Borough Council of
King's Lynn &
West Norfolk

Contaminated Land Inspection Report

Massingham PSD
Hillington
King's Lynn

March 2024

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Contents

Executive Summary

The borough council has a 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 identified Massingham Petroleum Storage Depot (the site) as being of Very High priority for detailed inspection due to the presence of largescale petroleum storage and potentially sensitive receptors.

Given the former site use, an assessment of the site has been undertaken to assess the potential for harm to human health, property, ground/surface water and environmental receptors under Part 2A.

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 visit to the area, the following can be stated: The site was historically a Petroleum Storage Depot (PSD) operated by the Ministry of Defence. The site was operational between 1939 and 1994. The site's present use is a mothballed PSD. The site is maintained by the Defence Infrastructure Organisation (DIO).

Several site investigations have been undertaken by contractors for DIO. The reports indicated that contamination was present on site in both soil and in the groundwater of the Principal Aquifer. From the contaminated land risk assessment, plausible source pathway receptor linkages were identified.

There was no evidence of significant effects on property (buildings or domesticated animals) Therefore the risk to property is considered to be VERY LOW.

There are no relevant types of receptor as set out in Table 1 of the statutory guidance within 1km of the site. These receptors were not considered further in this inspection report.

The site is enclosed and access is restricted to personnel of the Ministry of Defence or their contractors. Therefore, the risk to human health by direct contact is considered to be VERY LOW.

Hydrocarbon contamination has been noted in the groundwater beneath the site which is within a drinking water Source Protection Zone 1, however the boreholes immediately adjacent to the site are backfilled and will not be returned to public supply. Contamination to human health ingestion via potable water is currently considered to be MODERATE/LOW.

Soil contamination has been identified and it is considered that there is an active pathway to groundwater and surface water. Therefore, it is considered that there is a MODERATE/LOW risk to the Principal Aquifer and surface water receptors.

As contamination has been identified in the groundwater beneath the site and the site is a military site it could potentially be classified as a ‘Special Site’. This indicates that the Environment Agency, would be the regulating authority. The Environment Agency are working with DIO regarding protection of controlled waters and their advice will be taken before any decision is made on whether the site should be determined as Contaminated Land. As the risk to human health and controlled waters is not low, the site could be classified as Category 3 (human health) and Category 3 (water).

The contaminated land statutory guidance allows for postponing determination ‘if the land owner or some other person undertakes to deal with the problem without determination, and the authority is satisfied that the remediation will happen to an appropriate standard and timescale.’

DIO have indicated that they will be commissioning further works to address the Environment Agency’s comments on the land quality assessments. As the Authority is satisfied that the site owners are actively cooperating to address the risks identified on site, determination of the site is postponed allowing any works to be completed. This follows section 5.15 of the Contaminated Land Statutory Guidance.

A determination of the site as contaminated land will not be made at present, but the site will be kept under regular review. The next review will be in March 2025, or if additional information becomes available. The report will also be reviewed if site conditions change, or if there are any reports of pollution or harm from the site.

1 Introduction

The Borough Council of King's Lynn and West Norfolk (BCKLWN) has a 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 identified Massingham Petroleum Storage Depot (the site) as being of Very High priority due to the presence of large scale petroleum storage and potentially sensitive receptors. If the local authority identifies land where it considers there is a reasonable possibility that significant contamination exists, it should inspect the land to obtain sufficient information to decide whether it is contaminated land.

Before making any determination, the local authority should identify one or more significant contaminant linkage(s), and carry out a robust, appropriate, scientific and technical assessment of all the relevant and available evidence. This inspection report sets out this technical assessment.

This report details a review of information and written statement of conclusions on the current risk to human health, property, surface water, groundwater and the wider environment in line with section 4.3 and 5.3 of the borough council's Contaminated Land Inspection Strategy.

The site is owned by the Ministry of Defence and therefore could potentially be defined as 'Special Site' as defined by The Contaminated Land Regulations 2006 2.1(g)(i). The site was also considered a potential special site and priority for inspection as there was a possibility that the land could be affecting controlled waters, and particularly waters that are intended to be used for the supply of drinking water. The Environment Agency are the appropriate agency for special sites and have been notified of the investigation.

The contaminated land statutory guidance (5.5) states that the local authority has the sole responsibility for determining whether any land appears to be contaminated land. However, in making such decisions the authority may rely on information or advice provided by another body such as the Environment Agency (EA). The EA are providing ongoing advice to both the site owner and the borough council's environmental quality team.

The statutory guidance (5.15) allows for postponing determination 'if the land owner or some other person undertakes to deal with the problem without determination, and the authority is satisfied that the remediation will happen to an appropriate standard and timescale. This inspection report also sets out the action taken by the landowner.

2 Desk Study Information

Location

The site's location is shown in Figure 1. The grid reference for the centre of the site is 577299, 325386. The nearest postcode is PE31 6DS.

Previous investigation

The site has been subject to a number of investigations. Table 1 below lists the reports used in compiling this written statement.

Table 1 Documents used in this report		
Date	Author	Title
July 2013	Atkins	Land Quality Assessment: Combined Phase 1 and 2
November 2015	Parsons Brinckerhoff	Land Quality Assessment. Phase 2
September 2017	RSK	Additional Phase 2 Land Quality Assessment Review
May 2020	Environment Agency	Letter Re: Massingham PSD Land Quality Assessments
September 2022	Environment Agency	Email correspondence

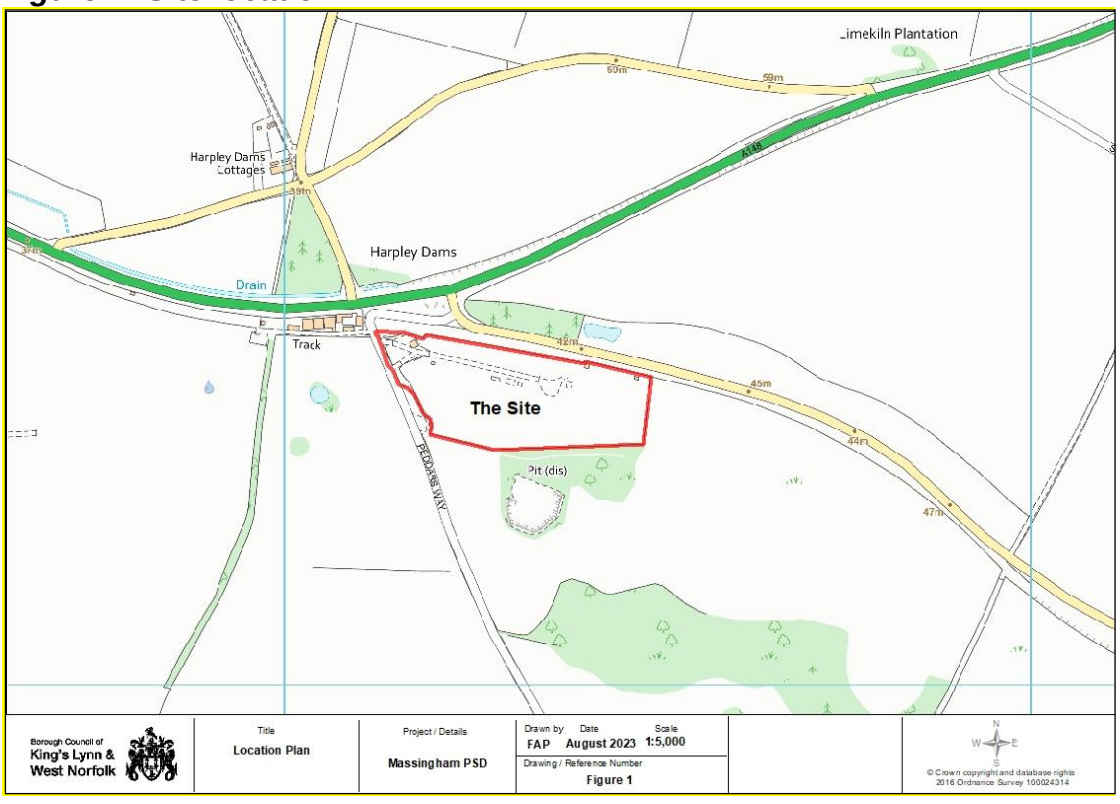
Previous Site Usage

The site was historically a petroleum storage depot operated by the ministry of Defence between 1939 and 1994. The site stored Kerosene and engine fuel. The petroleum products were mainly supplied to RAF Sculthorpe.

Present Site Usage

The petroleum storage depot has been mothballed and is not operational at this time. The site plan below shows the site location.

Figure 1: Site location



Ownership & 'relevant persons'

The site belongs to the Ministry of Defence (Secretary of State for Defence) and therefore could be designated a 'Special Site'. Part 2A EPA 1990 78 (1)(b) states that "at any time it appears to a local authority that any contaminated land in its area might be land which is required to be designated as a special site, the authority shall give notice of that decision to the relevant persons." In this case this is the Environment Agency, and the owner of the land. The environmental quality team have notified:

Defence Infrastructure Organisation (DIO), Environmental and Ordnance Liability Management
Environment Agency, Groundwater & Contaminated Land, East Anglia

Environmental Setting

Geology

Geological maps indicate that bedrock geology is Cretaceous Hollywell Chalk and New Pit Chalk Formations. Superficial geology is The Lowestoft Formation (Clay and Silt). BGS borehole records in the vicinity of the site indicate the presence of chalk within 10 metres of the ground surface.

The site is at approximately 45 metres above ordnance datum (m AOD). Previous investigations have shown the geological strata encountered to be as set out in table 2.

Table 2: Geological strata encountered (approximate, from Atkins 2013 report)

Strata	Thickness range (m)	Average thickness (m)	Range to top of stratum (m AOD)
Topsoil	0.10-1.40m	0.30m	45.00 - 42.60
Made Ground	0.40m	0.40m	41.00
Lowestoft Formation	1.00-15.40m	*	46.60 – 40.70
Cretaceous Hollywell Chalk and New Pit Chalk Formations	N/A	N/A	46.20 – 29.10

*Not calculated as depth not proven on most boreholes.

An Environment Agency review of the available geological records reports the presence of a buried tunnel-valley in the vicinity of the site (inferred in 'The Buried Tunnel Valleys of East Anglia', Woodland, 1970). The EA report that the intrusive investigations undertaken by Atkins and RSK have proven the presence of a buried channel / buried tunnel-valley feature in the central and northern parts of the site with several boreholes not encountering the base of the superficial deposits to the maximum drilled depth (approximately 20 metres below ground level). Chalk was reported to be present at shallow depth beneath the southern and eastern parts of the site.

Hydrogeology
The bedrock is designated by the Environment Agency as a Principal Aquifer. The superficial deposits are a Secondary Aquifer. Both are designated as having high leaching potential able to transmit pollution very easily. The site is located within a Source Protection Zone (SPZ) 1 and a public potable abstraction is located approximately 250m to the west of the site which is operated by Anglian Water, (Harpley Dams borehole, Licence No. 6/33/64/25, NGR: TF769254) but which is reported to not currently be in use.

The buried tunnel-valley may indicate a preferential groundwater flow direction, and potential pathways for contaminant migration.

Hydrology
The nearest major water feature is a drain which runs along a former railway line approximately 60m to the north of the site. A pond is located approximately 40 metres to the north. The Babingley River is approximately 3km to the north west.

Local Authority Pollution Prevention and Control Regulations (LAPPC)
No LAPPC processes are recorded on site or within 500m.

Environment Agency information
The Environment Agency Web records indicate the following:

- The site is in a Nitrate Vulnerable Zone for surface waters.
- No historic landfills are located within 500m of the site.

DEFRA MAGIC website records
MAGIC website records the following:

- Countryside Stewardship Water Quality Priority Areas (England) (Medium Priority).
- Sediment Issues Priority (England) (Medium Priority).
- Woodland - Water Quality (England) (Lower Spatial Priority).
- The site is in a Nitrate Vulnerable Zone (NVZ) for surface water and groundwater.
- The site is located within a Source Protection Zone 1.

Historic Maps

E-map Explorer

Enclosure Map 1800 – 1850 – Not available.

Tithe map circa 1840 – The site is shown as a field.

Ordnance Survey 1st Ed. 1879-1886 – The site is shown as a field. A railway line is visible to the north, beyond which is an area called Harply Dams. Several pits are shown in the general locality.

Historic Maps on file at the Borough Council of King's Lynn and West Norfolk
Historic maps information is summarised below.

1843 – 1893: Available mapping depicts the same features as the 1st ed. OS map.

1891 – 1912: The site is depicted as shown above with the exception that an additional piece of railway line (called Wilson's Siding) has been developed onto the site which connects to a tramway serving a gravel pit to the south of the site.

1945 – 1970: The site is depicted as a Petroleum Depot. The map depicts several mounds with flat tops which may indicate sunken holding tanks. Various buildings and structures can be seen on site, use unknown.

1970 – 1996: Not Available.

Aerial Photographs
Aerial photography information is summarised below.

1945 – 1946 MOD Aerial Photograph - The site is shown as a depot at this time. Some of the buildings described on the 1945-1970 map are visible.

1988 Aerial Photograph – The site is as described above.

1999 Aerial Photograph – The site is as described above.

2006-2009 Aerial Photograph – The site is as described above.

Planning History
There is 1 application for the site which was not determined:

Year	Application ref	Description
2006	06/02627/HZ	The receipt by pipeline, road and rail of bulk storage and delivery by pipeline, road and rail of refined hydrocarbon liquids, kerosene's, gasolines and gas oils. Application Not Determined as application did not need to be made under the planning regime.

Environment Agency Consultation
The Environment Agency have been contacted and responded in September 2022 that the site was not formally designated a special site but could be described as a 'potential special site'. Work undertaken by DIO has been on a voluntary basis under the process lead by BCKLWN in line with the Part 2A Inspection Strategy.

The EA, May 2020 letter report reviewed reports for the site and concluded that there appeared to be no immediate risk to controlled waters receptors. The review highlighted various uncertainties that needed addressing with an expectation that this would be undertaken voluntarily.

The EA sought confirmation from Anglian Water Services that the Harpley Dams public water supply abstraction licence remains out of use.

In September 2022 the Environment Agency reported that DIO were currently working through the EA review report, and are commissioning further works to address the comments. DIO have confirmed that the further work is being procured.

Anglian Water Information

In email correspondence Anglian Water (AW) confirmed the following with regards to the adjacent Harpley borehole, Licence No. 6/33/64/25, NGR: TF769254.

- Anglian Water Services boreholes immediately adjacent to this site are backfilled.
- Any return to supply plans would only be considered after careful review of groundwater contaminant risk (including the outcomes of the Part 2A investigation).
- A return to supply is not planned in the short, or medium term.

The nearest operational groundwater abstraction point is reported to be Harpley Dams (Sands) Licence No. AN/033/0064/003, NGR: TF760257, which abstracts from the Sandringham Sands aquifer. The aquifer at this location is reported to be overlain by the Upper Chalk and Gault Clay formations and not at risk from surface contamination.

AW report that the site lies on the boundary of Source Protection Zone 2/3 of the Hillington (Chalk) and Congham (Chalk) sources. Hillington (Chalk) is reported to be very highly vulnerable to contamination from surface as the Upper Chalk is at outcrop and groundwater levels typically within 5m of surface. This source is downgradient of the site. It is further reported that a ditch system runs along the A148 (Fakenham Road), and Abbey Road, directly past the Hillingdon abstraction and into the Babbingley River. Any contaminated surface water, either from runoff or seasonal chalk springs, could pass within 50m of the abstraction boreholes and potentially leach to ground.

Norfolk County Council Records

Norfolk County Councils planning website does not record any planning records for the site.

3 Site Walkover

Access was not gained to the site, but the area was visited in 2012 and observations made from the publicly accessible boundary. The publicly accessible areas were revisited in 2023, and no significant changes were noted to the site or surrounding area.

Location of Receptors

Humans
The site is enclosed behind a secure fence and is not open to the public. It is assumed that the site is maintained by the DIO either through military personnel or contractors, both of whom it is anticipated would operate under health and safety guidance specific for that location.
A house and commercial dog boarding kennel is located approximately 40m to the northwest of the site.

The site is in a source protection zone for drinking water and several public water abstraction points are located to the east and west of the site boundary.

Property
One house is located approximately 40m to the northwest of the boundary of the site. A commercial dog boarding kennels (Dogotel) is associated with the house. The statutory guidance defines both buildings and owned or domesticated animals as relevant receptors for property effects.

Environment
There are no relevant types of receptor as set out in Table 1 of the statutory guidance within 1km of the site. Therefore, this receptor will not be considered further.

Controlled Water - Groundwater
The bedrock and superficial deposits beneath the site are classified as a Principal Aquifer. The Cretaceous Hollywell Chalk and New Pit Chalk Formations are part of the former Middle Chalk Formation. The Middle Chalk Formation is not a designated aquifer as defined in Schedule 1 of the Contaminated Land (England) Regulations 2006 relating to special sites.

Controlled Water - Surface Water
Earlier research indicated the presence of a ditch along the northern perimeter of the site. The most recent walkover did not confirm presence of an active watercourse in this location. Therefore, this is not considered to be a significant receptor for surface water. A partially culverted drain is located 60 metres north from the site boundary adjacent to the former railway line. A pond is located approximately 40 metres to the north. Anglian Water identified a ditch system which runs along the main road to the north which could allow surface run off to enter the Babbingley River.

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 A.

Potential Sources of Contamination

The Land Quality Assessment (LQA) report produced by Atkins, 2013 discussed two previous reports, Disused Aviation Fuel Depots. Massingham Pump Station and Storage Site by Cuthbertson Environmental Limited, and Land Quality Assessment Massingham by Aquaterra Environmental Consultants Limited. The Cuthbertson report indicates that there is contamination present within on the site, specifically relating to 'leaded graves' (for the deposition of petroleum sludges potentially containing tetraethyl lead), but did not find any groundwater contamination.

The LQA considered relevant receptors including the public water supply borehole. During the site investigation for the LQA a series of boreholes was undertaken, with samples of soil and groundwater selected for chemical analysis.

The LQA identified five areas of potential concern:

1. TPH contamination in soil above the commercial/industrial land-use GAC for human health;
2. Elevated soil (hydrocarbon) vapours;
3. Naphthalene/benzene/ethylbenzene/xylenes in groundwater/TPH plume. Hydrocarbons in groundwater with benzene and TPH above the DWS, naphthalene, benzene, xylenes and ethylbenzene above the EQS in groundwater and two dissolved phase hydrocarbon plumes have been identified, migrating to the northeast;
4. Ground gas specifically carbon dioxide and methane At least four 'lead graves' where hydrocarbon sludge and potentially tetraethyl lead had been deposited.

The LQA report concluded that "Based on the Combined Phase 1 & 2 LQA carried out, the Site may not be suitable for use as a PSD (i.e. commercial/industrial), because of the risks identified.":

The presence of lead graves could be a source of significant contamination. The investigations have not specifically targeted these locations and no remediation works are reported. A number of other potential sources of contamination are identified including railway sidings, loading area, slop tank, underground storage tanks (USTs), manifolds, and underground pipelines.

The latest round of intrusive investigations in the Additional Phase 2 Land Quality Assessment Review by RSK dated September 2017 identified a hydrocarbon plume located in the north of the site. The measured

concentrations of a number of hydrocarbons and TPH fractions are reported to exceed the applicable water quality standards (environmental quality standards and/or drinking water standards) in groundwater sampled from beneath the site. Pollutant linkages to controlled waters were identified, these include:

- Vertical and lateral migration of dissolved phase contamination including leachate to the groundwater beneath the site within the secondary B
- aquifer and principal aquifer;
- Lateral migration of dissolved phase contamination from the site to surface water drain 60 m from the site.

Concentrations of hydrocarbons in soils at shallow depths were generally reported to be of low concentrations, below generic assessment criteria (GAC) for residential and commercial end use. A moderate to low risk to on site and off site users and potential future site users is reported.

In their review of submitted reports dated May 2020, the Environment Agency stated that there 'appeared to be no immediate risk to controlled waters receptors' but acknowledges a potential risk associated with the identified pathways. The Environment Agency highlighted various uncertainties, data gaps and outstanding risks that will need to be addressed. This could include targeted sampling near to identified sources of contamination, including sampling from soils beneath the underground storage tanks and details of groundwater quality in the chalk. In correspondence with the DIO it is understood they are commissioning further works to address the Environment Agency's comments.

From the information gathered it is considered that there is the potential for multiple sources of contamination to be present on the former PSD site. The potential sources are above and below ground storage tanks, the pipe infrastructure, lead graves, railway sidings and loading area. Potential contaminants are petroleum hydrocarbons and associated inorganic substances associated with the fuel use such as lead.

Assessment of probability of a contamination event

Human health, property
The PSD is in a remote rural area with one house positioned within 250m of the site. The site is also secured against trespass by a metal fence and chain-link gate. Therefore the probability of a contamination event affecting human health via direct contact is considered UNLIKELY.

The Anglian Water licensed abstraction is located 150 metres west of the site boundary. The Land Quality Assessment indicated that the groundwater beneath the site had been impacted by hydrocarbon contamination. The proximity of the potable drinking water supply and the identified groundwater contamination were considered, but as the borehole is not in use, the probability of a contamination event affecting human health via ingestion of contaminated drinking water is considered LOW.

The only property present on site is that associated with the PSD. The LQA considered that reported levels of methane and carbon dioxide are most likely generated from bacterial degradation of the hydrocarbon contamination. This would indicate that the ground gases are localised to the area of contamination and would not affect the nearby residential property. Therefore, the probability of a contamination event affecting property is UNLIKELY.

Controlled water - Groundwater
The site is situated on bedrock classified as a Principal Aquifer and the superficial deposits are classified as a Secondary Aquifer. Both aquifers are classified as having a high leaching potential and leaded graves are recorded as being present on site. The Environment Agency's review states that there appears to be no immediate risk to controlled waters receptors, therefore the probability of a contamination event to groundwater is assessed as LOW.

Controlled water - Surface water
Heavy end hydrocarbons and a number of PAH compounds were reported in a 2015 sample from the surface water course down gradient of the site. Based on the reported groundwater modelling, and screening against site specific assessment criteria, and the calculated travel times between the source and receptor, the 2015 report considered it to be highly unlikely that this specific impact to the surface water course was associated with groundwater discharge from the site. The impacts were considered to be likely to be associated with surface water run-off derived from the nearby road. RSK have concluded that, based on the calculated travel times, benzene and other contaminants could reach the surface water drain 60m from the site in the long term. RSK concluded that probability of lateral migration of dissolved phase contamination from the site to the surface water is currently concluded to be low. As the impact is only likely in the long term, the probability is assessed to be LOW.

Assessment of hazard
The LQA assessment by Atkins assessed the chemical analysis results against a screening criteria based on the site's present usage. This assessment has been used to assess the potential harm or pollution to the identified receptors.

Human Health
The level of contamination reported in the near surface soils is not considered to present a significant hazard to human health via direct contact, inhalation or ingestion. Therefore the hazard to human health from direct contact is considered to be LOW.

Contamination has been detected in the groundwater beneath the site which exceeded the adopted assessment criteria (Atkins SSV commercial/Industrial). The hazard to human health via the potential ingestion from potable drinking water abstraction points operated by Anglian Water is potentially MEDIUM.

Property
The only property on site is the buildings and tanks associated with the PSD. The nearest property is the Dogotel and associated residential dwelling. No records exist of any dogs being affected by any emissions from the PSD. Although the LQA report records elevated methane gas in the boreholes this is

considered to come from the bio-degradation of the hydrocarbon contamination. Therefore the hazard to property is considered to be LOW.

Controlled Water -Groundwater
The Atkins LQA reported that the Principal Aquifer has been impacted by hydrocarbon contamination from the site which exceeds the adopted assessment criteria (Atkins WSV). Therefore the hazard to groundwater is considered to be MEDIUM
RSK and the Environment Agency note groundwater quality in the chalk is a significant data gap and a source of uncertainty.

Controlled Water - Surface waters
Elevated levels of contamination have been detected within the near surface soils which could adversely affect the water quality in the ditch and surface water to the north. Therefore the hazad is assessed as MEDIUM.

Conceptual site model

The conceptual site model (Table 3) shows the sources, pathways and receptors identified and the subsequent risk classification.

Table 3: Conceptual site model

Source	Pathway	Receptor	Probability	Hazard	Risk
Heavy metals, polyaromatic hydrocarbons petroleum hydrocarbons	Direct contact, dust inhalation.	Humans (adults and children)	Unlikely	Low	Very Low Risk
	Ingestion (if AWS borehole is inactive)	Humans (adults and children)	Low	Medium	Moderate/Low Risk
	Direct contact	Property (buildings & animals)	Unlikely	Low	Very Low Risk
	Direct contact	Environment*	N/A	N/A	N/A
	Direct contact	Controlled water (surface and groundwater)	Low	Medium	Moderate/Low Risk

Very High Risk - 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

High Risk - Harm is likely to arise to a designated receptor from an identified hazard.

Moderate risk - 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.

Moderate/Low risk - 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.

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 VERY LOW risk from contamination to human health via direct contact and MODERATE/LOW risk for ingestion via potable water. A VERY LOW risk was assigned to property, No risk was identified to the wider environment and a MODERATE/LOW risk was identified to surface water and groundwater.

As the risk to human health is not low, the site could be classified as Category 3 (human health). Appendix B contains the categories from the statutory guidance.

The LQA produced by Atkins has identified hydrocarbon contamination in the groundwater beneath the site which exceeded the assessment criteria. Based on the information gathered to date, the pollution identified could be currently classified as Category 3 (Water). Appendix B contains the categories from the statutory guidance.

As the source of the contamination is hydrocarbons from a military site and the receptor is controlled waters, including water intended for human consumption, the Contaminated Land (England) Regulations 2006 identify that the site has the potential to be designated as a 'Special Site'. Before making a decision regarding designation the local authority must request the advice of the appropriate Agency (the Environment Agency), and must have regard to any advice given by that Agency in response to the request. This inspection report has been compiled following Environment Agency advice.

The contaminated land statutory guidance allows for postponing determination 'if the landowner or some other person undertakes to deal with the problem without determination, and the authority is satisfied that the remediation will happen to an appropriate standard and timescale.'

DIO have indicated that they will be commissioning further works to address the Environment Agency's comments on the land quality assessments. As the Authority is satisfied that the site owners are actively cooperating to address the risks identified on site, determination of the site is postponed allowing any works to be completed. This follows section 5.15 of the Contaminated Land Statutory Guidance.

The statutory guidance recommends that the local authority should keep the status of the land under review and take reasonable measures to ensure that the postponement of determination does not create conditions under which significant risks could go unaddressed in the future.

Recommendation & Review Date

As work is ongoing, the site should be kept under review. The next review date will be March 2025. Contact will be made with the Environment Agency, DIO and Anglian Water to confirm if site conditions have changed or if any new sources, receptors or exposure pathways have been introduced. The report should also be reviewed if site conditions change, or if there are any reports of pollution or harm from the site.

Appendices

Appendix A: Risk Assessment Methodology

Land contamination: risk management guidance from the Environment Agency[1] 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 practice[2] 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 'Contaminated Land Statutory Guidance, April 2012'). Damage to sensitive buildings, structures or the environment.

[1] gov.uk/guidance/land-contamination-how-to-manage-the-risks
[2] www.brebookshop.com/samples/142102.pdf

- 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	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 This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. 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.
Moderate risk	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.
Moderate/Low risk	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.
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.

Appendix B Definition of contaminated land, Contaminated Land Statutory Guidance, April 2012

Definition of contaminated land Significant harm to human health and Significant possibility of significant harm to human health	
Category	
1	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: (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	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.
3	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.

Significant harm to human health and Significant possibility of significant harm to 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).

Definition of contaminated land Significant pollution of controlled waters and Significant possibility of such pollution
The local authority should consider these factors in the context of the broad objectives of the regime as set out in Section 1. It should also consider how the factors interrelate (e.g. likelihood relative to impact). The authority should then decide which of the following categories the land falls into. Categories 1 and 2 would comprise cases where the authority considers that a significant possibility of significant pollution of controlled waters exists. Categories 3 and 4 would comprise cases where the authority considers that a significant possibility of such pollution does not exist.
(a) Category 1 (Water): This covers land where the authority considers that there is a strong and compelling case for considering that a significant possibility of significant pollution of controlled waters exists. In particular this would include cases where there is robust science-based evidence for considering that it is likely that high impact pollution (such as the pollution described in paragraph 4.38) would occur if nothing were done to stop it.
(b) Category 2 (Water): This covers land where: (i) the authority considers that the strength of evidence to put the land into Category 1 does not exist; but (ii) nonetheless, on the basis of the available scientific evidence and expert opinion, the authority considers that the risks posed by the land are of sufficient concern that the land should be considered to pose a significant possibility of significant pollution of controlled waters on a precautionary basis, with all that this might involve (e.g. likely remediation requirements, and the benefits, costs and other impacts of regulatory intervention). Among other things, this category might include land where there is a relatively low likelihood that the most serious types of significant pollution might occur.
(c) Category 3 (Water): This covers land where the authority concludes that the risks are such that (whilst the authority and others might prefer they did not exist) the tests set out in Categories 1 and 2 above are not met, and therefore regulatory intervention under Part 2A is not warranted. This category should include land where the authority considers that it is very unlikely that serious pollution would occur; or where there is a low likelihood that less serious types of significant pollution might occur.
(d) Category 4 (Water): This covers land where the authority concludes that there is no risk, or that the level of risk posed is low. In particular, the authority should consider that this is the case where: (a) no contaminant linkage has been established in which controlled waters are the receptor in the linkage; or (b) the possibility only relates to types of pollution described in paragraph 4.40 above (i.e. types of pollution that should not be considered to be significant pollution); or (c) the possibility of water pollution similar to that which might be caused by “background” contamination as explained in Section 3 (of the Statutory Guidance).