



Your Environment

STAGE 2: SITE INVESTIGATION REPORT 36-38 NORTH STREET, EMSWORTH, WEST SUSSEX, PO10 7DG

For Chris Flint Associates

Your Environment

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For and on behalf of YourEnvironment				

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1.0 Introduction

YourEnvironment (YE) was instructed by Chris Flint Associates (Quote No: Q1748, Dated: September 15th 2016) to conduct a Site Investigation (SI) at a site which is known as 36-38 North Street, Emsworth, West Sussex, PO10 7DG.

The SI undertaken is as a result of recommendations made by YE in our previously issued Stage 1: Desktop Study & Walkover Report for the site (Report Reference: YE2585, Issued: August 2016).

The purpose of this report is to satisfy planning conditions which have been attached to the redevelopment of the site by Havant Borough Council under planning reference APP/15/00829.

We are content that as a result of the actual site investigation works and subsequent soil testing undertaken, as outlined within this report, we have comprehensively characterised the ground conditions and consequently the potential for contamination to exist on site. These works and ensuing assessment have been detailed in this report.

2.0 Previous Report & Feedback from HBC

As previously outlined a Stage 1: Desktop Study & Walkover Report was completed by YE which was forwarded by our client to Havant Borough Council (HBC) to seek their comments and feedback on our recommendations made within this report.

Feedback received by our client from HBC concluded that the content of the report with respect to condition 8 was not sufficient to allow discharge of the condition, namely that this site investigation should be undertaken. It was also noted that points i and iii of the condition are then related to the information obtained through on site investigation.

A copy of the feedback provided to YE, from HBC, which has given rise to the works as detailed in this report, can be reviewed within **Appendix F**.

3.0 Proposed Development

We understand current plans for the redevelopment of the site include;

- Erection of two storey detached building for commercial use with associated landscaping.

The proposed redevelopment plans for the site, at the time of issuing this report can be reviewed within **Appendix A**.

4.0 Physical Setting

4.1 Site Information

Access

The site is accessed via North Street to the northeast of the site through a demolition fence that runs parallel to the site.

Topography

The site is situated on largely level topography.

Vegetation

The site has little vegetation, but has some long grass and weeds to the southwest flank of the site, and a square of soft landscaping accommodating moss and grass to the northern centre of the site.

Buildings and Structures

The site has no buildings or structures, immediately off site are brick buildings to the south, west and north of the site, and a wooden demolition boundary fence to the east.

Surface Permeability

It is estimated that approximately 80% of the site is impermeable concrete/ hardstanding, and 20% is permeable soft landscaping.

Drainage Features

A couple of manholes were noted on site.

Other Services

The site has full services.

Surrounds

The site is located in a commercial street with restaurants, shops and a garage located nearby.

4.2 Geology

The relevant British Geological Survey (BGS) online mapping information indicates the site to be underlain by superficial River Terrace Deposits (Clay, silt and sand), which is underlain by bedrock comprised of London Clay Formation (Clay, Silt and Sand).

4.3 Hydrogeology & Hydrology

The Environment Agency designate aquifers in accordance with the Water Framework Directive. These designations reflect not only the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetlands ecosystems. The aquifer designation data is based on geological mapping attained through the British Geological Survey.

As a result of the superficial deposits identified on site the aquifer is designated as being a Secondary (A) Aquifer. This is 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. These are generally aquifers formerly classified as Minor Aquifers.

In addition, due to the bedrock geology identified on site, the Aquifer within the Bedrock deposits is designated as being an Unproductive Aquifer. These are described as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Groundwater Abstraction Licences

There are no active groundwater abstraction licences within 2000m.

Surface Water Abstraction Licences

There are no active surface abstraction licences within 2000m.

Potable Water Abstraction Licences

There is one active potable water license within 2000m, which is 1907m east for water bottling.

Groundwater Vulnerability and Soil Leaching Potential

The soils on site are classified as 'HU' which is defined as soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

Detailed River Network

There are a number of network entries within 500m, the closest of which is 133m east known as the River Ems.

Surface Water Features

There are four surface water features within 250m, the nearest of which is 131m east.

Source Protection Zone

The study site is not located within a Source Protection Zone.

4.4 Site History Summary & Risk

The earliest mapping (c.1866) indicates the site to be undeveloped forming part of a larger arable field to the northeast, this remained to be the case until 1869 when the site was noted to contain numerous structures of unknown usage, which remained the case throughout the proximity of time.

The surrounding environs are largely arable in nature, with residential and industrial development occurring throughout the proximity of time, with residential dwellings noted south and west of the site in 1866.

The potential sources of contamination identified from historical mapping included; a railway line (300m north), mill pond (300m southwest, 300m southeast and 450m southeast), quay mill (500m south), brick field (700m south), timber yard (450m east), grave yard (50m east), gas works (150m north), brewery (500m northeast and 350m south), corn mill (450m northeast), malthouse (500m southeast), fire station (50m south), hospital (100m south), smithy (400m southeast), shipbuilders yard (700m southeast), nursery (600m north and 200m northwest), coachworks' depot and tank (100m east), gas holder (100m northeast), engineering works (150m north) and builders yard (150m

northeast). In respect of potential off site historical and current risks, limited uses have been identified, and as a result we consider these sources are located at distances which would negate their potential impact to the study site.

There are records of historic landfills such as 849m southeast, with no records of artificial/made ground identified within 1000m. In respect historical/current ground workings a brick field 696m south, grave yard 5m west, unspecified ground workings (69m west), pond (176m southeast) and mill ponds (192-198m southwest).

The hydrogeological and hydrological setting of the site is considered to be relatively low given the presence of a Secondary (A) Aquifer in the superficial and a Unproductive Aquifer in the bedrock. There are no groundwater or surface water abstraction points within 1000m, the closest potable point is approximately 1907m east. In addition, the nearest surface water feature is located 133m east which is the River Ems.

The proposed redevelopment is to incorporate soft landscaping, with the erection of a two storey detached building, which could deem a risk of potential contamination due to the close proximity of the gas works. With this taken in to account alongside the geological and hydrogeological setting we recommended an intrusive survey to ascertain if any potential contamination is present on site. Which may pose a risk to various receptors as identified in one following section.

5.0 Preliminary Conceptual Site Model and Risk Assessment

This presented Conceptual Site Model has been re-issued from the earlier works completed, using feedback supplied by HBC (if relevant) to provide information regarding the possible **sources** of contamination on site, the **pathway** in which the contamination can migrate and a vulnerable **receptor** to the contamination, all of which need to be present for there to be a risk. Given the continued end use of the site as being residential the generic land use of 'residential' has been applied. Consequently, the following Source – Pathway – Receptor relationships have been identified.

Hazard / Pollutant	Pathways	Receptor	Potential Severity	Probability of Risk	Level of Risk	Justification
Hydrocarbons (TPH, PAH, BTEX & MTBE). Heavy metals, SVOCs, VOCs and asbestos.	Ingestion, dermal contact, inhalation	Future end users and site visitors	Medium	Likely	Moderate	A moderate risk is considered given the historic/current setting of the site and immediately off site. However, the proposed plans are to incorporate soft landscaping areas.
		Construction Workers	Medium	Likely	Moderate	A low risk is considered given the historic/current setting of the site and surrounding environs. Construction workers are likely to come into direct contact with soils during groundworks therefore the use of appropriate PPE should be adopted to mitigate against any potential risks.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Medium	Low Likelihood	Low	A low risk is considered given the historic/current setting of the site and surrounding environs. The aquifer within the superficial is a Secondary (A) Aquifer and an Unproductive Aquifer in the bedrock. The nearest potable water abstraction is 1907m from the site and the nearest surface water feature is 131m east.
	Uptake	Plant and Wildlife	Mild	Low Likelihood	Moderate	A moderate risk is considered given that the proposed development will incorporate limited areas of discrete soft landscaping.
Ground Gases.	Gas generation, migration and build up within properties	Future end users, site workers and proposed site structure.	Medium	Low Likelihood	Moderate	A moderate risk is considered given the distance to the historical gas works which is nearly 79m northeast and the proposed development to incorporate soft landscaping.

Table 1: Preliminary Conceptual Site Model and Risk Assessment

6.0 Fieldworks

6.1 Ground Investigation

All SI works were completed on September 28th 2016 under the supervision of a Geo-Environmental Engineer from YE. In summary the investigation included:

- Three (3no.) hand excavated trial pits (TP1 to TP3) were completed to a maximum depth of 1.0mbgl, which were dug by the client.
- The trial pits were logged with any groundwater conditions noted and representative soil samples removed in accordance with current guidelines.
- Soil samples were removed from shallow sub surface locations, with further samples taken at depths of 0.15mbgl, 0.30mbgl, 0.50mbgl and 0.7mbgl. Samples were subsequently placed in suitable containers including 1kg tubs and 250ml glass jars and placed in cool boxes with cool packs prior to storage within our *in-house* laboratory fridges and then subsequent forwarding to our designated laboratory for analysis.

The positions of exploratory holes in relation to the existing site layout can be reviewed within **Appendix B**. Photographs taken during the SI can be referred to in **Appendix C**, with exploratory trial pit logs located in **Appendix D**.

7.0 Geology & Ground Conditions

The following ground conditions were encountered during the SI;

Made Ground – Encountered within both trial pits and generally comprised of a dark grey sandy silt gravel with brick, concrete, flint and to a maximum depth of 0.75mbgl in TP2.

River Terrace Deposits – Natural soils were encountered at subsurface depths ranging from 0.45mbgl in TP3 to 0.75mbgl in TP2 to the maximum excavated depth of 1.00mbgl. This stratum generally comprised of a light brown/yellow/mottled sandy gravelly CLAY. This stratum is likely to represent the River Terrace Deposits.

8.0 Groundwater Conditions

Groundwater was encountered at the base of TP3 at 1.0mbgl. No olfactory or sheen was noted with respect to the water.

It should be noted that groundwater levels are dependent upon seasonal variations and can change after periods of prolonged rainfall or drought. However, as a consequence of the anticipated depth to standing water level such seasonal variations are unlikely to have an effect on site development.

9.0 Visual and Olfactory Observations

With the exception of general anthropogenic material identified, no visual and/or olfactory evidence of potential contamination was noted within any soils encountered as part of the investigative works undertaken.

10.0 Contamination

10.1 Soil Testing

A total of seven (7no.) samples have been analysed by Messrs QTS Environmental Ltd in their UKAS and MCERTS accredited laboratory-testing facility in accordance with laboratory protocol.

The testing completed comprised of a focused suite of heavy metals, pH, speciated Total Petroleum Hydrocarbons (Aromatic/ Aliphatic Split) and speciated Polycyclic Aromatic Hydrocarbons (PAH – including the more carcinogenic forms naphthalene and benzo(a)pyrene), pH, and soil organic matter. This suite of testing also incorporated total cyanide, total phenols, benzene, toluene, In addition, selected samples retrieved from the identified Made Ground have also been submitted for an asbestos screen.

The results of this laboratory testing have been compared to the Soil Guideline Values (SGVs) as well as the CIEH 'LQM' guideline values for inorganic and organic contaminants in soils. The proposed development of the site is intended to comprise of commercial and therefore screening has been made against a land use of 'commercial'.

10.2 Selection of Screening Criteria

The on-site receptors for the study site are considered to be:

- Construction workers (during redevelopment of the site only);
- Future maintenance workers (following redevelopment);
- Future end users and site visitors (following redevelopment); and
- Trespassers (during redevelopment).

The off-site receptors for the site are considered to be:

- Residents and visitors to the nearby residential dwellings in the immediate vicinity of the site.

Risks to construction workers during the redevelopment process will be mitigated by adhering to appropriate health and safety legislation, and the wearing of appropriate personal protective equipment (PPE). During redevelopment, the site will be securely fenced to prevent trespassers from accessing the site, and good site management practices will be implemented to mitigate exposure to off-site receptors.

The potential pathways for contaminants within the soil to human health receptors following redevelopment are considered to be:

- Direct ingestion of soil and soil derived dust;
- Dermal contact with soil outside and soil derived dust inside
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside.

The potential pathways for contaminants within the soil to off-site human health receptors following redevelopment are considered to be:

- Direct ingestion of soil and soil derived dust;
- Dermal contact with soil outside and soil derived dust inside

- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside if contamination within soil is able to migrate across the site boundary within.

In the first instance, the results of this laboratory testing have been compared to generic assessment criteria (GAC) for the commercial land use scenario. These incorporate the following pathways:

- Direct ingestion of soil and soil derived dust;
- Dermal contact with soil outside and soil derived dust inside
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside.

Given that these incorporate a number of pathways that will not be relevant to the site following redevelopment, this is a highly conservative approach and exceedances will be discussed in this light.

Contaminants have been screened against revised LQM/CIEH S4UL criteria¹ where available. These GAC have been designed for use under planning, using Health Criteria Values based on minimal risk, and updated exposure parameters. The S4UL are intended to replace the previous LQM/CIEH GAC. The S4UL are based on the assumption of a sandy loam soil the 6% and 2.5% soil organic matter (SOM) criteria have been used, where available and appropriate, in the first instance. All soil samples were analysed for %SOM, the range was from 0.1-3.7%, and so this conservative approach is considered appropriate for initial screening.

Where no S4UL are available, the EIC/ AGS/ CL:AIRE/ GAC² have been used. The toxicological criteria within these are also based on minimal risk. It is recognised that these criteria have not recently been updated, and in particular, do not incorporate the slightly higher inhalation rates that have been used within the S4UL. However, given that they incorporate additional pathways, they are considered suitable for an initial screen. The EIC/ AGS/ CL:AIRE/ GAC are also based on a sandy loam soil and the 1% SOM criteria have been used in the first instance.

There is neither an S4UL nor a EIC/ AGS/ CL:AIRE/ GAC available for lead. In the absence of a GAC based on minimal risk, the C4SL for lead has been used. It is recognised that this is based on a “low level of toxicological concern” rather than on a minimal risk level. However, it is considered appropriate for use under planning, especially for a site where there will effectively be no pathways for inorganic metals following redevelopment.

All the GAC are based on a sandy loam soil. This is considered appropriate for use for initial screening. Although it is apparent from the laboratory soil descriptions, that the Made Ground, by its very nature is heterogeneous, and often has a significant sand/gravel component, especially at shallow depths, it is noted that many of the soil descriptions have a significant clay component at increasing depth.

All of the GAC assume unsaturated soils. However, the use of the GAC are considered to be conservative, because they assume a certain air-filled porosity and water-filled porosity.

¹ Nathanail et al. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, 2015. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3495

² CL:AIRE (2010) The EIC/AGS/CL:AIRE Generic Assessment Criteria for Human Health Risk Assessment

The GAC also assume that no free phase product is present, and are not intended for use in this instance. Groundwater was observed at a depth of 1.0mbgl in TP3, but there was no olfactory or sheen with respect to the water observed.

10.3 Soil Testing Results & Screening

All metals, PAHs, and TPH CWG analytes are presented in the following tables. Other potential contaminants of concern are only shown where there is at least one result exceeding the limit of detection. All of the soil contamination laboratory analytical results are presented within **Appendix F**.

Metalloids

Determinant	Min	Max	GAC	Number of exceedances
Arsenic	10	17	640*	0
Cadmium	<0.2	<0.2	190*	0
Chromium (III)	20	31	33 ^a	0
Chromium (VI)	<2	<2	6*	0
Copper	11	65	68000*	0
Lead	11	320	2300	0
Mercury	<1	<1	1100 ^b	0
Nickel	14	19	980 ^c	0
Selenium	<3	<3	12000*	0
Zinc	40	233	730000*	0
Total Phenols	<2	<2	3200*	0
Total Cyanide	<2	<2	140*	

Table 2: Metalloids Soil Exceedances

*LQM/CIEH GAC for Commercial produce land use scenario based on a sandy loam soil and 1% SOM.

#EIC/AGS/CL:AIRE GAC for Commercial land use scenario and 1% SOM+ C4SL commercial; land use scenario based on a sandy loam soil.

+C4SL for commercial land use scenario based on a sandy loam soil.

- a) Based on the inorganic mercury GAC as the conceptual site model does not suggest that other forms of mercury are likely to be present on site.
- b) LQM issued an update to the nickel S4ULs in August 2015 and this has been taken into account.

➤ There are no exceedances for metalloids screened.

Organics

Determinant	Min	Max	GAC	Number of exceedances
Naphthalene	<0.1	<0.1	380*	0
Acenaphthylene	<0.1	<0.1	880000*	0
Acenaphthene	<0.1	<0.1	83000*	0
Fluorene	<0.1	<0.1	79000 ^a	0
Phenanthrene	<0.1	0.74	79000 ^a *	0

Anthracene	<0.1	0.17	54000*	0
Fluoranthene	<0.1	0.30	23000*	0
Pyrene	<0.1	0.26	54000*	0
Benzo(a)anthracene	<0.1	0.14	170*	0
Chrysene	<0.1	0.19	350*	0
Benzo(b)fluoranthene	<0.1	0.20	44*	0
Benzo(k)fluoranthene	<0.1	<0.1	1200*	0
Benzo(a)pyrene	<0.1	<0.1	35*	0
Indeno(1,2,3-cd)pyrene	<0.1	<0.1	510*	0
Dibenz(a,h)anthracene	<0.1	<0.1	3.6*	0
Benzo(ghi)perylene	<0.1	<0.1	4000*	0

Table 3: PAH Soil Exceedances

- There are no exceedances noted from the screening undertaken on PAH congeners.

Determinant	Min	Max	GAC	Number of exceedances
Aliphatic >C5 - C6	< 0.01	< 0.01	78*	0
Aliphatic >C6 - C8	< 0.05	< 0.05	230*	0
Aliphatic >C8 - C10	< 2	< 2	65*	0
Aliphatic >C10 - C12	< 2	< 2	330*	0
Aliphatic >C12 - C16	< 3	< 3	2400*	0
Aliphatic >C16 - C21	< 3	< 3	92000*	0
Aliphatic >C21 - C34	< 10	<10	92000*	0
Aromatic >C5 - C7	< 0.01	< 0.01	140*	0
Aromatic >C7 - C8	< 0.05	< 0.05	290*	0
Aromatic >C8 - C10	< 2	< 2	83*	0
Aromatic >C10 - C12	< 2	< 2	180*	0
Aromatic >C12 - C16	< 2	> 2	330*	0
Aromatic >C16 - C21	< 3	12	540*	0
Aromatic >C21 - C35	< 10	<10	1500*	0

Table 4: TPH CWG Aliphatic/Aromatic Soil Exceedances

* LQM/CIEH GAC Commercial land use scenario based on a sandy loam soil and 2.5% SOM. It is noted that the LQM/CIEH S4UL guidance recommends an additive approach for the TPH fraction, so that a hazard index approach is used. Based on a preliminary conservative comparison of maximum concentrations to S4ULs, no forward modelling is necessary to prove that this would still result in no exceedances at the site.

- There are no exceedances noted from the screening undertaken on the respective TPH CWG bands.

Others

The asbestos screening returned a negative result for the presence of fibrous material from all samples analysed.

The soil contamination laboratory certificates can be reviewed within **Appendix E**.

11.0 Updated Conceptual Site Model and Risk Assessment

The Conceptual Site Model has been re-formulated based upon the results from the SI in accordance with BS10175:2015. It aims to provide information regarding the sources of contamination and the pathways in which contamination can migrate to a vulnerable receptor, all of which need to be present for there to be a risk. This is in relation to the proposed end use being classified as 'residential'. The following linkages have been identified:

Hazard / Pollutant	Pathways	Receptor	Potential Severity	Probability of Risk	Level of Risk	Justification
Hydrocarbons (TPH, PAH) Heavy metals, phenols, asbestos, cyanide.	Ingestion, dermal contact, inhalation	Future end users and site visitors	Medium	Low Likelihood	Negligible	Given the results of returned laboratory testing which shows there is no impacted soils in shallow encountered Made Ground and underlying natural soils
		Construction Workers	Medium	Likely	Negligible	A negligible risk is considered given the results of returned laboratory results. However, construction workers will come into direct contact with soils during groundworks therefore the use of appropriate PPE should be adopted to mitigate against any potential residual risks.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Medium	Low Likelihood	Low	A low risk is considered given the historic/current setting of the site and surrounding environs. The aquifer within the superficial is a Secondary (A) Aquifer and an Unproductive Aquifer in the bedrock. The nearest potable water abstraction is 1907m from the site and the nearest surface water feature is 131m east.
	Uptake	Plant and Wildlife	Mild	Low Likelihood	Negligible	Negligible risk given the returned laboratory results which indicates there to be no significant concentrations of phytotoxic contamination.
Ground Gases.	Gas generation, migration and build up within properties	Future end users and visitors, site workers and proposed site structures.	Medium	Low Likelihood	Low	A low risk is considered given the limited depth of Made Ground during site works, which mainly comprised of demolition material with no organic material present, which would lend itself to surmise an absence of soil gas generation.

Table 5: Updated Conceptual Site Model and Risk Assessment

12.0 Site Investigation Findings

12.1 Risks to Human Health

With the exception of the limited depth of Made Ground identified, no visual and/or olfactory evidence of potential contamination was noted within any soils encountered during the SI works undertaken, which focussed in the proposed private garden areas and also underneath the footprint of the proposed dwellings.

All of the selected soil samples from the SI which were submitted for the range of inorganic and organic analyses have returned concentrations below the available SGVs and LQM guidance values for each determinant which were adopted as Generic Assessment Criteria (GAC) within YE's risk assessment for the site.

Therefore, it would be reasonable to conclude that there is no risk to human health receptors.

12.2 Risks to Plants and Wildlife

A negligible risk has been attributed given the concentrations of phytotoxic contaminants below elevated concentrations often below the limit of detection returned.

12.3 Risks to Site Workers

Despite the absence of returned elevated concentrations of determinants precautions should be taken to minimise exposure of site workers during ground works through the implementation of site safety procedures and the use of suitable personal protective equipment (PPE). Such precautions should include, but not be limited to:

- Personal hygiene, washing and changing procedures;
- Availability of site welfare;
- Provision of PPE appropriate to the task; and
- Daily safety briefings and tool box talks.

All site works will be undertaken in accordance with the guidelines prepared by the Health and Safety Executive (1991) and all work will be carried out in accordance with the Principal Contractor's Health and Safety Plan.

13.0 Recommendations

The following recommendations are based on the results of chemical laboratory testing to date.

The following recommendations made do not constitute a formal remediation strategy and/or validation report. A remediation strategy should be agreed with the relevant local authority prior to such works commencing and/or the production of a validation report.

13.1 Watching Brief and Discovery Strategy

A watching brief should be maintained by the Main Contractor at all times during the groundworks stage. Should any unforeseen contamination, such as oils or soils/groundwater with an unusual colour or odour, be encountered during groundworks then the following procedure should be implemented:

- Work to cease in that area to prevent exposure to ground workers and potential contaminants being spread around;
- Notify a Geoenvironmental Consultant, to attend site and sample material;
- Notify the Environmental Health Department / Contaminated Land Officer(s) of Havant Borough Council;

If the nature and extent of the contamination is unmanageable under the procedure set out above, then a suitable management, mitigation or remediation procedure will be agreed with the CLO. However, this is considered unlikely at this particular site.

13.2 Asbestos

Although screening has revealed no asbestos to be present within the samples analysed from exploratory holes undertaken, it cannot be guaranteed that asbestos is not present within the soils across the remainder of the site. Consequently, we would recommend that a watching brief be adopted with regards to the site for the potential of finding any Asbestos Containing Materials (ACMs). If any ACMs are identified these need to be dealt with accordingly in relation to the Hazardous Waste Regulations 2005.

13.3 Services

If new services will be installed as part of the redevelopment of the site we would recommend the local water board be contacted to determine their specification for the type of pipework which should be used on this site.

All services and in particular potable water supply pipework should comprise of material that is resistant to attack and degradation to chemical attack.

Further information can be found within the published guidance for the '*Selection of Water Supply Pipes to be used in Brownfield Sites*', issued in January 2011 by the UK Water Industry Research (UKWIR), this supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note – '*Laying Pipes in Contaminated Land*' which has been withdrawn.

13.4 Surface Water

It should be noted that the Environment Agency does not recommend that soakaways be placed within Made Ground, potentially contaminative land or in ground previously identified as contaminated.

13.5 Verification Reporting

It is recommended that you confirm with the relevant environmental consultees whether they require a validation and/or closure report providing documentation/audit trail for the completion of any remediation/mitigation works completed on site.

If a verification Report is required it should include, but not be limited to, the following:

- Site visit records and photographic records from the watching brief;
- Site visit records and photos from visits completed by a Geoenvironmental Consultant;
- Duty of care records for disposal of waste material including the landfill site(s) or disposal facility where the material has been disposed and a copy of the Contractor's current waste carrier's licence (to be provided by Contractor).
- Records and test certificates relating to the management and disposal or unforeseen contaminants and/or ACMs (if any);
- Details of source and chemical test results for imported materials; and
- Confirmation of water supply pipe materials installed.

14.0 Limitations

This report has been prepared by YE with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources.

The opinions given in this report have been dictated by the finite data on which are they based and are relevant only to the purpose for which the report was commissioned.

Information reviewed should not be considered exhaustive and has accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, YE reserves the right to review such information and, if warranted, to alter the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and as such is not a guarantee that the study site is free of hazardous conditions.

This report has been prepared solely for the use of the named client, and may not be relied upon by other parties without written consent from YE. YE disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.