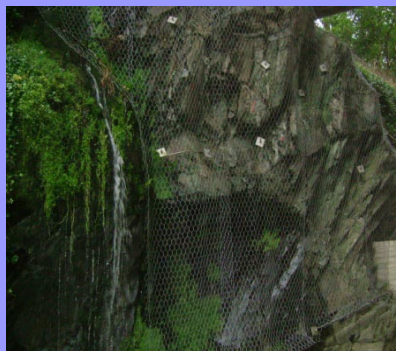
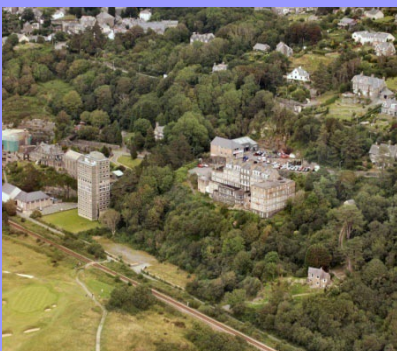




# Consulting Structural, Civil, Environmental, Geotechnical, Highway and Transport Engineers



Phase I- Preliminary  
Sources Report  
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**Proposed Site for: Dover Grammar School  
for Boys and Girls**

**C1149**

Proposed Site of: Dover Grammar School for Boys and  
Girls,  
Melbourne Avenue,  
Dover,  
Kent,  
CT16 2EG.

Phase 1, Preliminary Sources Report

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This document is available electronically please contact the author to obtain a copy.

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## 1.0 Scope

This report contains the details of a non-intrusive Environmental Assessment carried out by HSP Consulting LLP for a development at the proposed site of Dover Grammar School for Boys and Girls, Melbourne Avenue, Dover, Kent, CT16 2EG. This report has been prepared for Gleeds – Building Surveying Ltd on behalf of Kent County Council and must not be relied upon by any other party without the explicit written permission of HSP Consulting.

All parties to this report do not intend any of the terms of the Contracts (Rights of Third Party Act 1999) to apply to this report.

Please note that this report does not purport to provide definitive legal advice.

The executive summary contains an overview of key findings and conclusions. However no reliance should be placed on the executive summary until the whole of the report has been read. Other sections of the report may contain information which puts into context the findings noted within the executive summary.

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## 2.0 Executive Summary

HSP Consulting conducted a Phase I Non-Intrusive Environmental and Geotechnical Preliminary Sources Study for the proposed development based around the future site for Dover Grammar School for Boys and Girls, Melbourne Avenue, Dover, Kent, CT16 2EG.

The site appears to be approximately 10.27Ha. The site development proposal plans are currently unavailable and will be discussed further in the Phase II Report.

The following observations have been made from the completion of the Phase I Desk Preliminary Sources Study regarding the site:

- The site is located within the predominantly agricultural and residential area of Whitfield village in the county of Kent, some 3.2km north of Dover.
- The site appears to lie in an area where the solid geology comprises Cretaceous Upper Chalk overlain by drift deposits of Clay-with-flints.
- The site is underlain by a Major Aquifer.
- The site lies predominantly within a source protection zone III, with the south-western corner crossing over into a source protection zone II.
- A number of areas of potentially infilled land have been identified within 500m of the site. These include chalk pits on and around the site. All have been infilled at some point in the past with unknown constituents.
- A number of industrial land uses including a fascias and soffits company, cosmetic manufacturers and garage services are located within 500m of the site. These potentially contaminative land uses are not considered likely to have adversely affected the site.
- The historical information obtained as part of this desk study suggests that the site has predominantly been an area of agricultural land. However, a chalk pit has been located towards the south-west boundary from at least 1875 until 1980 where it appears to have been infilled. Three small buildings associated with the adjacent Green Lane Farm are identified in the south-west corner from approximately 1898. These become labelled as Green Lane Cottage during the 1950`s and New Barton Farm during the early 1960`s. These buildings are no-longer identified on the historical plans by the early 1980`s when the near-by chalk pits also appear to have been infilled. The site land-use remains agricultural land up until the present day.

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### 3.0 Introduction

HSP Consulting was instructed by Gleeds - Building Surveying Ltd on behalf of Kent County Council to carry out a non-intrusive Phase I Geotechnical and Environmental Preliminary Sources Study. The study was conducted for the area of land based around upon around the proposed site of Dover Grammar School for Boys and Girls, Melbourne Avenue, Dover, Kent, CT16 2EG. (Approximate National Grid Reference E631180, N144040).

A Preliminary Sources Study is the first stage within the site investigation process. Phase I Studies combine a desktop study and a thorough site walkover to produce a detailed Site Conceptual Model. This Conceptual Model is then the focus of a Phase II intrusive site investigation.

Phase I Environmental Studies are recommended by BS10175:2001 and CLR11 as best practice for Site Investigations of potentially contaminated land and are often required for the discharge of planning conditions.

#### Report Information Sources

The Information used to collate the Phase I report can be gleaned from many of the following sources:

- Envirocheck ® Report from Landmark
- Coal Authority Reports (where applicable)
- Site walkover survey
- British Geological Survey
- National Environment Research Council
- Associated Local Authorities
- Ordnance Survey
- National Grid mapping (where necessary)
- Environment Agency
- Anecdotal evidence from local people
- Petroleum Officer
- Centre for Ecology & Hydrology
- DEFRA
- National Radiological Protection Board
- Ministry of Agriculture Food and Fisheries
- English Nature/English Heritage

---

## 4.0 Overview of British Legislation

The Environment Act 1995 was used to introduce the changes laid out by Part IIA of the Environmental Protection Act 1990. This placed a new responsibility on local authorities throughout the United Kingdom to devise and implement a strategy to identify and remediate land that has been contaminated through its historical usage.

Part IIA allows Local Authorities to designate land as contaminated if it is judged to:

- Have caused significant Harm

Or

- Have significant potential of causing significant Harm

Local Authorities themselves are empowered to judge what they perceive to be significant harm and are also responsible for judging whether a site has the significant potential to cause such harm.

Part IIA of the Environmental Protection Act 1990 states that the liability for remediation of a site falls upon the 'appropriate person' who caused the land or ground waters to become contaminated. Local Authorities are now under duty to serve remediation notices on areas identified as contaminated land.

Although Local Authorities have the responsibility to identify and designate contaminated land under Part IIA, in reality this very rarely happens for a number of reasons.

The predominant reason for this is the complex legal requirements for proving liability.

Therefore ground contamination is usually addressed within the planning process which is often more stringent than 'significant harm' and is governed by English common law as well as parliamentary guidance.

New guidance has been issued to support the implementation of the Contaminated Land provisions in the form of the Contaminated Land Exposure Assessment (CLEA) model. This was published by DEFRA and the Environment Agency circa March 2002 and recently a revision in February 2009 was released following an extensive scientific review.

## 5.0 Site Location and Status

The centre of the site is given as SP or NGR E631180, N144040.



The site is located within a predominantly agricultural and residential area of Whitfield village in the county of Kent some 3.2km north of Dover.

The approximate area of the site is; 10.27Ha.

### 5.1. Proposed end use of the site

Dover Grammar School for boys and Girls is one of a number of Kent schools involved in the Building Schools for the Future (BSF) programme. This is a Government initiative aimed at transforming, through rebuilding, remodelling or upgrading, every secondary school in England. However, currently there are several development options for the site that are being considered. Once a final decision has been confirmed this will be discussed in the Phase II Site Investigation Report which will follow this report.

---

## 5.2 Description of the Site

A site walkover was undertaken on Wednesday 14th October 2009 in the area of the proposed development and the salient observations can be summarised as follows:

- The site is roughly rectangular in shape and falls steeply in a north to south direction. Archers Court Maths and Computing College is located to the western boundary of the site and Melbourne Avenue appears to run parallel to the southern boundary. The current land use is as an agricultural field and appears to have been recently ploughed.
- The area of the site is approximately 10.27 Ha.
- There are no indications of remedial measures or recent site investigation.
- There does not appear to be any obvious signs of contamination apparent on the site.

## 6.0 Land Use

### 6.1 Current Local Land Uses & Fuel Station Entries

There are 15 Contemporary Trade Entries listed within 500m of the site boundary. Six of these are located within 250m of the site. The closest of these lies 75m to the south and relates to a fascias and soffits company. The remaining potentially contaminative uses include among others; cosmetic manufacturers and garage services.

One fuel station entry has been identified within 500m of the site boundary. This is located 478m to the north-west and is classified as open.

According to the 'Department of the Environment Industry Profiles' the following contaminants may be potentially present:

#### Garage Services

Contaminant		Location Contaminants May Possibly Be Found			
Main Group	Sub Group	Fuelling Areas	Servicing Areas	Vehicle Washing Areas	Paint Shops
Metals and their compounds	Lead				
	Chromium				
	Zinc				
	Copper				
Acids/Alkalis					
Asbestos					
Organics	Simple Aromatic Compounds				
	Non-Halogenated Solvents				
	Halogenated Solvents				
	PAHs				
	Fuels/Oils				
Ethylene Glycol					
Polymerised glycols and ethers					
Detergents					

Shaded areas indicate areas where contamination is most likely to occur.

### 6.2 Sensitive Land Use

The site is within a Nitrate Vulnerable Zone.

---

## 7.0 Landfills, BGS Mineral Sites and Waste Storage

### 7.1 Landfill Sites

No waste management facilities, landfill sites, historical landfill sites or waste transfer stations have been identified within 500m of the site.

### 7.2 BGS Mineral Sites

No Recorded BGS Mineral Sites have been identified within 500m of the site

### 7.3 Waste and Materials Storage Locations

Information obtained to date indicates that no buildings on site are or have been in the past used to store any listed chemicals.

From the sources used for this report there is no evidence to suggest that any storage of hazardous substances has taken place within 500m of the site.

## 8.0 Site History

Historical land usage is usually inferred from historical maps of a site.

As part of this desk study reference to old Ordnance Survey Plans has been undertaken. The following plans were available, extracts of which are included in the appendices:

- 1875, 1898, 1907, 1937 County Grid Series O.S maps; 1:2,500
- 1957-1958, 1977, 1986, National Grid Series O.S maps; 1:2,500
- 1956, 1962-1973, 1970, 1977-1989, 1982, 1987, 1992, 1995-1996, 1996, National grid series O.S. maps; 1:1,250
- 1879, 1899, 1908, 1938, 1947-1949, 1949, 1950-1951 County Grid Series O.S maps; 1:10,560
- 1960-1962, 1970-1976, 1974, 1981-1987, 1990-1991, 1999, 206, 2009 National Grid Series O.S maps; 1:10,000

### 8.1 Historical land use and Contamination

Published Map Date	On Site	0-250m	250-500m
1875-1878	Predominantly agricultural land use with chalk pits located towards the south-west boundary.	Predominantly agricultural land use with chalk pits located 10m to the north and along the south boundary.	Predominantly agricultural land use with chalk pits located to the south-east and north-west. Barntie Shaw chalk pit identified 260m to the north-east. Roman road has been identified running north/south. Sandwich Hole Old Quarry identified 450m to the south-east.
1898-1899	No significant change.	Green Lane Farm built over old chalk pits along the southern site boundary. Green Lane is identified as leading north-east.	Whiting works located 450m to the south-east, there is also a tank located on this site.
1907-1908	Three small buildings have been identified towards the south-west boundary associated with Green Lane Farm.	Green Lane is extended heading south from Green Lane Farm.	No significant change.
1937-1938	No significant change.	No significant change.	Plantation of non-coniferous trees to the south-west.
1945-1949	No significant change.	No significant change.	No significant change.
1950-1951	No significant change.	No significant change.	No significant change.

Published Map Date	On Site	0-250m	250-500m
1956-1958	Building towards the south-west parameter labelled as Green Lane Cottage.	Possible foundations and road structure identified in the field to the west of the site boundary. Green Lane Farm no longer located. Significant residential development identified to the south-east and south-west of site including County Primary School 150m to the south-west.	Significant residential development identified to the south-east and south-west of site including The Powell School 500m to the south-west. Old Park Barracks identified 500m to the north-west. Whiting works now Whiting poultry farm , tank no longer located
1962	Green Lane cottage now labelled as New Barton Farm.	Archers Court School developed immediately west of site including two labelled tanks 10m to the west.	A chalk pit 400m to the north-west has also been infilled as part of the schools playing field.
1970-1976	No significant change.	Significant residential development to the west and further development to the south-east. Electricity sub-stations located 100m to the north-west and 300m to the south-east.	Residential development to the west.
1977	No significant change.	No significant change.	A chalk pit 300m to the north-west has been infilled and built upon with a road running east/west.
1981-1987	No buildings located on site and the chalk pit has become infilled.	Chalk pit 10m to the north infilled.	. Barntie Shaw chalk pit infilled.
1992	No significant change.	No significant change.	Large commercial development and business park identified to the north-west.
1996	No significant change.	No significant change.	Development to the road running east/west including roundabouts and slip-roads.
1999	No significant change.	No significant change.	No significant change.
2006	No significant change.	Further development of business park to the north-west.	No significant change.
2009	No significant change.	Extension of road from business park to the north-west.	No significant change.

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## 8.2 Historical Tanks and Energy Facilities

Three tanks have been located within 500m of the site boundary. Two tanks have been sited 10m to the west and are identified on the historical plans from approximately 1962 and are associated with the Archers Court School development. A further tank has been identified 450m to the south-east from 1898 until the late 1950`s. This is associated with Whiting works

/ poultry farm. It is not known what constituents these tanks may have contained.

Two electricity sub-stations have been identified within 500m of the site. The closest one is located 100m to the north-west of the site boundary and appears on the historical plans from approximately 1970. The other has been identified 300m to the south-east of the site boundary and appears on the historical plans from approximately 1971.

## 8.3 Nearby Potentially Infilled Land

There are a number of areas of potentially infilled land identified within 500m of the site boundary.

The closest of these relates to a chalk pit located on site towards the south-west boundary from approximately 1875 until the early 1980`s when it becomes infilled and utilised as agricultural land.

Three buildings have been identified on site in the south-west corner from approximately 1898 to the early 1980`s. It is not known if these buildings included any underground structures and therefore there is the potential for infilled cellars or buried foundations to be present upon the site.

A chalk pit located 10m to the north was also identified from approximately 1875 until the 1980`s when it is no longer located.

Chalk pits also occur along the south boundary of the site from 1875 until circa 1898 when they are infilled and built upon with Green Lane Farm.

A further chalk pit identified 300m to the north-west from 1875 becomes infilled and built upon with road infrastructure during the 1970`s

A chalk pit identified 400m to the north-west has been identified from approximately 1875 until 1962 when it is infilled and utilised as part of the playing fields for Archers Court School.

These entries of potentially infilled land have been backfilled at some time in the past with unknown constituents.

---

## 9.0 Environmental Setting

When considering the environmental setting of the site, the relevant site sensitivity and geological maps produced by the British Geological Survey, Environment Agency, and site specific Envirocheck® Reports have been utilised.

### 9.1 Geology

The information used has been extracted from; 1:50 000 Geology map sheet Dover No. 290, and Envirocheck® report (ref: 29062990\_1\_1). Where necessary, information has also been cross-referenced with the British Geological Survey (BGS) Lexicon of Named Rock Units database found on the BGS website in the Information and Data section.

The geological setting is often of paramount importance when considering environmental risk from contamination. Sources, pathways and receptors may be present which may form pollutant linkages. The geological setting of a site may be a key aspect when defining its conceptual model.

### 9.2 Bedrock (Solid)

The solid geology of the area around the site comprises of Cretaceous Upper Chalk beds.

### 9.3 Superficial

According to the 1:50 000 Geology map sheet Dover No. 290 the site is overlain by drift deposits of Clay-with-flints. The Envirocheck® report (ref: 29062990\_1\_1) suggests there may also be head, peat, river terrace deposits and marine and estuarine alluvium present on site.

### 9.4 Radon Gas

The property is in a radon affected area, as between 3 and 5 % of homes are above the action level. Therefore, basic radon protective measures are necessary in the construction of new dwellings or extensions.

## 9.5 Subsidence Hazards

Hazard	Located	Direction	Severity
Potential for Ground Dissolution Stability Hazards	On-site	SW	Very Low
Potential for Ground Dissolution Stability Hazards	On-site	S, W	Low
Potential for Ground Dissolution Stability Hazards	On-site	W, SW	Moderate
Potential for Ground Dissolution Stability Hazards	On-site	W, S	High
Potential for Ground Dissolution Stability Hazards	0-250m	S, NE	Very Low
Potential for Ground Dissolution Stability Hazards	0-250m	S, SW, NE, N	Low
Potential for Ground Dissolution Stability Hazards	0-250m	SE	High
Potential for Landslide Ground Stability Hazards	On-site	W	Low
Potential for Landslide Ground Stability Hazards	On-site	SW	Very Low
Potential for Landslide Ground Stability Hazards	0-250m	S, SW	Low
Potential for Landslide Ground Stability Hazards	0-250m	SW	Moderate
Potential for Running Sand Ground Stability Hazards	On-site	S	Very Low
Potential for Running Sand Ground Stability Hazards	0-250m	SW, NE, N	Very Low
Potential for Shrinking or Swelling Clay Ground Stability Hazards	On-site	S	Very Low
Potential for Shrinking or Swelling Clay Ground Stability Hazards	On-site	SW	Low
Potential for Shrinking or Swelling Clay Ground Stability Hazards	0-250m	SW, NE, N	Very Low

---

## 9.6 Mining Report

The site is not in an area affected by coal mining.

Three natural and mining cavities have been identified within 500m of the site boundary. The closest relates to a natural solution pipe formed by surface water entering a cave system identified 241m to the north.

## 9.7 Hydrogeology

The site is underlain by a Major Aquifer. These are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public water supply and other purposes.

The soils underlying the site are classified as being of High Leaching Potential (U). These soils have little ability to attenuate diffuse source pollutants. Non-absorbed diffuse pollutants and liquid discharges have the potential to move rapidly to the underlying strata or to shallow groundwater. Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) is assumed, until proved otherwise.

## 9.8 Hydrology

The site is not within 500m of an area affected by flooding from rivers or sea.

There are no surface water features identified within 500m of the site boundary.

## 9.9 Ecological Aspects

The site is covered by agricultural land with tree lines to the west and southern boundaries.

No species of significant ecological note were identified during the site walkover.

## 9.10 Source Protection Zones & Water Abstractions

The majority of the site lies within a source protection zone III (total catchment) zone, which is the total area needed to support the discharge from the protected groundwater source. However the south-western corner of the site lies within a source protection zone II (outer protection zone).

There are no groundwater source abstractions located within 500m of the site boundary.

## 10.0 Regulatory Pollution Controls

### 10.1 Discharge Consents and Licences

There are six Discharge Consents issued within 500m of the site. These are detailed in the table below.

Name	Direction	Estimated Distance from Site (m)	Discharge Type	Receiving Water	Status
P & O Ferries Ltd.	NW	206	Trade Effluent Discharge-Site Drainage	Underground Strata	New Consent
P & O Ferries Ltd.	NW	212	Trade Effluent Discharge-Site Drainage	Underground Strata	New Consent
Perrys Motor Sales Ltd	N	241	Discharge Of Other Matter-Surface Water	Into Land	Post National Rivers Authority Legislation where issue date > 31/08/1989
Ferryline Forwarding Ltd	N	344	Discharge Of Other Matter-Surface Water	Into Land	Lapsed (under Environmental Act 1995, Schedule 23)
Tesco Stores ltd	NW	451	Trade Effluent Discharge-Site Drainage	Into Land	Post National Rivers Authority Legislation where issue date > 31/08/1989
Tesco Stores ltd	NW	451	Discharge Of Other Matter-Surface Water	Into Land	Post National Rivers Authority Legislation where issue date > 31/08/1989

There are two Local Authority Pollution Prevention and Control consents recorded within 500m of the site. These are detailed in the table below:

Name	Direction	Estimated Distance from Site (m)	Status
Jenkins & Pain White Cliffs	N	274	Authorised
Tesco White Cliffs	NW	477	Authorised

### 10.2 Contraventions & Statutory Authorisations

No Pollution Incidents into Controlled Waters consents have been identified within 500m of the site.

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## 11.0 Environmental Risk Assessment

### 11.1 Introduction

The source-pathway-receptor model is used to estimate risk in the form of a conceptual site model.

#### Potential Sources of Contamination

- Any Made Ground.
- Energy and fuel facilities.
- Contamination of soils from past contaminative uses.
- Building materials (possible asbestos, buried foundations etc.).
- Services (effluent/sewage pipes etc.).
- Soil types.

#### Potential Pathways/Transport Mechanisms

- Vertical or lateral migration of contamination.
- Gas or vapour migration (both lateral and/or vertical).
- Dermal contact, ingestion or inhalation.
- Superficial run-off waters.
- Uptake of contaminants by plants.
- Osmosis of organic contaminants.
- Dust generation.

#### Potential Targets or Receptors

- Wildlife.
- Building materials (cements, mortars, concretes etc.).
- Services (e.g. plastic pipes).
- Human health (including site workers during development, end users of the site, near site users, and trespassers).

---

## 11.2 Site Conceptual Model

The historical information obtained as part of this desk study suggests that the site has predominantly been an area of agricultural land. However, a chalk pit has been located towards the south-west boundary from at least 1875 until 1980 where it appears to have been infilled. Three small buildings associated with the adjacent Green Lane Farm are identified in the south-west corner from approximately 1898. These become labelled as Green Lane Cottage during the 1950`s and New Barton Farm during the early 1960`s. These buildings are no-longer identified on the historical plans by the early 1980`s when the near-by chalk pits also appear to have been infilled. The site land-use remains agricultural land up until the present day.

A number of industrial land uses are listed within 500m of the site boundary. Six of these are located within 250m of the site. The closest relates to a fascias and soffits company. The remaining potentially contaminative uses include among others; cosmetic manufacturers and garage services.

No waste management facilities, landfill sites, historical landfill sites or waste transfer stations have been identified within 500m of the site.

A number of areas of potentially infilled land have been identified within 500m of the site. The closest of these relates to a chalk pit located on site towards the south-west boundary from approximately 1875 until the early 1980`s when it becomes infilled and utilised as agricultural land. Three buildings are identified on site in the south-west corner from approximately 1898 to the early 1980`s. It is not known if these buildings included any cellars and therefore there is the potential for infilled cellars and buried foundations to be present on site. A chalk pit located 10m to the north was also identified from approximately 1875 until the 1980`s when it is no longer located. Several further chalk pits have been identified within 500m of the site. All of which appear to have been infilled at some time in the past. It is not known what constituents were used to backfill these entries - these could have comprised putrescent and degradable materials. Due to this unknown composition of fill materials, the number of sites and the distance from the site it is believed that there is a possibility of landfill gas being generated and migrating on to the site. Therefore it is recommended that gas monitoring be undertaken upon the site.

The environmental data collected as part of the desk study investigation suggests that the site is unlikely to have been adversely affected by hydrological issues, hazardous substances and landfill sites.

A Phase I Environmental Study is concerned with the potential pollutant linkages. A qualitative risk assessment can be conducted by making an informed judgement about the potential chance of a linkage occurring and also the severity of the occurrence.

Table 2 – Qualitative Risk Assessment

		Chance of Occurrence				
		Very Low	Low	Medium	High	Very High
Consequences of Occurrence	Very Low	Very Low	Very Low	Very Low	Low	Low
	Low	Very Low	Very Low	Low	Medium	Medium
	Medium	Low	Medium	High	High	High
	High	Medium	Medium	High	Very High	Very High
	Very High	Medium	High	Very High	Very High	Very High

The following table summarises site specific risk assessment relating the potential sources of contamination (i.e. contemporary trade uses within 250m, off site garages and potentially infilled land within 250 of the site) to the associated risk.

Source	Pathway	Receptor	Hazard	Likelihood	Risk
TPH	Osmosis, Ingestion, Sorption	Human	M	L	M
		Health, Services,	VL	L	VL
		Aquifer	L	L	VL
Metals	Direct contact, Groundwaters, Ingestion, Plant Uptake	Human	L	L	VL
		Health, Aquifer,	L	L	VL
		Flora, Fauna	VL	VL	VL
			L	L	VL
Sulphates	Chemical Attack	Building	M	L	M
Methane/CO <sub>2</sub>	V/Z	People	L	L	VL
PAH	Osmosis Ingestion Sorption	Human	M	L	M
		Health, Services	M	L	M

Consideration of the guidance provided in the Department for Environment, Food and Rural Affairs (DEFRA) and Environment Agency Document 'R & D Publication CLR8: Potential Contaminants for the Assessment of Land', tables 2.3 and 2.4 suggests a series of potential contaminants which may be expected to be present within the soils and/or groundwater underlying a site. The contaminants are dependent upon the primary land usage. The following land usage and associated potential contaminants are considered relevant to this particular site:

- Industrial Profile (primary land usage)

**Agricultural Land**

(it should be noted that such land uses are not included as specific industrial profiles in CLR8 and therefore a CLEA screening suite for commonly occurring contaminants is suggested)

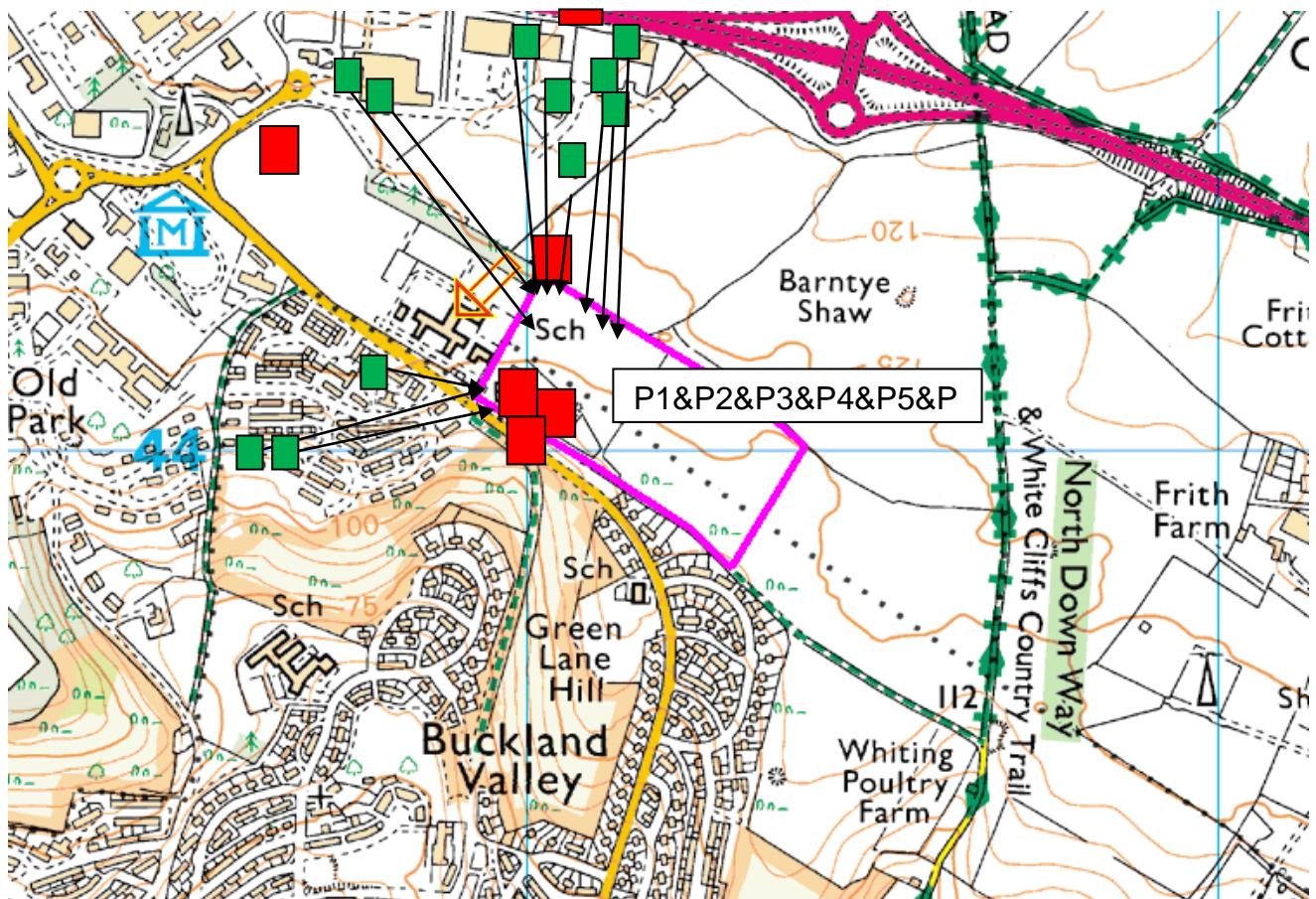
- Contaminants

Metals	Cadmium	Chromium	Copper
	Lead	Mercury	Nickel
	Zinc		
Semi Metals and Non-metals	Arsenic	Boron	Selenium
Others	pH		
Inorganic Chemicals	Cyanide (free)	Cyanide (total)	
Organic Chemicals	PAH (total)	TPH (total)	Phenols
	PCB's		

Soils at the site might be contaminated with the substances listed. These are the source of contamination that may affect the future development.

Consideration should also be given to a secondary source of contamination at the site. The areas of infilled land identified within 500m of the site could potentially be producing landfill gas which could potentially be migrating on to the site.

A schematic diagram has been produced indicating the pathways for these source contaminants to reach the receptors:



P1 – Inhalation

P2 – Ingestion

P3 – Direct contact

P4 – Groundwater

P5 – Osmosis

P6 – Ground gas migration

 Contemporary Trade Uses

 Potentially Infilled Land

---

## 12.0 Conclusion summary and potential contaminants

There is a potential for a pollution linkage to be present upon the site and therefore it would be recommended that a risk assessment be undertaken to determine the extent of possible contamination. The exercise will seek to determine the subsequent impact that may be imposed upon human health and environmental receptors.

An initial ground investigation to determine the presence and level of a typical basic suite of common contaminants would be advisable. Furthermore, it is recommended that water-soluble sulphate is analysed (for buried concrete specification). Plasticity of the clays may need to be determined for information for foundation design for any potential structures.

It would be prudent to carry out contamination analyses on soils and, if significantly elevated concentrations are present, then groundwater samples should also be tested.

There is sufficient evidence to suggest it would be prudent to undertake gas monitoring to determine the Gas Regime for the site. This is due to the presence of a number of areas of infilled land located within 500m of the site. All of the entries have been identified on historical maps and have, at some time in the past, been backfilled and in some cases built upon. These areas have been backfilled with unknown constituents which could comprise degradable and putrescent materials which could be generating landfill gas. Due to the distance of these areas (the closest area of infilled land is located on site) there is the potential for this gas to migrate onto the site itself. Therefore it is recommended that gas monitoring be undertaken upon the site.

It is therefore noted that the site has a potential for contamination to be present. However, the nature of such contamination is unlikely to be onerous. Such contamination (if present) is unlikely to prevent development but any intrusive investigation incorporating geotechnical considerations should be prescribed following receipt of design information.

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## 13.0 Phase II Recommendations

Site investigations may be complex and therefore can require the initiation of several phases of investigation. This initial Phase I report should be followed up by an intrusive investigation and Phase II report. Details of the work involved in this phase of works are outlined below with recommendations:

### 13.1 Intrusive Fieldwork

- 6 No. Window Sampler Boreholes to a target depth of 5.0m below existing ground level.
- SPT's at 1m c/c, to 6.0.00m within the boreholes.
- 5 No. Mechanically Excavated Trial Pits to a maximum depth of 3.50m below existing ground level.
- Provision of three gas testing standpipes with sealing caps within the boreholes to allow gas monitoring to be undertaken.

### 13.2 Sample examination and description

Samples will be examined and descriptions given, any visual or olfactory evidence of contamination will be noted. Sample logs will also be compiled to aid the investigation.

### 13.3 Laboratory analysis

The chemical analysis has been outlined within this Phase I report. However, going further HSP Consulting would recommend the following analysis as an initial phase of testing;

X6 analysis of Basic Suite of contaminants

X2 Water Soluble Sulphate analysis

X6 Maxi Suite of contaminants including speciated PAHs and TPHs

X4 Plasticity Index & Moisture Content analysis

X4 Particle Size Distribution Tests

It should be noted that the analysis given has been outlined in order to adequately characterise the site based upon the information gleaned from this Phase I report. Until intrusive works are instigated there is no way of determining whether the proposal will provide adequate information and therefore further testing may well be required once the conditions of the site are established. This may be either for further contamination or geotechnical characterisation, or to aid in establishing a suitable remediation strategy or

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foundation design. The findings of the analysis will also provide the necessary information for HSP Consulting to revise the initial conceptual model in determining remedial works where necessary.

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## 14.0 Appendices

- I. *Site Location & Environmental Mapping*
- II. *Site Sensitivity Sheets*
- III. *Historical Site Maps*
- IV. *Site Data Sheets*
- V. *Site Photographs*