Your Environment

Desktop Study

2 Kings Walk, Shoreham

Horizon Design Limited

Your Environment
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Report Number: YE350.301

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Contents

Introduction 2
Environmental Information 3
Geological Information 4
Ground and Surface Waters 5
Designated Environmentally Sensitive Sites 6
Geological Hazards 7
Historical Map Information 8
Walkover Report 10
Summary of Possible Contamination Sources 11
Framework for the Assessment of Contamination 12
Source / Pathway / Receptor 13
Quantative Risk Assessment 15
Conceptual Site Model 16
Recommendations 17
APPENDIX A: Site Visit Photographs 19
APPENDIX B: GroundSure EnviroInsight Report 21
APPENDIX C: GroundSure GeoInsight Report 21
APPENDIX D: Historical Mapping - Small Scale 21
APPENDIX E: Historical Mapping - Large Scale 21
APPENDIX F: Planning Decision Notice 21

Introduction

This report is a desktop study (with additional site walkover) to fulfil a planning condition as per the attached consent (Appendix F). The following table outlines the details of the site:

Site address	2 Kings Walk, Shoreham-By-Sea, BN43 5LG
Grid reference	520664, 104438
Total area	0.06ha

Several databases were searched to gain information relating to Geoenvironmental information including historical uses of the site, likely geology and activities with an environmental impact being carried out locally.

Additionally, a site walkover was carried out by Colin Hiscock (Director) on 22 April 2013.

Environmental Information

Records of Part A(2) and Part B Activities and Enforcements
There is one historical and one current Part B activity located within 500m, the current permit is located 166m north for the unloading of petrol into storage at a petrol station. No enforcement is recorded.

Licensed Discharge Consents
There are six current discharge consents within 500m, the closest of which is 252m north for the discharge of final/treated effluent.

Environment Agency Recorded Pollution Incidents
There is one record of an incident taking place within 250m of the study site at 54m northwest. The incident took place in 2001 and had a recorded category 3 (minor) impact to water, land and air.

Sites Determined as Contaminated Land under Part IIA EPA 1990
There are no records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 19

90 within 500m of the study site.

Records of Environment Agency Historical Landfill Sites
There are three sites located within 1500m, the closest of which is 115m north. It is not recorded the type of waste which was deposited here.

Records of Potentially Contaminative Industrial Sites
There are thirteen records of sites within 250m. The closest to the study site is recorded as being an unspecified works 10m southwest. Of notable interest off site is a hydraulics firm 12m southwest, an engineering firm 12m southwest and a car repair firm also 12m southwest.

Petrol and Fuel Sites
There is one record of a petrol filling station within 500m which is 152m north, the status is listed as being open.

Geological Information

Superficial - Storm Beach Deposits; Flint-rich gravel and rarely sand; commonly with bank-like form.

Bedrock - Lambeth Group and Newhaven Chalk Formation.

Lambeth Group; formerly known as the Woolwich and Reading Beds, marine deposits comprising of predominately sands and gravels with showings of silts and clay.

Newhaven Chalk Formation; Composed of soft to medium hard, smooth white chalks with numerous marl seams and flint bands, including abundant Zoophycos flints (notably at levels near the base). The formation is known to contain distinct phosphatic chalks of limited lateral extent.

Aquifer within Superficial Deposits - On site is 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.

Aquifer within Bedrock Deposits - On site is recorded as being a Principal Aquifer to the extreme northeastern section of the site and a Secondary (A) Aquifer to the remaining portion. The Principal Aquifer is defined as geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally Principal Aquifers were previously Major Aquifers with the Secondary (A) Aquifer identical to that present within the superficial deposits.

Ground and Surface Waters

Groundwater Abstraction Licenses
There is one licence located within 2000m, which is 1417m west for the purposes of animal water and general use in non farming situations.

Potable Water Abstractions Licenses
There are no licences located within 2000m of the study site.

Detailed River Network
There are a number of entries located within 500m of the study site, the closest of which is 324m north for a Secondary River.

Surface Water Features
The nearest surface water feature is located within the 51 to 250m periphery and is considered to be the Solent.

Flooding
The study site located within a Zone 2 or Zone 3 Environment Agency indicative floodplain. There are flood defences within 250m, but no areas benefitting from flood defences or areas used for flood storage within 250m. There are British Geological Survey (BGS) groundwater flooding susceptibility flood areas within 50m of the boundary of the study site. The highest susceptibility to groundwater flooding based on the underlying geological conditions is considered to be very high. The BGS confidence rating in respect of this result is also considered to be high.

Designated Environmentally Sensitive Sites

The study site is located within a Nitrate Vulnerable Zone (NVZ). Off site, a Site of Special Scientific Interest (SSSI) is located 328m north with a Local Nature Reserve (LNR) 131m southeast and 174m west respectively. In addition, an Environmentally Sensitive Area is located 1723m north, an Area of Outstanding Natural Beauty (AONB) 1499m north and a National Park (NP) 1708m northwest.

Geological Hazards

On site there is a very low risk from landslide and collapsible hazards with a negligible risk from running sand, compressible ground and shrink-swell hazards. In addition, there is a null-negligible risk from soluble rock hazards.

Shallow Mining
There is a low risk from subsidence hazards relating to shallow mining on-site.

Artificial/Made Ground
There are two records of artificial/Made Ground within 500m, these are located 113m northwest and 394m north.

Radon Affected Areas/Protection
The site is located within a Radon Affected Area, as between 1 and 3% of properties are above the Action Level. However, no radon protective measures are necessary for any new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment.

Historical Surface Ground Working Features
There are three records within 250m of the study site, one of which is listed as being on site for a gravel pit (which extends off site to the west). The other two records are listed as being off site for a pond 112m west (1873) and 182m north (1963) respectively.

BGS Current Ground Workings
There is one record listed as being within 1000m of the study site boundary and is 362m northwest for the ceased extraction of sands and gravels.

Non-Coal Mining
On site there is recorded as being a rare likelihood for the commodity of chalk. This is defined as infrequent minor mining may have occurred but restricted in extent.

Historical Map Information

Year	Information
1873	The site is undeveloped with a footpath intersecting the site from the northwest to the northeast.
1873 - 1875	It is possible to observe the urban sprawl associated with the village of Shoreham to the northeast beyond 500m.
1896	There have been no discernible changes to the site or immediate surrounds.
1898	There have been no discernible changes to the site or immediate surrounds.
1909	It appears that the very western edge of the site is part of a possible larger extraction pit. In addition residential dwelling with associated garden areas are now noted along the shoreline.
1912	There have been no discernible changes to the site or immediate surrounds.
1909 - 1912	There have been no discernible changes to the site or immediate surrounds.
1931	The site has been developed and now comprises of three buildings, which are assumed to be residential given that the immediate surrounds have also been developed in a configuration which is synonymous with residential. 25m west is a glasshouse structure.
1947 - 1950	There appears to be no discernible changes to the site. A labelled gravel pit can be observed at approximately 350m northwest.
1951	The site is now devoid of any aforementioned structures with the majority of the surrounds also noted to have been cleared of structures. Garages are observed immediately north of the site as well as an electrical substation 75m north.
1953	There have been no discernible changes to the site or immediate surrounds.
1963	The site has been redeveloped comprising of one building assumed to residential with garden areas. Immediately bordering the site are works to the southwest with residential north and south. A garage is also noted approximately 150m northeast.
1963	It is possible to observe the urban expansion associated with Shoreham village.
1968	There have been no discernible changes to the site or immediate surrounds.
1968 - 1969	It is possible to observe to development that has occurred to the surrounds.
1971 - 1974	There have been no discernible changes to the surrounds of immediate environs.
1971 - 1974	It is possible to observe to development that has occurred to the surrounds.
1981 - 1982	It is possible to observe to development that has occurred to the surrounds.
1984	There have been no discernible changes to the site or immediate surrounds.
1987 - 1990	The map is incomplete and therefore it is not possible to observe if any changes have occurred to the site or immediate environs.
1994	The map is incomplete and therefore it is not possible to observe if any changes have occurred to the site or immediate environs.

2002	There have been no discernible changes to the site or immediate surrounds.
2012	There have been no discernible changes to the site or immediate surrounds.
2012	There have been no discernible changes to the site or immediate surrounds.

Therefore, from the historical maps we can consider the following:

On site sources of possible contamination;
Fill to extraction pit
Made Ground due various historical buildings

Off site sources of possible contamination;
Works
Garages

Walkover Report

A site walkover was undertaken by Colin Hiscock. The area for proposed development was situated to the rear of the property.

Garages were immediately visible from the property.

The hard standing outside the garages was relatively unbroken and no visual contamination from oils etc was evident. Also, drains were present across the site. These drains looks as though they were functioning and in working order.

It is likely that all the premises hold stores of waste a new oil although due to the limited capacity of the likely businesses these are not considered to be extensively used.

No visual or olfactory evidence of contamination was noted.

Therefore, from the walkover report we can consider the following:

On site sources of possible contamination;
None noted

Off site sources of possible contamination;
Works - specifically hydraulic hose workshop
General repair garage / MOT testing station
Vehicle restoration garage

Summary of Possible Contamination Sources

Other potential sources of contamination off site have been discounted given the distance to the study site. The most prevalent source of contamination is considered to be the fill to the extraction pit and laterally the Made Ground as a result of historic buildings having been present on site. The walkover survey of the site and surrounds indicates that although there are garages and workshops present near to the proposed development, there was no visual or olfactory evidence of contamination occurring. In addition the particular land uses do not lend themselves to having potentially impacted soils or groundwaters underlying the development site.

Framework for the Assessment of Contamination

Environmental risks are assessed within the risk management framework established in Part IIA of the Environmental Protection Act (EPA) 1990 (HMSO, 1990), which provides a statutory definition of contaminated land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such that:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
(b) Pollution of controlled water is being, or is likely to be caused.

Risk from contamination is assessed by consideration of possible linkages between contaminant sources and potential receptors which could be harmed or polluted.

The key aspect of the framework is the development of a Conceptual Site Model (CSM) which illustrates the spatial interaction between the potential sources and receptors on site.

The information presented in this report was collated and evaluated to develop an initial Conceptual Site Model (CSM) to assess ground contamination issues at the site.

For a risk of pollution or environmental harm to occur as a result of ground contamination, ***all*** of the following elements must be present:

A source, i.e., a substance that is capable of causing pollution or harm;
A receptor, i.e., something which could be adversely affected by the contaminant; and
A pathway, i.e., a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

Potential sources, pathways and receptors are identified in the sections below and the risks associated with possible pollutant linkages outlined.

Source / Pathway / Receptor

Sources

The *main* ***sources*** of potential contamination that have been identified at the site or in the vicinity of the site are summarised above and below:

Source	Location	Description
Made Ground	Onsite	Made ground anticipated to exist on the site as a result of historical development of the site. The chemical quality of the Made Ground is unknown
Ground Gases	Onsite	Ground gasses can be generated from any organic material present in the Made Ground material on the site. Ground gases may also be generated off site and migrate to the site through permeable strata
Underground Structures	Onsite	Due to the historic development of the site, it is likely that a number of underground structures could be identified within the site. Underground structures could be associated with potential contamination

Receptors

The site specific ***receptors*** that could be potentially affected by the contamination hazards identified during this preliminary appraisal are summarised below:

Category	Receptor	Properties
Humans	Site users (residents and visitors)	Potential contact with contaminated soils in soft landscape areas; potential for accumulation of ground gas within buildings with resulting health effects
	Construction workers	Reworking of the contaminant impacted materials in Made Ground or natural strata during construction works can expose workers to contamination
Property	Materials and site structures	Foundations and site services may be damaged by potentially aggressive compounds present in soils. Potential for ground gas ingress into buildings.

Pathways

In order for contaminants to reach potential receptors, there has to be a viable ***pathway*** for the contaminant. Potential pathways that may affect the migration of contaminants are listed below:

Pathway	Medium	Properties
Direct Contact	Dust, solid and liquid phase	There may be direct contact with potentially contaminated Made Ground across the site. There is a possibility of dust fumes being produced during earthworks in the construction phase. Dermal contact and ingestion of potentially contaminated soils during construction or operational phase of the site.
Migration of Ground Gas	Gaseous flow	Made Ground is known to be heterogeneous in composition. Migration through granular material in Made Ground and alongside buried utility pipes / cables or along preferential flow paths.
Leaching through Made Ground	Unsaturated flow	Potential for leaching and migration of potential contaminants along preferential flow paths in the Made Ground due to its heterogeneity.
Foundations and Underground Infrastructure and Obstructions	Preferential flow	Depending on the foundation solution adopted, preferential flow paths for the vertical migration of potential contaminants to the underlying groundwater could be created.

Quantative Risk Assessment

Potential pollutant linkages are identified using the source-pathway-receptor framework detailed above. An assessment of the potential significance of each linkage is then made by consideration of the likely magnitude and mobility of the source, the sensitivity of the receptor and nature of the migration/exposure pathways.

This qualitative risk assessment has been undertaken in accordance with CIRIA C552: Contaminated Land Risk Assessment, A Guide to Good Practice (Rudland et al., 2001)

An assessment of the likelihood of the risk being realised and the magnitude of potential risk is presented below to give an estimation of the significance of each potential pollutant linkage Identified. The assessment is undertaken based on the continued end use proposed.

Conceptual Site Model

Hazard / Pollutant	Pathways	Receptor	Potential Severity	Probability of Risk	Level of Risk	Justification
Made Ground	Ingestion, dermal contact, inhalation	Future site users	Medium	Low Likelihood	Low / Moderate	The composition of the Made Ground as is infill to quarry is unknown and could be the source of contaminants through direct contact e.g. in soft landscaped areas.
		Construction Workers	Medium	Likely	Moderate*	Construction workers are likely to come into direct contact with the Made Ground of unknown composition during site works.
Ground Gases	Gas generation, migration and build up within properties	Future site users	Medium	Likely	Moderate	The properties of the Made Ground as is the infill to the quarry on the site is unknown. Organic materials within the Made Ground or infill to the quarry could be a potential source of ground gases.
		Construction workers	Medium	Likely	Moderate*	
		Materials and site structures	Mild	Likely	Moderate	

*The risk to construction workers and site operatives can be reduced lo Low by the use of suitable Health and Safety measures such as suitable PPE, education and appropriate inductions.

The risk posed to human health during operation has been estimated as MODERATE due to uncertainty related to the ground conditions. The risks posed from ground gases due to the presence of Made Ground and infill to the quarry have been estimated as MODERATE due to the uncertainty in the ground conditions. The majority of the risks identified are due to the presence of Made Ground and infill to the quarry on the site as well as uncertainty related to ground contamination at the site.

Recommendations

Your Environment would recommend a Stage 2 Site investigation in order to further asses the risks as outlined above and these works would be as outlined below:

The main objectives of the proposed Stage 2: Site Investigation (SI) works are to establish whether or not the potential contaminants of concern are present on site at unacceptable concentrations that may be restrictive to the development.

Testing Regime

The testing regime has been devised in accordance with BS10175:2001 *Guidelines for the Code of Practice for Contaminated Land* and CLR Report No.4 *Sampling Strategies*. The objective at this stage of the report is to attempt to delineate the extent of any contamination at the site by using intrusive soil sampling and testing techniques.

Scope of Works

Prior to intrusive investigation, the site area should be assessed using a Cable Avoidance Tool (CAT) to check for the presence of buried services. If service plans are available for the site, these should also be consulted prior to site work commencing.

We would suggest that investigation of the site should comprise of drilling 1no. exploratory windowless sample holes to a nominal depth of 4.0 meters below ground level (mbgl).

We would recommend that the windowless sample hole is installed with a gas monitoring standpipe in order to quantify potential gas risks.

All positions should be logged and samples removed in accordance with current protocol. In addition, groundwater conditions, if encountered, shall be logged and visual/olfactory observations noted.

The installed positions will be monitored for ground gases and groundwater, monitoring will commence approximately 7-10 days after completion of the holes to enable equilibration of the underlying soils and groundwater. Monitoring will be completed on a weekly basis on three (3no.) occasions.

Gas monitoring shall be completed in accordance with CIRIA C665 *Assessing Risks Posed by Hazardous Ground Gases to Buildings*, when atmospheric pressure is either falling and/or below 1005 millibars (mb).

A portable Gas Analyser (GA2000+) will be used to monitor soil gases (Oxygen, Carbon Dioxide, Methane and Hydrogen Sulphide) within the positions. A Photo Ionisation Detector (PID- MiniRae 2000 lamp 10.6eV) meter will also be used during monitoring rounds to analyse the presence of Volatile Organic Compounds (VOCs) as a matter of course.

Once gas monitoring has been completed, a dip meter will be used to test for groundwater depth.

Analysis

An appropriate and consistent analytical suite of contaminants should be applied to any samples retrieved from site.

Based on the findings contained within this report, we would recommend that soil testing should comprise of a site specific screen to include: heavy metals, speciated PAH (including

the more carcinogenic forms of naphthalene and benzo(a)pyrene, banded TPH (C_8 - C_{40}), water soluble sulphates and pH.

A UKAS and MCERTS accredited laboratory will carry out testing.

Guidance
The results from the SI will be compared against UK guidance including Soil Guideline Values (SGVs) and LQM 'CIEH' Generic Assessment Criteria using the 'residential' classification.

Results from gas monitoring shall be used to calculate a Gas Screening Value (GSV) in accordance with CIRIA C665 *'Assessing Risks Posed by Hazardous Ground Gases to Buildings'*.

Statutory Consultees
We would recommend that this report be forwarded to the relevant Statutory Consultees including the Local Council's Environmental Health and Planning Department prior to any future site investigation works commencing to seek their comments and subsequent approval prior to commencement of the Site Investigation works.

I trust the above information is sufficient for your requirements in this matter, should you have any queries please do not hesitate to contact me.

For *Your*Environment



Colin Hiscock

Director

APPENDIX A: Site Visit Photographs



Figure 1: Location of proposed Conservatory



Figure 2: View from house showing garages in proximity to boundary

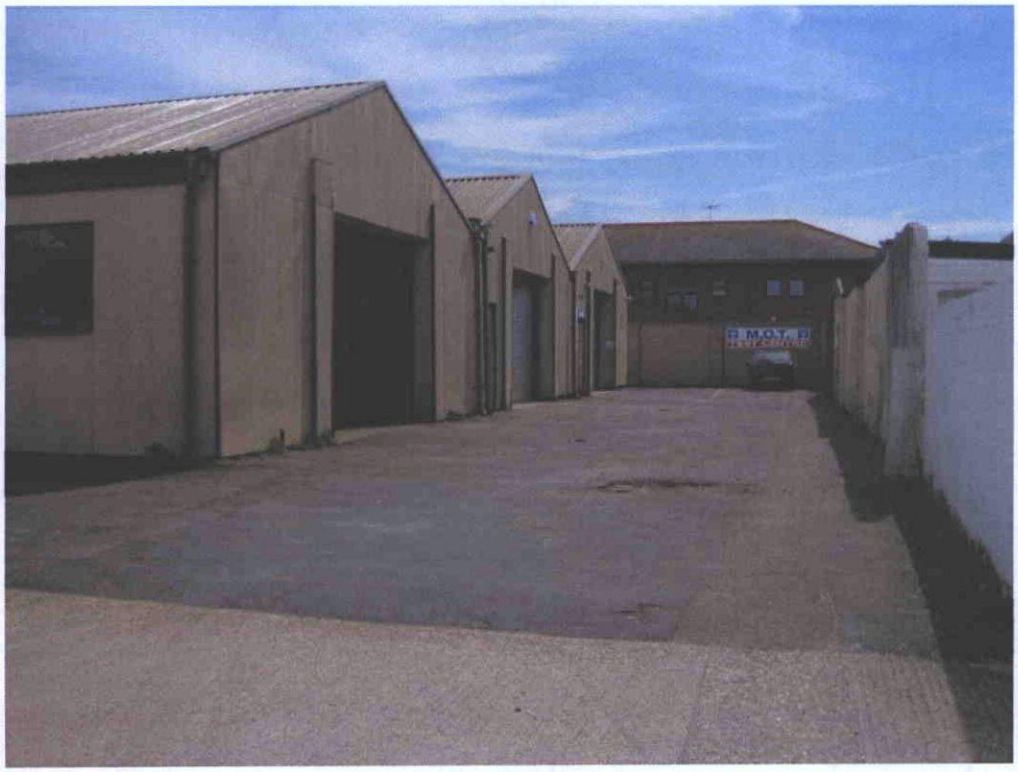

Figure 3: Garages from the main road frontage



Figure 4: Frontage of hydraulics business

APPENDIX B: GroundSure EnviroInsight Report

APPENDIX C: GroundSure GeoInsight Report

APPENDIX D: Historical Mapping - Small Scale

APPENDIX E: Historical Mapping - Large Scale

APPENDIX F: Planning Decision Notice