



Contaminated Land Inspection Report

Winfarthing Avenue

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Executive Summary

The Borough Council of King's Lynn and West Norfolk (BCKLWN) has a statutory duty to inspect its district for potentially contaminated land under Part 2A of the Environmental Protection Act 1990. The Borough Council's Part 2A inspection strategy did not identify the site at Winfarthing Avenue as being of priority for further inspection. No significant sources of contamination were identified that could expose site users or the local environment to harm based on the use for informal recreation. As there is a proposal for the site to be planted as a community orchard, the strategic inspection is being revised to confirm the site's current Part 2A status.

This assessment has been undertaken to assess the potential for harm to human health, property, ground/surface water and designated environmental receptors under Part 2A EPA 1990.

To gather information of the site's history a desk study and preliminary risk assessment were carried out by the Environmental Quality Team. From the evidence gathered during the desk study of the site history and a site walkover, the following can be stated: The site was historically railway cottages and part of the Great Eastern Railway Harbour Branch. Construction of the Hardings Way road took place during 2010-11 during which time the site was cleared of vegetation and was used as a holding area for material management. The site's present use is informal open space. The site is maintained by the borough council.

The site and adjacent sites have been subject to a number of previous investigations as part of the wider Waterfront and Nar Ouse Regeneration Area projects and establishment of the adjacent Hardings Pits doorstep green. A detailed risk assessment and contaminated land inspection report have been carried out on the Hardings Pits site. Findings from these investigations indicate that the site and surrounding area do not present unacceptable risks in their current use.

From the contaminated land risk assessment plausible source pathway receptor linkages were identified. A LOW risk was assessed from contamination to human health, VERY LOW risk to property, VERY LOW risk to the wider environment and LOW risk was identified to surface water and groundwater.

There was no evidence of harm or of a significant possibility of significant harm to the receptors identified in the conceptual site model. As the risk posed is low or very low, the site would be classified as Category 4 as set out in the Statutory Guidance. Therefore the site is not considered to be contaminated land under Part 2A of the Environmental Protection Act 1990.

At the time of this report, the site is proposed for community orchard. Any application for planning consent for a change of use of the site should have regard to the information in this report and in previous investigations, and would need specialist advice from a competent person if this use is to be successfully and safely established.

1 Introduction

This report details a review of information and risk summary about land at Winfarthing Avenue, South Lynn and provides a conclusion on the risk to human health, property, groundwater and the wider environment.

The strategic inspection of the site did not identify significant sources of contamination that could expose site users or the local environment to harm based on the use for informal recreation. As there is a proposal for the site to be planted as a community orchard, the strategic inspection is being revised to confirm the site's Part 2A status.

The Contaminated Land Statutory Guidance (DEFRA, 2012) suggests that where the authority has ceased its inspection and assessment of land as there is little or no evidence to suggest that it is contaminated land the authority should issue a written statement to that effect. This inspection report forms that written statement but makes recommendations for further investigation.

2 Desk Study Information

Location

The site's address is Winfarthing Avenue. The location is shown in Figure 1 below. The grid reference for the centre of the site is 561947 319048. The nearest postcode is PE30 5LY.

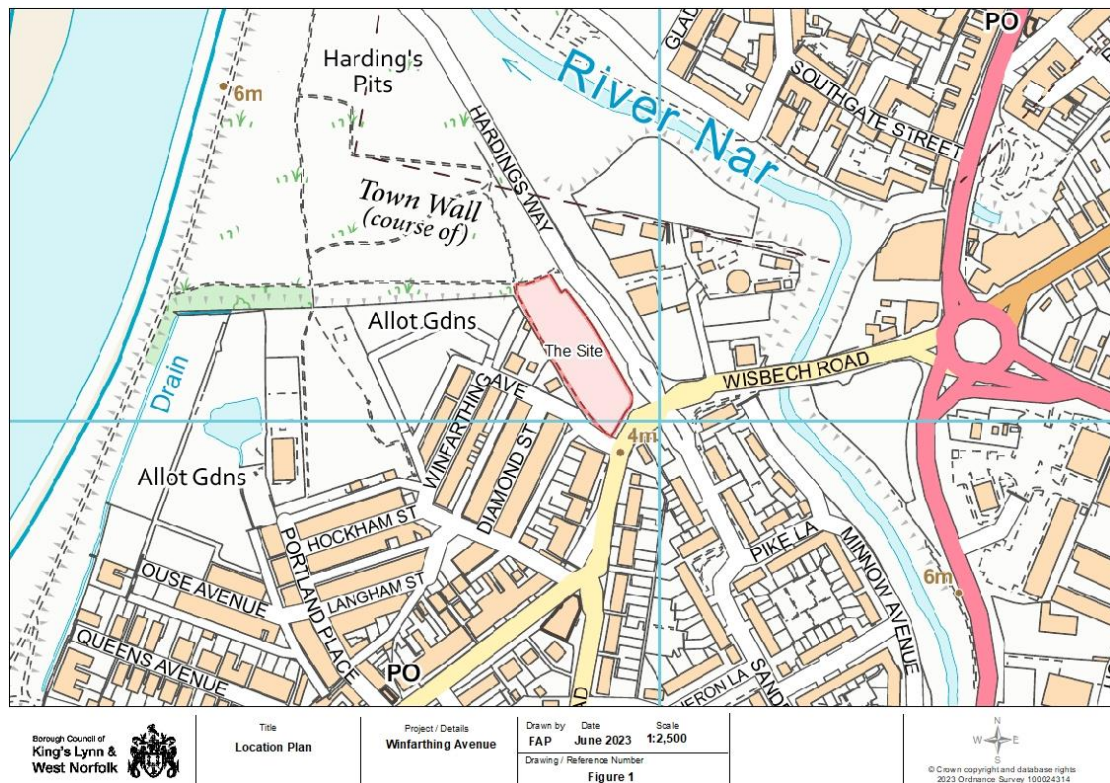


Figure 1: Site location

Previous Site Use

The site was historically railway cottages and part of the Great Eastern Railway Harbour Branch.

Present Site Use

The site's present use is informal open space. The site plan below (figure 2) shows the site and surrounding area.

Photographs of the site are in appendix A.

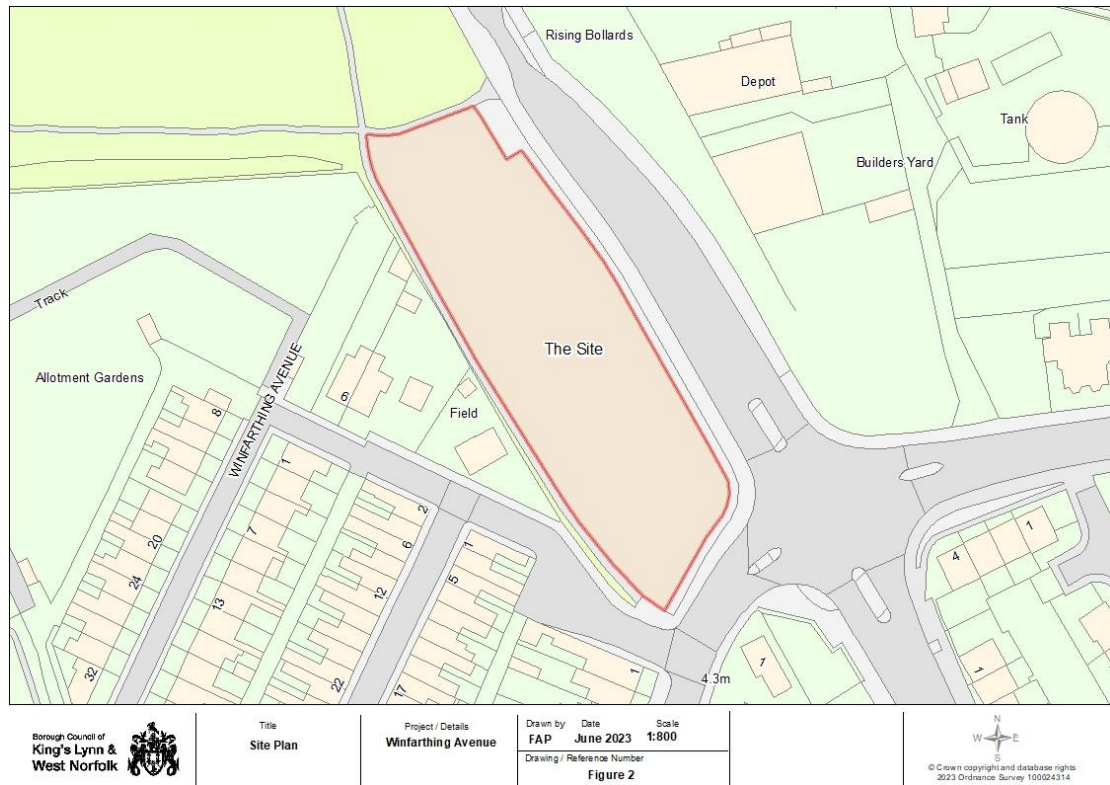


Figure 2: Site plan

Ownership

The land is owned by the borough council. This report will be made available to the site owners and any other interested parties including Natural England.

Environmental Setting

Geology & Soils

Soils are described as lime-rich to moderate fertility loamy and clayey soils of coastal flats with naturally high groundwater¹. The geological map indicates that bedrock geology is Kimmeridge Clay. Nearer the surface, geology is reported to consist of basal sands overlain by Barroway Drove clays and silty clays, Nordelph Peats, and Terrington Beds clays and silts.

The site is at approximately 5 metres above ordnance datum (m AOD). Previous investigations have shown the geological strata encountered in the area to be as set out in table 1.

¹National Soil Resources Institute (NSRI), Soilscape (England), 2005

Table 1: Geological strata encountered (from Mouchel 2008)

Strata	Thickness range (m)	Average thickness (m)	Range of depth to top of stratum (m AOD)
Made Ground	0 to 2.4	1.2	5.0
Terrington Beds	1.1 to 6.2	3.8	4.66 to -1.42
Nordelph Peat	0.0 to 1.2	0.6	0.0.2 to -1.42
Barroway Drove Beds	3.3 to 6.5	4.8	0.05 to -3.31
Basal Sands	0.2 to 1.4	0.9	-5.11 to -7.25
Kimmeridge Clay	not proven	not proven	-5.98 to -8.42

The Made Ground in the area was recorded in Mouchel 2008 as brown sandy-gravelly CLAY or clayey-gravelly SAND. Gravels comprised angular-rounded flint, quartzite, concrete ash and chalk. Occasional cobbles of these materials were also recorded.

Hydrogeology

The superficial deposits and Kimmeridge Clay are designated by the Environment Agency as non-aquifers. There are no known licensed water abstractions within 1km of the site.

Hydrology

The nearest major water features are the River Great Ouse to the west and River Nar to the northeast and east.

Local Authority Pollution Prevention and Control Regulations

1 permitted process exists within 500m: Overtons Coach Painters, Wisbech Road, who carry out vehicle refinishing. No pollution incidents have been recorded from the site.

DEFRA MAGIC website records

MAGIC website records that Hardings Pits Doorstep Green is adjacent to the site, to the north. The Doorstep Greens initiative provides renovated areas of public open space close to people's homes that can be enjoyed permanently by the local community. The initiative is a Natural England and New Opportunities Fund project 'aimed at targeting communities who experience disadvantage and where regeneration of the local environment and outdoor recreation provision is sorely needed'. Natural England must be consulted if any changes are proposed on a doorstep green.²

Historical Maps

NCC Historic Map Explorer

Tithe map circa 1840 – The site is a field with the southern boundary formed by a road which runs along the route of the current Wisbech Road. A pond is

² DEFRA/Natural England <https://www.gov.uk/guidance/doorstep-and-millennium-greens-making-changes>

depicted approximately 20m to the south east, directly to the south of Wisbech Road.

Historical Maps on file at the Borough Council of King's Lynn and West Norfolk

Historic maps are presented in Appendix B and summarised below.

1843 – 1893: The site is shown as open space with tracks or paths running across the northern part of the site. The southern portion of the site appears to contain two buildings (presumed houses and garden) with a small embankment leading to the Great Eastern Railway (Harbour Branch) which runs along the eastern side of the site in a strip of around 10m wide. The surrounding area contains assumed clay pits to the north and northwest, a coal yard to the east and houses & associated small open fields to the west. A small siding of the railway runs into the clay pits. Wisbech Road forms the southern boundary. An oil works and manure works are shown approx. 100m & 200m to the south southeast, and a gasworks 150m to the southeast.

1891 – 1912: The site and surroundings are largely unchanged. Part of the land to the northwest is labelled Allotment Gardens and some filling of the pits appears to have taken place. Some new terraced housing is shown to the west along Wisbech Road and the newly built Diamond Street. The oil works and manure works buildings have increased in size.

1904 – 1939: The surroundings are largely unchanged to the east, and south. The oil works is no longer labelled, the manure works buildings have again increased in number and size. The pits to the northwest appear to have largely been filled and there are some structures and paths associated with the railway siding in that location. The site itself appears to contain a pair of semi-detached houses in the centre of the site with associated garden and the previously noted house and outbuilding in the south of the site.

1919 – 1943: Not available.

1945 – 1970: The buildings in the centre of the site are labelled New Cottages and the building in the south of the site is labelled Railway Cottage. Buildings and land to the east of the coal yard are labelled Depot, Builders Yard, Bowling Green, Railway Tavern (PH) and Harvest House. The pits to the north appear to have all been filled. The land to the west is predominantly housing, allotment gardens and a playing field. The gas works and oil works have reduced in size and the Manure Works is now labelled fertilizer factory.

1970 – 1996: Not available

Aerial Photographs

Aerial photographs are presented in Appendix B and summarised below.

1945 – 1946 MOD Aerial Photograph: the site and surroundings appear to be much as depicted on the 1945-1970 mapping. The presence of shadow suggest that the harbour branch line ran along an embankment which was higher than the site's ground level.

1999 Aerial Photograph: The site is shown as open ground with no buildings present and partially covered with scrub and trees. The former harbour branch line cannot be seen, presumed removed. The gas works, oil works, and manure works appear disused with just building foundations visible in places.

2006-2009 Aerial photograph: The site includes further tree cover in the southern end, scrub and rough grassland in the northern end. The gas works site has been redeveloped and includes a new road running north south and

joining with the Southgates roundabout. The oil works and manure works sites have been cleared. The land now known as Hardings Pits appears to have been established including levelling and filling of the pits and establishment of pathways.

2017 Aerial photograph: The site appears to have been cleared and levelled and consists of grassland. A new road has been constructed running approximately north south on the eastern boundary of the site. Land to the east, south and west is either completely developed or being developed for commercial and housing. Allotment gardens are clearly seen to the west of the site. The Hardings Pits area to the north is established with grassland, trees and shrubs.

Planning History and previous site investigation

There are 4 applications for redevelopment of the site which were permitted:

Year	Application ref	Description
2010	10/00264/FM	Provision of new public transport route (CIF 2 Route) from Wisbech Road to Boal Street: Variation of condition 17 of planning permission 09/01441/FM to allow tree felling in advance of April to avoid nesting birds and preliminary site clearance at southern end of the transport route outlined in supporting documents
2009	09/01441/FM	Provision of new public transport route (CIF 2 Route) from Wisbech Road to Boal Street
2004	04/01053/F	Hardings Pits Creation of new paths, earthworks and associated site furniture
2001	2/01/0670/O	Site for creation of public open space residential development and associated infrastructure incorporating existing pumping station in accordance with drawing KLN002/05

The above permissions document the clearance of the site, construction of the new road (Hardings Way) and creation of the Hardings Pits public open space. Construction of Hardings Way included a reptile mitigation strategy for common lizard and grass snake including relocation and provision of hibernacula on Hardings Pits.

Part of the site and adjacent land have been subject to investigations. Table 2 below lists the reports used in compiling this inspection report.

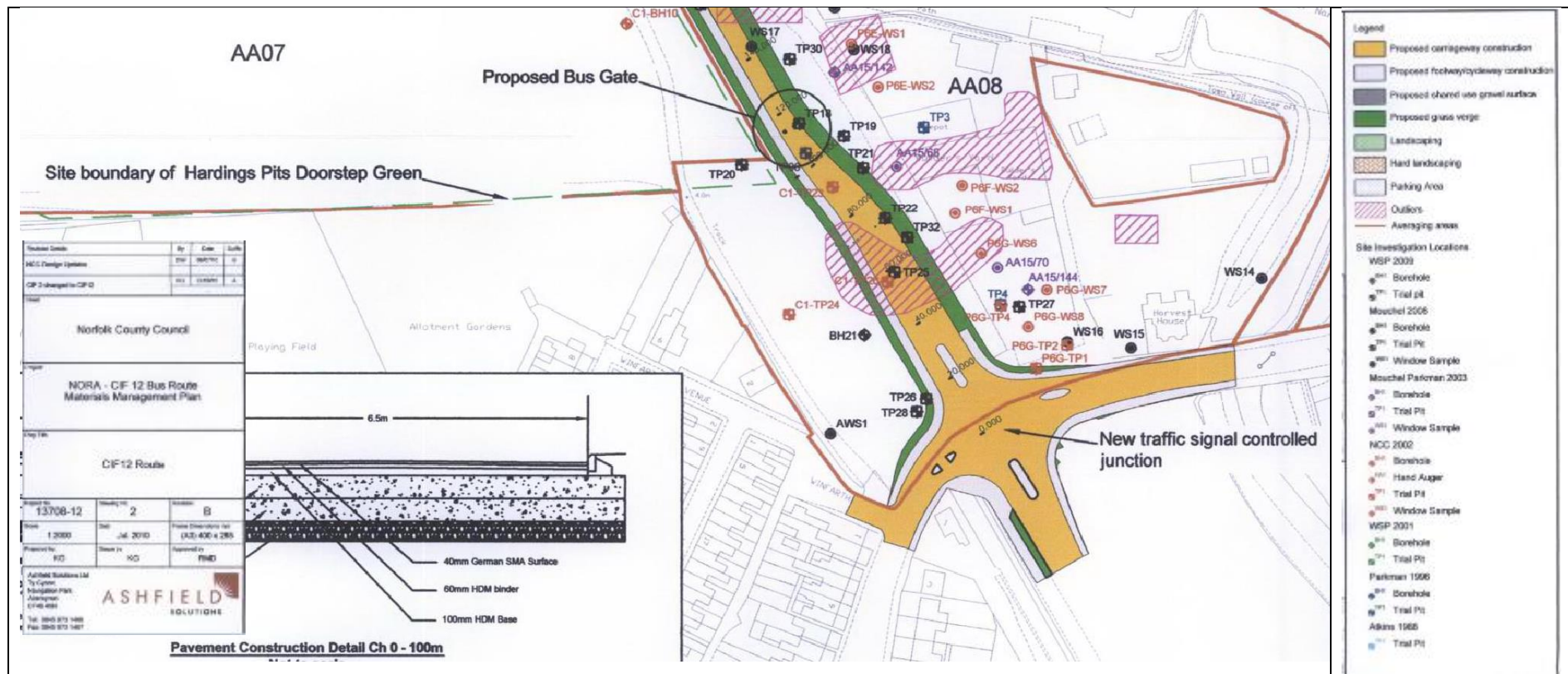
Date	Author	Title
October 1988	WS Atkins for BCKLWN	Hardings Pits - preliminary investigation and assessment of landfill gas and chemical hazards (draft report)

July 2002	Norfolk County Council	Nar Ouse Redevelopment Area, site investigation report
September 2008	Mouchel for BCKLWN	Interpretive Report - Waterfront Regeneration
November 2008	Mouchel letter to BCKLWN	Waterfront Regeneration, King's Lynn: Potential Statutory Part 2A Liabilities
June 2009	Mouchel	Remediation Strategy
August 2009	Ashfield Solutions	Land Contamination Statement
October 2009	SLR for BCKLWN	Harding's Pits and Former Harbour Branch Line Additional Risk Assessment Quantitative Human Health Risk Assessment
July 2010	Ashfield Solutions for BCKLWN	CIF12 Public Transport Route Remediation Scheme and Materials Management Plan
May 2010	Ashfield Solutions for BCKLWN	Nar Ouse Regeneration Area Offline Storage Project Remediation Scheme and Materials Management Plan
September 2011	WSP Remediation	Verification Report, Community Infrastructure Fund 12 Public Transport Route

The Ashfield Solutions, CIF12 Public Transport Route Remediation Scheme and Materials Management Plan, 2010 report (10/00264/FM 09/01441/FM) documents previous site investigation work including some intrusive sampling and chemical analysis of selected samples. Extract 1 below shows the sampling locations on the site and the surrounding area, from the Ashfield 2010 report.

A concrete slab 0.1m thickness was reported to have been identified in TP13, boulder size pieces of wooden railway sleeper in TP13A both to the north of the site. Cement-bonded Asbestos was found within TP27 to the east of the site. Hydrocarbon odours were noted in BH25, TP13A to the north of the site and TP25 directly to the east of the site.

A summary of the chemical analysis results from samples recovered from site are summarised in table 3. Accompanying logs and chemical analysis results are in appendix D. The previous investigations conclude that the land within this site was suitable for the use as open space or informal recreation.



Extract 1: Site investigation locations. Extract from Ashfield Solutions, CIF12 Public Transport Route Remediation Scheme and Materials Management Plan, 2010

Table 3: Summary of chemical analysis from previous investigations										
location	AWS1	AWS1	AWS2	AWS2	BH21	BH21	BH21	TP20	TP24	Resi without plant uptake*
sample	E1	E2	E1	E2	E1	E2	E3			
depth bgl	0.7	3.0	0.3	2.5	0.5	1.5	2.7	0.3	1.5	
desc	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Mouchel 2008	Mouchel 2008	Mouchel 2008	Mouchel 2008	Mouchel 2008	Mouchel 2008	Mouchel 2008	Mouchel 2008	NCC 2002	2011
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	5.2	5.7	23.0	17.0	12.0	14.0	8.5	46.0	8.2	35
Barium	23.0	25.0	170.0	100.0	100.0	110.0	120.0	200.0		1670
Beryllium	<1	<1	2.1	<1	<1	<1	<1	1.5		9.1
Cadmium	0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	84
Chromium	8.7	10.0	28.0	34.0	31.0	26.0	26.0	44.0	29.0	1000
Copper	80.0	12.0	130.0	13.0	12.0	19.0	9.9	300.0	10.0	5000
Mercury	0.2	0.2	0.8	<0.1	<0.1	0.2	<0.1	0.9	<0.1	238
Nickel	8.1	8.6	33.0	29.0	28.0	29.0	25.0	41.0	24.0	130
Lead	39.0	26.0	140.0	19.0	21.0	56.0	16.0	250.0	25.0	420
Selenium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.6	<0.3	595
Vanadium	11.0	13.0	52.0	54.0	44.0	43.0	36.0	74.0		150
Zinc	77.0	35.0	100.0	110.0	61.0	61.0	51.0	250.0	35.0	5000
TPH aromatic >C12-C16					<0.1	<0.1	<0.1	2.4		
TPH aromatic >C16-C21					<0.1	<0.1	0.6	21.0		
TPH aromatic >C21-C35					<0.1	<0.1	1.1	57.0		
Total Petroleum Hydrocarbons					<20	<20	<20	80.0		

TPH >C5-C6	<0.1	<0.1	<0.1	<0.1				<0.1		
TPH >C6-C7	<0.1	<0.1	<0.1	<0.1				<0.1		
TPH >C7-C8	<0.1	<0.1	<0.1	<0.1				<0.1		
TPH >C8-C10	0.5	<0.1	2.2	1.5				<0.1		
TPH >C10-C12	3.7	<0.1	5.8	3.8				0.1		
TPH >C12-C16	11.0	2.0	22.0	4.0				2.5		
TPH >C16-C21	35.0	2.9	110.0	10.0				7.9		
TPH >C21-C35	190.0	8.3	530.0	19.0				25.0		
Total Petroleum Hydrocarbons	240.0	13.0	670.0	19.0				36.0		
Naphthalene	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	2.7		1000
Acenaphthylene	0.2	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	1.6		0.29
Acenaphthene	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	0.6		
Fluorene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5		
Phenanthrene	1.6	<0.1	6.9	<0.1	<0.1	<0.1	<0.1	4.7		13
Anthracene	<0.1	<0.1	0.7	<0.1	<0.1	<0.1	<0.1	2.1		
Fluoranthene	5.9	<0.1	20.0	<0.1	<0.1	<0.1	0.2	11.0		74.82
Pyrene	3.6	<0.1	15.0	<0.1	<0.1	<0.1	0.1	9.5		
Benzo[a]anthracene	2.5	<0.1	10.0	<0.1	<0.1	<0.1	<0.1	7.5		3.7
Chrysene	4.4	<0.1	16.0	<0.1	<0.1	<0.1	0.2	8.4		8.8
Benzo[b]fluoranthene	7.0	<0.1	20.0	<0.1	<0.1	<0.1	0.2	7.7		7
Benzo[k]fluoranthene	2.9	<0.1	18.0	<0.1	<0.1	<0.1	0.2	6.6		10
Benzo[a]pyrene	5.4	<0.1	18.0	<0.1	<0.1	<0.1	0.3	8.1		1.0
Dibenzo[a,h]anthracene	0.9	<0.1	4.6	<0.1	<0.1	<0.1	0.3	2.5		0.86
Indeno[1,2,3-cd]pyrene	6.4	<0.1	21.0	<0.1	<0.1	<0.1	0.5	7.6		4.2
Benzo[g,h,i]perylene	6.8	<0.1	21.0	<0.1	<0.1	<0.1	<0.1	7.1		47
Total (of 16) PAHs	48.0	<2	170.0	<2	<2	<2	2.0	88.0		3.47

Benzene	<1	<1	<1	<1						0.01
Catechols	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Phenol	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Cresols	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Xylenols	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Naphthols	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Trimethyl phenols	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Phenols (total)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		
pH	7.5	8.0	7.4	8.2	7.9	8.0	8.1	7.7		
Stone content (as received) %	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
Soil colour	brown	brown	brown	brown	brown	brown	Brown	brown		
Soil texture	sand	sand	sand	sand	clay	clay	Clay	sand		
Other material	stones	stones	stones	stones	stones	stones	Stones	stones		
Asbestos (presence/absence)	ND	ND	ND	ND	ND	ND	ND	ND		
<p>* Assessment criteria from 2011 assessment for a residential end use without home grown produce, which was considered appropriate for the use of this site as informal open space. Human health or modelled/max assessment criteria for controlled waters if this was the risk driver</p> <p>..... = Result above 2011 assessment criteria</p>										

The areas where elevated concentrations of certain contaminants were reported (outliers) were excavated within the footprint of the Hardings Way (CIF 12) route and associated soft landscaping, as shown in extract 2 below from the WSP 2011 report.



Key:

- CIF12 Outliers
- Extent of Outlier Excavation within the CIF12 Footprint
- Excavated Material suitable for reuse <0.2mbgl
- Excavated Material suitable for reuse >0.2mbgl

Extract 2: Outlier areas in Hardings Way (CIF 12) route
Extract from WSP 2011 Verification Report

The 2011 Verification Report records that during construction of Hardings Way the site was used as a quarantine area (QA3) for excavated soils and also as a Contaminated Holding Area situated upon soft cover. A composite sample, comprising five sub-samples from across the original ground surface within area QA3 was obtained (rate of one sample per 500m²), to benchmark the conditions. Following the works a further composite sample was retrieved for comparison. The results are reported to indicate that significant cross-contamination did not occur. No samples were reported to exceed relevant assessment criteria. The sample references and laboratory report references are summarised and copies of analysis certificates provided in the verification report. Table 4 summarises the reported chemical analysis. It is noted that the post works samples reported an increased level of organic contaminants, but due to the method of sample collection, it is not possible to say what the source may have been and if this is localised or widespread.

During the NORA Waterfront Masterplanning and construction of Hardings Way it was considered that the risks to controlled waters were acceptable and have not been increased by local developments. The 2011 verification report concludes that development for more sensitive uses could be undertaken up to the boundary of Hardings Way and associated landscaping without compromising the management of risks to human health. But appropriate risk assessment would need to be carried out to assess the risks if a change of use is proposed.

Table 4 Quarantine Areas Baseline Sampling of surface soils from WSP Verification Report, 2011				
Sample ref	CIF12CHABS (pre works)	CIF12CHABS (post works)	Assessment criteria	C4SL*
Date	27/09/10	08/03/11	2011	2014
Lab report ref	10-17563	110311-41		
Lab Description	Silt	Sand		
Moisture	12%			
Cyanide, total	<7.5	<1		
Cyanide free	<5	<1		
Selenium	0.4	<1	595	
Mercury	0.2	<0.14	238	
Arsenic	12	18.3	35	170
Barium	88	86.3	1670	
Cadmium	0.54	0.264	84	880
Cobalt	6.5	7.22		
Chromium	23	21.4	1000	250
Copper	38	38.4	5000	
Nickel	17	18.3	130	
Lead	140	55.4	420	1400
Vanadium	53	42.3	150	
Zinc	150	91.6	5000	
Ammonium, water soluble (2:1), as NH ₄	6.3	<15		
Napthalene	<0.1	0.5	1000	
Acenaphthylene	<0.1	0.161	0.29	
Acenaphthene	<0.1	0.213		
Fluorene	<0.1	0.225		
Phenanthrene	<0.1	2.05	13	
Anthracene	<0.1	0.515		
Fluoranthene	<0.1	3.04	74.82	
Pyrene	<0.1	2.69		
Benzo(a)anthracene	<0.1	1.39	3.7	
Chrysene	<0.1	1.4	8.8	
Benzo(k)fluoranthene	<0.1	0.88	10	
Benzo(b)fluoranthene	<0.1	1.72	7	
Benzo(a)pyrene	<0.1	1.62	1.0	21
Indeno(1,2,3-c,d)pyrene	<0.1	0.903	4.2	
Dibenzo(a,h)anthracene	<0.1	0.267	0.86	
Benzo(g,h,i)perylene	<0.1	1.13	47	
Total PAH (EPA 16)	<1	18.7	3.47	
Total Phenols	<0.8	<0.025		
Benzene	<0.01	<0.01	0.01	230
C5-C6 Aliphatic	<0.2	<0.01		
C6-C8 Aliphatic	<0.2	<0.01		
C8-C10 Aliphatic	<0.2	<0.01		
C10-C12 Aliphatic	2.6	<0.01		
C12-C16 Aliphatic	<2	15.9		
C16-C21 Aliphatic	<5	19.8		
C21-C35 Aliphatic	17	268		
C6-C7 Aromatic	<0.01	<0.01		
C7-C8 Aromatic	<0.01	<0.01		

C8-C10 Aromatic	<0.01	<0.01		
C10-C12 Aromatic	<2	<0.01		
C12-C16 Aromatic	<2	26.7		
C16-C21 Aromatic	<5	29.7		
C21-C35 Aromatic	26	265		
Aromatics >EC40-EC44	NT	158		
Total TPH	70	1240		
Asbestos	NF	NF		
*C4SL Category 4 Screening Level for public open space, CL:AIRE 2014				

Hardings Pits Part 2A contaminated land inspection Report

The report considered documentary information about the Hardings Pits site and the results of soil sampling. Plausible source pathway receptor linkages were identified and a MODERATE/LOW risk from contamination to human health, LOW risk to property, VERY LOW risk to the wider environment and MODERATE/LOW risk was identified to surface water and groundwater. It was concluded that based on the current use, and the results of a Detailed Quantitative Risk Assessment that exposure resulting from the plant uptake of arsenic and lead in soil and the subsequent consumption of wild blackberries is unlikely to result in significant harm.

3 Site Walkover

A site walkover was carried out in July 2023. Photographs are presented in Appendix A. The site has a secure gated entrance for maintenance vehicles from Wisbech Road in the south (photograph 1) and is surrounded on the southern, Wisbech Road side by post and rail fencing which is damaged in places (photograph 2). A footpath runs north/south along the western boundary of the site, with hedges and fences separating the site from the gardens of the houses to the west. There was a small amount of litter and flytipping near the entrance to the site including a fridge (photograph 3).

The northern boundary of the site is formed by a footpath which separates the site from the Hardings Pits doorstep green (photograph 4). The north-eastern corner of the site contains a 'dog-leg' in the fence which forms the eastern border, surrounding an area of remnant hardstanding (photograph 5). Remnant hardstanding, gravelly materials and a piece of concrete were observed along the eastern boundary of the site, inhibiting some vegetation growth in places (photographs 6, 7 & 8). There is some bramble growth in the south eastern corner of the site (photograph 9 & 10). The remainder of the site is vegetated with rough grassland (photograph 11).

Location of Receptors

Humans

There are homes with gardens adjacent to the site and allotments within 10m to the west of the site. The site is used for informal recreation and dog walking.

Property

There are houses within 10m to the west of the site, and allotments managed by an allotment society.

Environment

There are no relevant types of receptor as set out in Table 1 of the statutory guidance within 1km of the site. Therefore, these receptors will not be considered further. Mitigation of the reptile habitat is reported to have been carried out when the site was cleared for the construction of Hardings Way.

Controlled Water - Groundwater & Surface water

The River Great Ouse is 250m to the west and the River Nar is 100m to the east at its closest point.

4 Contaminated Land Risk Assessment

The Council has used a process adapted from CIRIA C552 (Contaminated Land Risk Assessment, a guide to good practice) to produce the conceptual site model and estimate the risks to defined receptors. This involves the consideration of the probability, nature and extent of exposure and the severity and extent of the effects of the contamination hazard should exposure occur. Further explanation is provided in Appendix C.

Earlier investigations have identified the presence of metals, polyaromatic hydrocarbons and petroleum hydrocarbons in made ground. No evidence of harm was observed in the site walkover and there are no significant pollution incidents reported which have been associated with the site. The adjacent Hardings Pits contaminated land inspection report concluded that exposure resulting from the plant uptake of arsenic and lead in soil and the subsequent consumption of wild fruit is unlikely to result in significant harm. The Hardings Pits site contains waste material, so a more significant source of contaminants, but the edible plants are fairly shallow rooted.

Assessment of probability of a contamination event

From the information gathered it is considered that there is the potential for a source of contamination to be present on the site.

Human health, property, environment

The site does not appear to be regularly used for informal recreation or dog walking as the nearby Hardings Pits is designated and easily accessible for that use. There are a small number of brambles which could produce fruit, but there is no evidence that this area is producing a heavy crop which is regularly picked for human consumption. There is no evidence that contamination is migrating off-site or that nearby receptors are being exposed.

The probability of a contamination event affecting human health is LOW, property UNLIKELY, designated environmental receptors is UNLIKELY.

Controlled water – Groundwater, surface water

The site is unlikely to contribute to significant pollution of controlled waters, due to lack of mobile contaminants, the ground conditions and non-aquifer status of groundwater beneath the site. Site drainage does not appear to be providing a preferential pathway to surface water. Therefore a pollution event appears unlikely in the short or long term.

The probability of a contamination event to surface water and groundwater is assessed as LOW.

Assessment of Hazard

The potential source of contaminants on the site is within the made ground and surface soils, from the former harbour rail line and from materials management during construction of Hardings Way. Laboratory analysis results from earlier assessments were screened against assessment criteria derived at the time of the construction of Hardings Way. These are shown in Table 3.

Human Health

There is no visual or olfactory evidence of contaminated materials at the site surface. Levels of contamination recorded are considered to be insignificant if direct contact is not routinely occurring. The hazard is assessed as LOW.

Property

Harm, should it occur to produce, owned or domesticated animals or buildings is not expected to be significant as defined in the statutory guidance. The hazard is assessed as LOW.

Environment

In considering environmental receptors, the statutory guidance states that the authority should only regard certain receptors (described in Table 1 of the Statutory Guidance) as being relevant for the purposes of Part 2A. Harm to an ecological system outside that description should not be considered to be significant harm. The site and surrounding area do / do not contain any of the receptors stipulated in Table 1 of the Statutory Guidance.

Controlled Water -Groundwater & Surface Water

The contaminants of concern have not been reported at significant levels in perched water or groundwater within or below the site, or within nearby surface water. Therefore the hazard is assessed as LOW.

Conceptual site model

The conceptual site model (Table 5) shows the sources, pathways and receptors identified and the subsequent risk classification.

Table 5: Conceptual site model

Source	Pathway	Receptor	Probability	Hazard	Risk
Metals, polyaromatic hydrocarbons petroleum hydrocarbons asbestos containing materials within surface soils and made ground	Direct contact, ingestion, dust inhalation, plant uptake and consumption of wild fruit	Humans (adults and children)	Low	Low	LOW risk
	Direct contact	Property (buildings, animals)	Unlikely	Low	VERY LOW risk
	Direct contact	Environment*	Unlikely	Low	VERY LOW risk
	Direct contact	Controlled water (surface and groundwater)	Low	Low	LOW risk

Low risk - It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

Very low risk - There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is unlikely to be severe.

*Ecological systems as set out in Table 1 of the contaminated land statutory guidance

5 Outcome of Preliminary Risk Assessment

Conclusion

Plausible source pathway receptor linkages were identified and a LOW risk from contamination to human health, VERY LOW risk to property, VERY LOW risk to the wider environment and LOW risk was identified to surface water and groundwater.

There was no evidence of harm or of a significant possibility of significant harm to the receptors identified in the conceptual site model. As the risk posed is low, the site would be classified as Category 4 as set out in the Statutory Guidance (Appendix C contains the categorisations from the Statutory Guidance).

No evidence was noted of significant pollution of controlled waters or of the significant possibility of such pollution.

Conservative assessment criteria used in previous assessments were derived for a residential end use without home grown produce considering the use of this site as informal open space. Using these criteria indicates that the areas located near sampling locations TP20 and AWS2 may require further investigation if the site use was changed to a more sensitive end use, due to elevated concentrations of Arsenic, Lead, poly aromatic hydrocarbons and petroleum hydrocarbons and if contact with the soil and plant uptake become more likely.

Part 2A status

Statutory Guidance states that 'If the authority considers there is little reason to consider that the land might pose an unacceptable risk, inspection activities should stop at that point.' In such cases the authority should issue a written statement to that effect. This report forms that written statement.

On the basis of its assessment, the authority has concluded that the land does not meet the definition of contaminated land under Part 2A and is not considered contaminated land.

Further Action

This assessment is based on the site's current use and is valid providing no changes are made to the soil or vegetation cover material, to surface water conditions or to the site's use.

It is understood at the time of this report, that the site is proposed for a community orchard. Applicants for planning consent for a change of use of the site should have regard to the information in this report and in previous investigations, and would need specialist advice from a competent person, including an arboriculturist if this use is to be successfully and safely established.

Appendices

Appendix A: Site Photographs





Photograph 1: Southern entrance to the site



Photograph 2: Southern boundary with Wisbech Road



Photograph 3: fly-tipped fridge



Photograph 4: Boundary path with Hardings Pits



Photograph 5: North-eastern corner of the site with remnant hardstanding



Photograph 6: Remnant hardstanding, effect on vegetation growth



Photograph 7: Buried concrete close to fence



Photograph 8: Moss growth



Photograph 9: Brambles in south eastern corner of site



Photograph 10: South eastern corner of site



Photograph 11: View of the site looking north

Appendix B: Drawings

Appendix C: Risk Assessment Methodology

Land contamination: risk management guidance from the Environment Agency³ provides the technical framework for applying a risk management process when dealing with contaminated land.

The Borough Council's Contaminated Land Strategy has identified priority sites based on mapping and documentary information. The Contaminated Land Inspection Report collates all the existing information on the site and develops a conceptual site model to identify and assess potential pollutant linkages and to estimate risk.

The risk assessment process focuses on whether there is an unacceptable risk, which will depend on the circumstances of the site and the context of the decision. The Council has used a process adapted from CIRIA C552, Contaminated Land Risk Assessment, a guide to good practice⁴ to produce the conceptual site model and estimate the risk of harm to defined receptors. This involves the consideration of the probability, nature and extent of exposure and the severity and extent of the effects of the contamination hazard should exposure occur.

The probability of an event can be classified as follows:

- Highly likely: The event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;
- Likely: It is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- Low likelihood: Circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term;
- Unlikely: Circumstances are such that it is improbable the event would occur even in the long term.

The severity of the hazard can be classified as follows:

- High: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Contaminated Land Statutory Guidance, April 2012');
- Medium: Chronic damage to human health ('significant harm' as defined in 'Contaminated Land Statutory Guidance, April 2012'), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Contaminated Land Statutory Guidance, April 2012');
- Low: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in

³ www.gov.uk/guidance/land-contamination-how-to-manage-the-risks

⁴ www.brebookshop.com/samples/142102.pdf

'Contaminated Land Statutory Guidance, April 2012'). Damage to sensitive buildings, structures or the environment.

- Minor: Harm, though not necessarily significant harm, which may result in financial loss, to expenditure to resolve. Non-permanent human health effects (easily prevented by use of PPE). Easily repairable effects of damage to buildings, structure and services.

Once the probability of an event occurring and hazard severity has been classified, a risk category can be assigned from the table below:

		Hazard			
		High	Medium	Low	Minor
Probability	High Probability	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Probability	Moderate risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk
Very High Risk		<p>There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening</p> <p>This risk, if realised, is likely to result in a substantial liability.</p> <p>Urgent investigation (if not undertaken already) and remediation are likely to be required.</p>			
High Risk		<p>Harm is likely to arise to a designated receptor from an identified hazard.</p> <p>Realisation of the risk is likely to present a substantial liability.</p> <p>Urgent investigation (if not undertaken already) if required to clarify the risk and to determine the potential liability. Some remedial work may be required in the longer term.</p>			
Moderate risk		<p>It's possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that harm would be relatively mild.</p>			
Moderate/Low risk		<p>It is possible that harm could arise to a designated receptor from an identified hazard. However, if any harm were to occur it is more likely that harm would be relatively mild.</p>			
Low Risk		<p>It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.</p>			
Very Low Risk		<p>There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is unlikely to be severe.</p>			

*Determination of contaminated land
Contaminated Land Statutory Guidance, April 2012*

Human Health

Category	
1	<p>The local authority should assume that a significant possibility of significant harm exists in any case where it considers there is an unacceptably high probability, supported by robust science-based evidence that significant harm would occur if no action is taken to stop it. For the purposes of this Guidance, these are referred to as “Category 1: Human Health” cases. Land should be deemed to be a Category 1: Human Health case where:</p> <ul style="list-style-type: none">(a) The authority is aware that similar land or situations are known, or are strongly suspected on the basis of robust evidence, to have caused such harm before in the United Kingdom or elsewhere; or(b) The authority is aware that similar degrees of exposure (via any medium) to the contaminant(s) in question are known, or strongly suspected on the basis of robust evidence, to have caused such harm before in the United Kingdom or elsewhere;(c) The authority considers that significant harm may already have been caused by contaminants in, on or under the land, and that there is an unacceptable risk that it might continue or occur again if no action is taken. Among other things, the authority may decide to determine the land on these grounds if it considers that it is likely that significant harm is being caused, but it considers either: (i) that there is insufficient evidence to be sure of meeting the “balance of probability” test for demonstrating that significant harm is being caused; or (ii) that the time needed to demonstrate such a level of probability would cause unreasonable delay, cost, or disruption and stress to affected people particularly in cases involving residential properties.
2	<p>Land should be placed into Category 2 if the authority concludes, on the basis that there is a strong case for considering that the risks from the land are of sufficient concern, that the land poses a significant possibility of significant harm, with all that this might involve and having regard to Section 1. Category 2 may include land where there is little or no direct evidence that similar land, situations or levels of exposure have caused harm before, but nonetheless the authority considers on the basis of the available evidence, including expert opinion, that there is a strong case for taking action under Part 2A on a precautionary basis.</p>
3	<p>Land should be placed into Category 3 if the authority concludes that the strong case described in 4.25(a) does not exist, and therefore the legal test for significant possibility of significant harm is not met. Category 3 may include land where the risks are not low, but nonetheless the authority considers that regulatory intervention under Part 2A is not warranted. This recognises that placing land in Category 3 would not stop others, such as the owner or occupier of the land, from taking action to reduce risks outside of the Part 2A regime if they choose. The authority should consider making available the results of its inspection and risk assessment to the owners/occupiers of Category 3 land.</p>

Human Health

Category

- 4** The local authority should consider that the following types of land should be placed into Category 4: Human Health:
- (a) Land where no relevant contaminant linkage has been established.
 - (b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.
 - (c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.
 - (d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

Appendix D: Previous investigation logs & chemical analysis