Shredded Wheat Factory

South Site

Piling Risk Assessment

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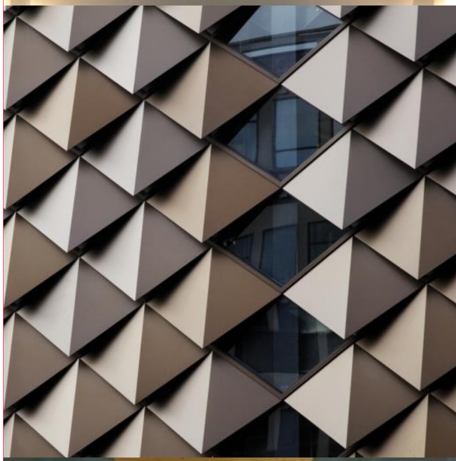
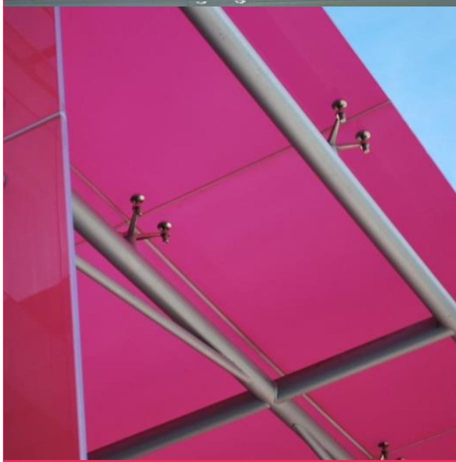
Client Name: Metropolitan Development Services

Client Address: The Grange, 100 High Street, Southgate, N14 6PW

Site Address: Broadwater Road Site, Welwyn Garden City, AL7 3BQ





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Appendices

1.0 Introduction

Piled foundations are proposed for the development at the southern part of an area referred to as the shredded wheat factory site.

Given the sensitivity of the groundwater underlying the site a piling risk assessment has been produced, in order to identify the risks associated with a piled foundation solution.

As detailed below, the assessment of risk presented by a piled foundation solution has been identified as a specific condition to the overall development of the site (Planning Application no. N6/2015/0294/PP).

Condition 32: *No piling shall take place without the express written consent of the Local Planning Authority and until evidence to show that there is no resultant unacceptable risk to groundwater and a piling method statement (detailing the depth and type of piling to be undertaken and the methodology by which such piling will be carried out, including measures to prevent and minimise the potential for damage to subsurface sewerage infrastructure, and the programme for the works) has been submitted to and approved in writing by the Local Planning Authority. Any piling must be undertaken in accordance with the terms of the approved piling method statement.*

This report has been written to address this planning condition.

1.1 Scope

This piling risk assessment provides an overview of the site's ground and groundwater conditions and considers the potential risks associated with the adoption of Continuous Flight Auger (CFA) piling to groundwater.

The report also identifies appropriate risk management and monitoring protocols that can be adopted to ensure any residual risk is brought within adequate and practicable limits.

In preparation of this report, reference is being made to Environment Agency guidance on Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination (ref 1).

Particular reference is also being made to the most recent environmental assessment completed for this site by EAME (ref 2). It is anticipated that readers of this risk assessment will have access to the environmental assessment completed by EAME and hence, a copy has not been included.

2.0 The Site

2.1 Site Location

The southern site is approximately 3.6 ha in area and is also accessed via Hydeway off Broadwater Road (A1000). The site is located centrally within the town of Welwyn Garden City at National Grid Reference (NGR) TL 24134 12739. The site is relatively flat and lies at an elevation of between 84 and 85 metres above ordnance datum (AOD). The Site has largely been cleared of all above ground structures. A site location plan can be referred to in *Appendix A* of this report.

2.2 Site History

With the first buildings have appeared on site in connection with the Shredded Wheat Factory, the area of the site has undergone a number of phases of development since the 1920s.

Although, generally referred to as the southern part of the Shredded Wheat Factory site, reports generally subdivide the site into three zones, namely the 'Cereal Partners Facility', the 'Suchard Chocolate Factory', and the 'Polycell Factory' zone (ref 2).

For the purpose of this Piling Risk Assessment, the latter, namely the 'Polycell Factory' zone is of prime significance. The area was occupied by a film study until the 1940s, when it was taken over by the Ardath Tobacco Company. Then, in the 1960s, this site zone was taken over by Polycell, until Polycell ceased operation on this site in 1998.

There were two principal areas of production; the Polyfilla powder and paste area and the liquids area.

Associated with the liquids area was a solvent tank farm (see Figure 2-1 & Figure 2-2), comprising 13 (six in use when the site was operational, seven redundant) underground storage tanks (USTs) and one above ground storage tank (AST).

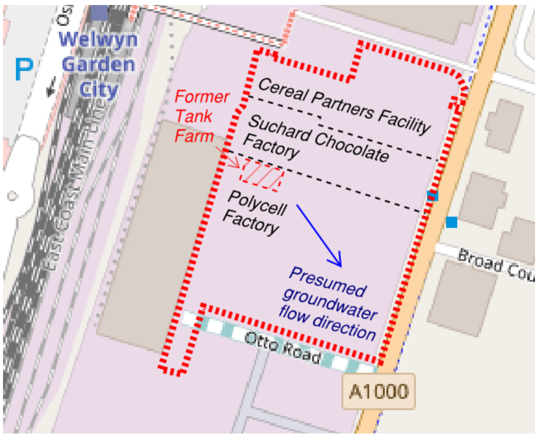

Figure 2-1: Southern part zones

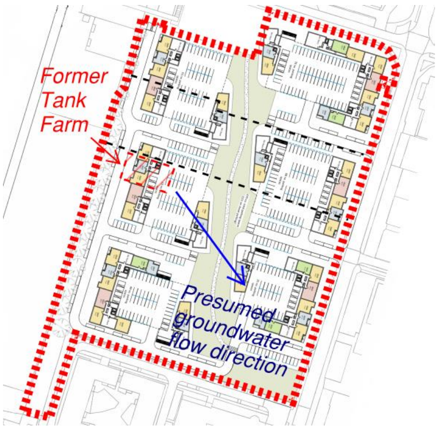

Figure 2-2: Former tank farm in the context of the proposed development

2.3 Hydrogeology

2.3.1 Superficial deposits

Sands and gravels of the Kesgrave Catchment Subgroup underneath the site are classed by the Environment Agency (EA) as a ‘Secondary A Aquifer’. These are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers.

In southern area of the site, geological maps indicate these sands and gravels to be covered by the Lowestoft Formation, which is a Diamicton, comprising of sandy gravelly clay. The Lowestoft Formation is classified by the EA as a Secondary (Undifferentiated) Aquifer. Units are assigned as Secondary (Undifferentiated) Aquifers in cases, where it has not been possible to attribute either category A or B to a rock type.

2.3.2 Bedrock

The entire Site is underlain by chalk of the Lewes Nodular and Seaford Chalk Formations. These formations are defined by the Environment Agency (EA) as a Principal Aquifer. Principal Aquifer are layers of rock or drift deposits that have high intergranular and/or fracture permeability. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

The EA have defined Groundwater Source Protection Zones (SPZs) for groundwater sources near abstractions (e.g. water wells / boreholes) or springs. These zones are designated to protect groundwater from contamination in the vicinity of abstractions used for public drinking water supply.

The maps show three main zones; an inner, an outer and the total catchment, with a fourth zone occasionally applied, representing a surface water catchment, draining and feeding the groundwater aquifer.

The EA website indicates that the site is situated within a ‘Total Catchment Zone 3’ (SPZ3).

2.4 Hydrology

The nearest named surface watercourses are the River Mimram, situated approximately 2 km to the north and the River Lea approximately 1.8 km to the south-southwest.

There are no on-site water features.

2.5 Ground Model

2.5.1 Geology

Superficial deposits

Underneath the made ground that was usually found to depths of approximately 1 meter but in places to depths of up to 3 - 5 metres below ground level, superficial deposits, namely the Lowestoft Formation, followed by the Kesgrave Catchment Subgroup. The Lowestoft Formation and the Kesgrave Catchment Subgroup comprise of sandy gravelly clays and sands and gravels respectively.

These superficial are present to depths ranging from approximately 11 and 21 meters below ground levels (m bgl.).

Bedrock deposits

The superficial deposits and underlain by chalk of the Lewes Nodular and Seaford Chalk Formations.

2.5.2 Groundwater

Groundwater was generally encountered within the chalk of the Lewes Nodular and Seaford Chalk Formations at depths between approximately 22.0 and 22.8 meters below ground levels [or at ordinance datum levels between +62.1 m OD and +62.9 m OD].

The Lewes Nodular and Seaford Chalk Formations are classed as a Principal Aquifer. Groundwater is therefore considered to be of high sensitivity. The site is in the Total Catchment (Zone 3) of an SPZ3.

The Lowestoft Formation and the Kesgrave Catchment Subgroup are classed as Secondary A Aquifer and Secondary (Undifferentiated) Aquifers. However, underneath the site, they have not been found to contain groundwater (i.e. groundwater was found at 22-23 meters below ground levels and therefore at depths beyond that of superficial deposits only).

In their report, EAME concluded that groundwater monitoring data suggests that two groundwater units are present beneath the site; an upper unit within the more weathered ‘putty’ chalk and a deeper unit within the ‘normal’/’hard’ chalk.

Hydraulic conductivity testing in the deeper (between depths of approximately 42 and 49 m bgl.) ‘normal’/’hard’ chalk revealed a hydraulic conductivity (K) value (2.07 m/d) that is approximately 6 times higher than the K value (0.33 m/d) found at shallowed depths (ref 3).

Based on the monitoring data, EAME interpreted groundwater in the chalk to flow towards south-easterly directions.

2.5.3 Contamination Sources

As described in Section 2.2, associated with the liquids area was a solvent tank farm, comprising 13 (six in use when the site was operational, seven redundant) underground storage tanks (see **Error! Reference source not found.**) and one above ground storage tank (AST).

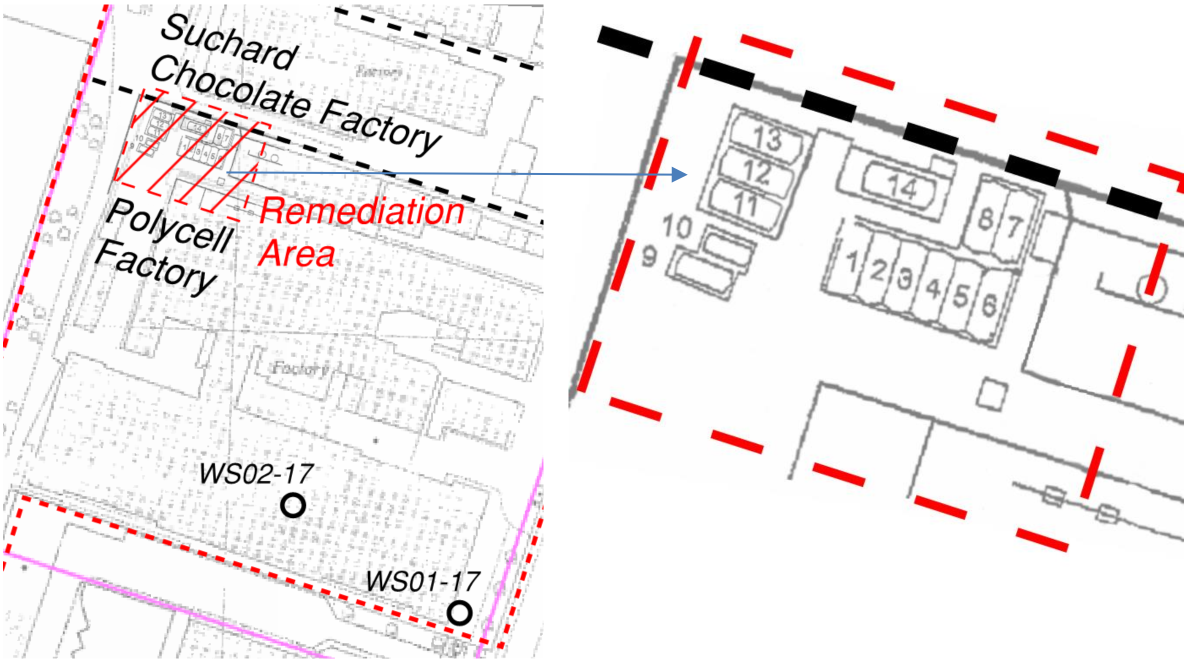

Figure 2-3: Location of remediation area

Naphtha, white spirit and methanol were stored in the six 4,000-gallon USTs (tanks 7 & 8, 5 & 6, and 3 & 4 respectively) and methylene chloride was stored in a 6,250-gallon AST (tank 14). The seven redundant tanks have volumes ranging from 1,500 to 6,000 gallons and were used to store white spirit, derv, IPA, oxtail, naphtha, turps and methanol (ref 2).

Preliminary risk assessments had identified other areas of potential contamination; however, with the exception of total petroleum hydrocarbon concentrations of 770 mg/kg in WS01-17 and 1440 mg/kg in WS02-17 at shallow depths (~0.4 m bgl.), site investigations did not confirm the presence of contaminant sources other than the aforementioned former solvent tank farm (see also Section 2.5.5).

2.5.4 Remediation

Remediation was carried out in the area of the former Solvent Tank Farm from 2008 onwards as detailed below (ref 4).

Tank pull & soil remediation

The tank pull and soil excavation phase of the remediation works was completed in October 2008.

Following removal of the tanks and the concrete bases, surrounded impacted soils was excavated to a depth of three metres, within an area of approximately 30 m by 30 m.

Soil vapour extraction

The wells that were installed as part of the below mentioned groundwater remediation scheme and additionally drilled boreholes were also used to carry out soil vapour extraction to remove product smeared through the unsaturated zone below the tank farm.

Groundwater remediation

Pump and treat

A groundwater remediation system to treat the dissolved phase contamination was installed and operated by Bilfinger Berger, the remediation contractor, between December 2008 and March 2010.

As part of the groundwater remediation, it is understood, a network of approximately 40 wells were installed in the source area to abstract the contaminated groundwater and re-inject treated water.

The purpose of the groundwater remediation plant was the removal of free product, and monitoring of the wells in the remediation area using an electronic oil/water interface probe to confirm that free product has not been recorded above the instrument limit of detection of 1 mm thickness.

Oxygen releasing compounds (ORC)

The final stage of the groundwater remediation works undertaken by Eneotech was the injection of oxygen releasing compounds (ORC) into the groundwater in early 2011 to raise the dissolved oxygen levels within the aquifer and promote the biodegradation of the contaminants.

Groundwater monitoring

An on-going groundwater monitoring programme was implemented to assess the effectiveness of the active remediation phase and long term remediation through monitored natural attenuation based on the following schedule:

- Monthly monitoring between October 2008 and March 2009;
- Quarterly monitoring between June 2009 and September 2013; and
- Six monthly until project completion in September 2015.

Delta-Simons conclusion on remedial measures

In September 2015, Delta-Simons concluded that the source removal and ex-situ soil remediation was successful in removing the bulk of the soil contamination source and treating the contaminated soils.

The active groundwater remediation phase had been successful in removing free product from the groundwater: free product had not been recorded on the groundwater table since March 2010.

In addition, the soil vapour extraction system removed approximately 70 tonnes of volatile compounds from the soils beneath the former tank farm. The results of the long-term groundwater monitoring programme indicate that the groundwater remediation scheme had been effective in significantly reducing the dissolved phase hydrocarbon and VOC contamination within the source zone and the dissolved phase plume (ref 4).

2.5.5 2017 Investigation

A further site investigation was recently undertaken in by Earth & Marine Environmental Consultants Ltd (EAME) and is detailed in the following report:

Environmental Assessment (Southern Area) Broadwater Road Site, Welwyn Garden City, AL8 6UN, UK Project Reference: 016-1512 REV 00 (ref 2).

This involved the drilling of six shell and auger boreholes to a maximum depth of 41 metres below ground level, with soil testing and groundwater monitoring.

Residual contamination in soil / the unsaturated zone

During the drilling of boreholes, soil sampling with PID in headspace monitoring was carried out EAME. This revealed elevated PID results, which is synonymous with elevated concentrations volatile organic compounds (VOC) in the following areas and depths only. The results of the PID in headspace monitoring are illustrated in Appendix B.

Elevated concentrations of VOC were generally found associated with relatively high concentrations of hydrocarbons of the EC8 to EC16 range, representing the typical mix of contaminants that were anticipated for the area of the former solvent tank farm.

Former solvent tank farm / remediation area (see Figure 2-3 above)

At depths between approximately 4 and 10 meters below ground levels (m bgl.). Low concentrations at shall depths are associated with the soil remediation / excavate of soils that was carried in this area to a depths of approximately 3.5 m bgl.

As part of the remediation, a reduction of concentrations in soils beyond such depths will have been aimed to achieve by means of soil vapour extraction (SVE). However, the efficiency of the SVE will have been dependent on the permeability of the soil, leaving behind residual concentrations, in particular, in soil cohesive horizons lower permeability to air.

In this area, elevated concentrations of VOC were also found at depths near the groundwater table at depths of approximately 22 m bgl.

In groundwater downstream direction of the former solvent tank farm

Elevated concentrations were also found at depths near the groundwater table in boreholes (BH04-17 & BH06d-17) that had been drilled in locations in groundwater downstream direction from the former solvent tank farm (see Appendix B).

Residual contamination in groundwater / the saturated zone

The site investigation works completed along with data from the subsequent laboratory analysis suggest that localised, residual petroleum hydrocarbon contamination is still present in the soils and groundwater beneath the former solvent tank farm/remediation area.

Appraisal of groundwater monitoring data suggests that two / the following groundwater units are present beneath the site:

- An upper unit within the more weathered 'putty Chalk', and
- A deeper unit within the Principal Chalk Aquifer.

EAME state that there is a slight groundwater head difference between the upper and deeper unit, with heads in the deeper units being slightly lower. (Note: a comparison of heads found in the upper and lower units suggest a head difference of approximately 0.2 m).

The results of the risk assessment concluded that potential impacts on off-site groundwater quality from residual groundwater contamination are likely to be small and the empirical site data demonstrates a clear reduction in petroleum hydrocarbon concentrations down hydraulic gradient.

This assessment was carried out with the following contaminants regarded as the main contaminants of concern (ref 3).

- C8-C10 Aromatics;
- C10-C16 Aromatics; and
- Dichloromethane (DCM)

However, given the recorded elevated concentrations of (EC8 to EC16) petroleum hydrocarbons in groundwater, with some these concentrations and observation during sampling, indicating the presence of free product and the sensitivity of the Principal Chalk Aquifer, it was considered likely that remedial actions are required in the form of environmental betterment, taking into consideration current best practice guidance, including the principals of sustainable remediation.

In consultation with the Environment Agency, the further remedial measures were suggested by EAME and will be carried out by John F Hunt remediation team (ref 5). Remediation that is being suggested comprises of the following:

(A) Installation of 18 further deep boreholes in the source area to give an overall treatment grid at 6m spacing over a source area of approximately 30m x 12m in order to monitor, delineate, abstract and reinject groundwater;
(B) Longer-term monitoring programme to demonstrate the degree of betterment being achieved;
(C) Decommissioning of all boreholes/wells no longer required for monitoring purposes;
(D) A verification report with details of all works undertaken, injection, abstraction and discharge statistics, monitoring results and findings on completion of the remedial works and monitoring.

Whilst the active remediation phase (see Point A) will need to precede the construction works, the on-going longer-term monitoring (see Point B) is designed to run concurrent with the development programme (e.g. during groundworks/foundation piling activities) and after practical completion, if necessary.

3.0 Piling Risk Assessment

At the current design stage, the adoption of CFA piles is considered to be the preferred piling solution. This method has been selected with consideration of minimal ground vibration, as well as groundwater protection aspects.

The main focus of the risk assessment is on the area of the former solvent tank farm.

CFA piles essentially involve driving a large auger into the ground, with soils within the radius of the auger brought to surface and replaced with concrete on withdrawal of the auger. The displacement of the surrounding ground is governed by the speed of rotation of the auger relative to the speed of vertical penetration. Theoretically, it is possible to adjust the speeds so that the volume of soils displaced laterally and removed as arisings is equal to the volume of concrete placed.

Within the EA Report (2001), the six Source-Pathway-Receptor scenarios are identified as:

1. *Creation of preferential pathways, through a low permeability layer (an aquitard), to allow potential contamination of an underlying aquifer;*
2. *Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface;*
3. *Direct contact of site workers and others with contaminated soil arising which have been brought to the surface;*
4. *Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration);*
5. *The driving of solid contaminants down into an aquifer during pile driving; and*
6. *Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.*

This piling risk assessment tabulated overleaf address aspects 1, 5 and 6 above only, in keeping with the objectives of this report. The risk assessment methodology follows that presented in *Appendix C.*

TABULATED RISK ASSESSSMENT: CFA Piles

Aspect	Potential Consequence	Potential Probability	Potential Risk	Risk Management Options Available	Resultant Risk
1. Creation of preferential pathways, through a low permeability layer (an aquitard), to allow potential contamination of an underlying aquifer.	**Medium** Pollution of sensitive water resources in groundwater, although not abstracted in the immediate vicinity	**Unlikely** • Soil Remediation has been undertaken reducing migration of contaminants • Limited Made Ground contamination identified in recent investigation • Low permeability boulder clay (Diamicton) present • 'Putty' Chalk layer identified as partial confining layer. • CFA piling method essentially self-sealing with concrete and therefore no resultant pathway.	**Low**	Not applicable	**Low**
5. The driving of solid contaminants down into an aquifer during pile driving.		**Low Likelihood** Above considerations, plus: • Low likelihood as arisings brought to surface in CFA method, with speed of auger rotation to be matched with downward force to avoid driving soils down.	**Moderate / Low**	Speed of auger rotation needs to be matched with downward force to avoid driving soils down.	**Low**
6. Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.		**Low Likelihood** Above considerations.	**Moderate / Low**	Cement content of the concrete will need to be closely monitored so that this in itself does not 'bleed' into groundwater.	**Low**

4.0 Summary and Recommendations

The risk assessment presented herein has concluded that there is a low risk to contamination of groundwater beneath the site from the use of CFA piling for the following reasons.

Albeit the fact that numerous phases of remediation that have been carried out (in the area of the former solvent tank farm) soil materials with elevated concentrations of total petroleum hydrocarbons of the EC8 to EC16 range are still present at depths between approximately 4 and 10 meters below ground levels.

Elevated concentrations of such contaminants are also still present near the water table at levels of approximately 22 m bgl. in the area of the former solvent tank farm and in groundwater downstream direction from this groundwater contaminant source.

However, further remedial measures are currently being carried by John F Hunt as suggested by EAME in consultation with the Environment Agency in order to reduce concentrations of contaminants in groundwater.

Piling will be required, with piles likely to be driven into the 'hard'/normal chalk at depths beyond the putty Chalk.

However, with the CFA piling method chosen, soil materials are brought to the surface rather than being driven to depths.

For this to be safeguarded, it will be important that the speed of the auger rotation is being matched with the downward force to avoid soils being driven down; and the piling contractor will have to prepare and submit relevant method statements for approval prior to piling works commencing.

The contractor will also have to closely monitor the cement content of the concrete so that this in itself does not 'bleed' into groundwater.

Ultimately, it is also important to mention that a longer-term monitoring programme to demonstrate the degree of betterment being achieved is being undertaken. As a result, monitoring will be carried out prior, during and post the completion of the piling operation being undertaken.

In the unlikely event that the piling was found to have a detrimental effect on the quality of groundwater within the Chalk Principal aquifer, then, this would be picked up by the monitoring and adequate measures would have to be considered to counteract this.

The following considerations should will also have to be taken into account:

- *Where arisings are generated, they should be classified, handled and disposed of in compliance with relevant best practice and regulatory requirements;*
- *The piling contractor should make allowance for the provision of appropriate PPE; and*
- *In the event of uncovering any areas of unexpected contamination during the piling works, including odorous or stained soils, works should be ceased with the advice of the appointed environmental consultant sought immediately.*

This document should be forwarded to the Planning Authority for discharge of the relevant planning condition before piling works commence.

5.0 References

ref 1. Environment Agency. 2001. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater & Contaminated Land Centre report NC/99/73 (EA Report 2001).

ref 2. EAME. 2018. Environmental Assessment (Southern Area) Broadwater Road Site, Welwyn Garden City, AL8 6UN, UK Project Reference: 016-1512 REV 00

ref 3. EAME. 2018. Re: Proposed Development, Southern Area of Broadwater Road Site (EA Ref. NE/2018/128222/04-L01, dated 23rd May 2018). EAME reference: ref: 016-1512 Wheat Quarter Limited - Response to EA Letter of 23-05-18 REV00.

ref 4. Delta-Simons. 2015. Phase I Environmental Assessment, Former Shredded Wheat Factory, Broadwater Road, Welwyn Garden City. Delta-Simons Project No. 2342.17 V2.

ref 5. EAME. 2018. Re: Proposed Remediation Works, at Broadwater Road Site, Welwyn Garden City. 016-1512 Plutus Estates WGC EA Remediation Letter REV00. EAME reference: 016-1512 Plutus Estates WGC EA Remediation Letter REV00.

Appendix A – Site Plan

Appendix B – Site Plan

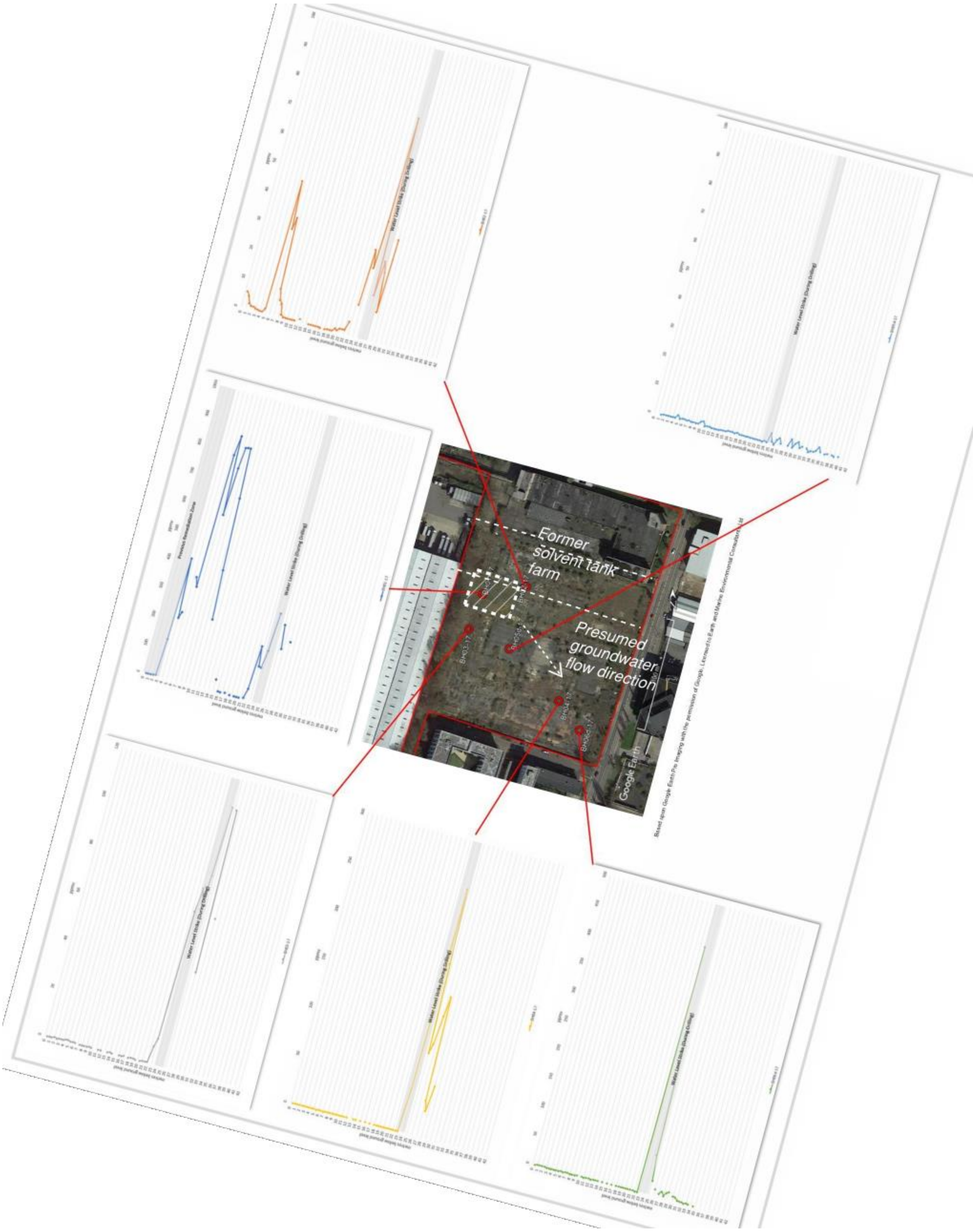

Figure B-1: PID Profiles as presented by EAME (ref 2) with remediation zone and presumed groundwater flow direction

Appendix C – Risk Assessment Rationale

The qualitative risk assessment of environmental harm is designed to establish connecting links between a hazardous source to a potential receptor via an exposure pathway.

The qualitative risk assessment corresponds with the proposed piling operations on site.

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the hazardous source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of hazard on a site does not necessarily mean there is a risk.

By considering where a viable pathway exists which connects a source with a receptor the risk assessment in Section 3.0 and Table A4.1 identifies where pollutant linkage exists. If there is no pollutant linkage there is no risk and only where a pollutant linkage is established does the risk assessment, consider the level of risk.

The risk assessment considers the likelihood of a particular event taking place (accounting for the presence of the hazard and receptor and the integrity of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances actually occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability (Likelihood)	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Negligible Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Negligible Risk
	Low Likelihood	High/Moderate Risk	Moderate/Low Risk	Low Risk	Negligible Risk
	Unlikely	Moderate/Low Risk	Low Risk	Negligible Risk	Negligible Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	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 resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc.). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either 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	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a *high probability* that *severe harm* could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	*Harm* is *likely to arise* to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	*It is possible* that without appropriate further action *harm could arise* to a designated receptor. It is relatively *unlikely* that any such harm would be *severe*, and if any harm were to occur it is *more likely* that such harm would be *relatively mild.*
Low Risk	*It is possible* that *harm could arise* to a designated receptor from an identified hazard. It is *likely* that, at worst, if any harm was realised any effects would be *mild.*
Negligible Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation or risk management operations.

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