequences of harm

		CONSEQUENCES			
		Severe	**Medium**	**Mild**	**Minor**
PROBABILITY	**Highly likely**	Very high	High	Moderate	Moderate/ Low
	Likely	High	Moderate/ Low	Moderate/ Low	Low
	Low likelihood	Moderate/ Low	Moderate/ Low	Low	Very low
	Unlikely	Moderate/ Low	Low	Very low	Very low

Table 5 – categories of risk

4.1 Sources

There are no Sources of contamination at this site.

4.2 Receptors

The site is secure from unauthorised access so the existing Receptors at this site are Commercial/Industrial.

The site is on impermeable clay-based ground with no groundwater.

RECEPTOR	DESCRIPTION
Residential	habitation of dwelling up to 2 storeys with default material/design parameters; access to private and/or communal open space with soil track back to form indoor dust; ingestion of home grown produce
Allotments	default parameters for use and consumption of vegetables but not animals or their produce (*e.g* . eggs)
Industrial/ commercial	assumes office orlight physical work in a permanent 3 storey structure with short external work breaks and no hard cover on outside ground
Infrastructure	buried services such as drinkng water pipes, electricity/data cables

Table 6 – definition of Receptors

4.3 Pathways

The main (generic) pathways for the potential contaminants to affect man and his environment are:

- Direct Exposure to the surface and site users; and
- Sub-surface Migration of contamination into groundwater.

	DIRECT EXPOSURE		SUB-SURFACE MIGRATION
1	Outdoor ingestion of dust	**13**	Surface infiltration (e.g. from AST)
2	Indoor Ingestion of dust	**14**	Sub-surface infiltration (e.g. from UST)
3	Consumption of home-grown vegetables	**15**	Anthropogenic (e.g. pipes, conduits)
4	Ingestion of soil attached to vegetables	**16**	Permeable ground
5	Outdoor exposure through dermal contact	**17**	Groundwater (perched)
6	Indoor exposure through dermal contact	**18**	Groundwater (unrestrained)
7	Outdoor inhalation of fugitive dust		
8	Indoor inhalation of fugitive dust		
9	Outdoor inhalation of soil vapour		
10	Indoor inhalation of soil vapour		
11	Ingestion of surface water		
12	Permeation into plastic water supply pipes		

Table 7 – key to pathways

4.4 Existing Conceptual Exposure Model (CEM)

There are no plausible Sources of contamination at this site, from current or historical use.

5. RISK MANAGEMENT AND REMEDIATION

5.1 Qualitative assessment

It is proposed to build residences on the land formerly occupied by a warehouse.

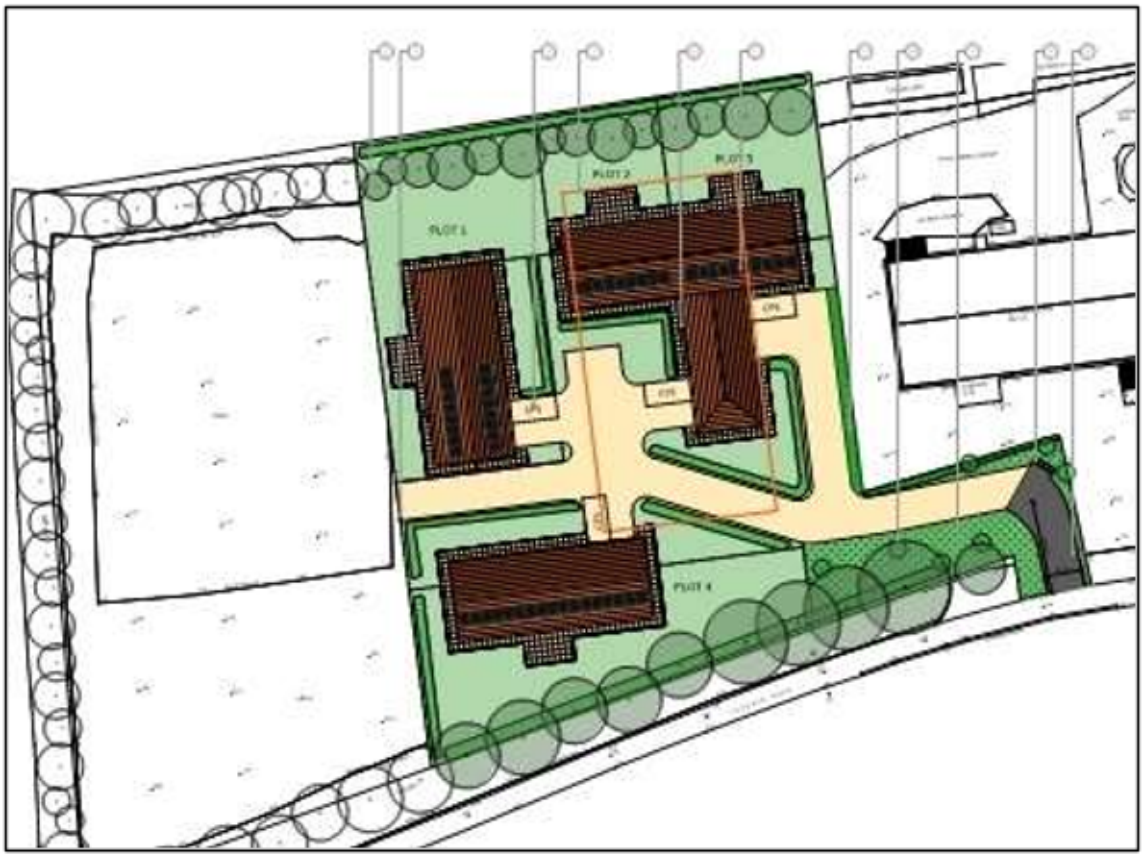

Fig 21 – proposed development

The development will introduce new Receptors to the site:

- Site workers;
- Buried utilities; and
- Residents with children.

The increase in sensitivity of receptors is largely a function of the time exposed to any hazard, which, in the case of residents with children, will be exposed for the greatest period of time and less so for site workers.

5.2 Recommendations for remediation

This report has identified that there are no sources of contamination that will be a hazard to site workers, buried utilities or future residents.

<< END >>