

Phase I Desk Study

Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA

On behalf of Barton Peveril Sixth Form College c/o Bidwells

Report Reference: GWPR5268/DS/April 2023			Status: Final
Issue	Prepared By	Checked By	Verified By
v.1.01	Alex Stratford BSc (Hons) MSc Geotechnical and Geoenvironmental Engineer	Miltiadis Mellios MSc(Eng) GMICE FGS MEnvSc Principal Engineer	Francis Williams MGeol (Hons) FGS CEnv AGS CGeol Director

Site Investigations | Environmental Consultants | Geotechnical Engineers

2 The Long Barn, Norton Farm, Selborne Road, Alton, Hampshire GU34 3NB
0333 600 1221 enquiries@groundandwater.co.uk **groundandwater.co.uk**

Registered Office: Kineton House, 31 Horse Fair, Banbury, Oxfordshire OX16 0AE Registered in England No. 07032001

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EXECUTIVE SUMMARY	
PROPOSED DEVELOPMENT	At the time of reporting, April 2023, the proposed development was understood to comprise the construction of a new two storey Arts and Design Building at the Barton Peveril Sixth Form College. The surrounding area around the building is to comprise hard landscaping areas.
GEOLOGY AND HYDROGEOLOGY	The British Geological Survey Solid and Drift Geology Map for the Eastleigh area (Southampton Sheet No. 315) revealed that the western portion of the site was underlain by superficial River Terrace Deposits 1 (Sand and Gravels) whereas the eastern portion of the site was underlain by superficial River Terrace Deposits comprising mainly loamy Clay. The entire site was underlain by bedrock deposits of the London Clay Formation. No areas of Made Ground or Reworked Ground were noted within a 250m radius. A study of the aquifer maps on the DEFRA website revealed the western and central areas of the site was underlain by a Secondary A Aquifer whilst the eastern portion of the site was underlain by a Secondary (Undifferentiated) Aquifer comprising the superficial River Terrace Deposits, underlain by Unproductive Strata comprising bedrock deposits of the London Clay Formation. Examination of the Environment Agency records showed that the site did not fall within a Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater. No surface water features were present within a 250m radius of the site. The nearest surface water feature was the Monks Brook located 260m west of the site flowing in a north to south direction. A lake associated with the Lakeside country park was noted approximately 370m south of the site. From analysis of hydrogeological and topographical maps it was anticipated that groundwater was, present within the seasonal aquifer of the superficial River Terrace Deposits. Water may be perched within Made Ground at shallower depths. It was considered that groundwater was flowing in a westerly direction toward the Monks Brook in line with local topography.
POTENTIAL SOURCES OF CONTAMINATION	Full details can be seen in sections 6.3 and 6.4 of this report. Onsite - The Desk study has revealed the following potential sources of contamination onsite: • Potential for Made Ground (associated with historical construction/demolition onsite) • Electricity Sub-station • Gas Governor Offsite - The Desk study has revealed the following potential sources of contamination within the site's environs: • Electricity Sub-station • Gas Governor • Sewage Works • Surface Ground Workings • Tanks • Allotment Gardens
RECOMMENDATIONS / PHASE II OBJECTIVES	It is recommended that an intrusive ground investigation is undertaken at the site to evaluate the risk that contaminants of concern within the soils and groundwater may affect end-users. This should determine the underlying ground

and groundwater conditions and include an assessment of the level of contamination to enable the quantification of the ground-related risks associated with the proposed redevelopment.

Consideration should be given to the testing of soil samples recovered from exploratory holes for chemical laboratory testing. The testing should be for a broad range of contaminants in accordance with DEFRA / CLEA methodologies and include the contaminants of concern identified within the Conceptual Site Model.

If analytical results show elevated concentrations of contaminants of concern in the soil samples, then there might be a requirement to assess the potential risks of leachability of contaminants migrating into the Secondary A Aquifer groundwater underlying the site. This might mean leachate testing on soils samples is required or groundwater sampling and testing.

The CSM has identified a low risk from ground gases at the site as a result of limited Made Ground on-site and negligible from off-site sources/Made Ground. Analysis of soil samples should include Total Organic Carbon (TOC) testing in order to enable a pragmatic ground gas risk assessment to be undertaken at the site. This approach will only quantify the risk associated with on-site sources.

Radon Protection measures might be required. Further risk assessment will be carried out via a BGS radon Report.

The CSM has identified a low risk from vapours at the site as a result of limited Made Ground. No other off-site sources have been identified. Analysis of soil samples should include BTEX compounds (used as a marker compound for VOCs) as an initial screen. This approach will only quantify the risk associated with on-site sources. No monitoring of standpipes or direct VOC testing is required.

1. INTRODUCTION

1.1. General

Ground and Water Limited were instructed by Bidwells on behalf of Barton Peveril Sixth Form College on the 28th February 2023 to conduct a Phase I Desk Study on the site at Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA. The scope of the investigation was detailed within the fee proposal GW-1716, dated the 21st February 2023.

1.2. Aims of the Investigation

This Phase 1 Desk Study was undertaken to advise the client on risk factors pertaining to the site with special reference to former and present day potential contaminative uses and their impact on sensitive receptors, these being human health, controlled waters, buildings, building materials and services.

1.3. Conditions and Limitations

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

1.4. Technical Glossary

Generic technical terms and their description can be viewed within the glossary provided within Appendix B.

2. SITE SETTING

2.1. Site Location

The site comprised a ~50,000m² rectangular-shaped plot of land, orientated in a north-west to south-east direction, along the northern side of Chestnut Avenue. The site was located in the southern portion of town of Eastleigh in the county of Hampshire.

The national grid reference for the centre of the site was approximately SU 44653 18273. A site location plan is given within Figure 1. A site development area plan is shown in figure 2 and an aerial photograph of the site shown in figure 3.

2.2. Site Description

A Site Walkover was undertaken on the 4th April 2023. A description of the site, as noted during the Site Walkover, is tabulated below. Photographs can be seen in Appendix C.

Site Description Sheet	
Use of site	At the time of the site walkover visit, 4 th April 2023. The site is a car parking area used at Barton Peveril college
Site topography	The majority of the site is reasonably flat.
Area topography	Area is reasonably flat in the surrounding area.
Structures onsite	The site development area comprised Temporary units currently used as educational Classrooms, and tennis court. The central and western portion of the site comprised permeant college buildings.
Structures off-site	Residential houses were noted to the north and west of the site. Another school was noted to the east of the site.
Use of surrounding ground	Land to the south, west and north of the site comprised residential houses. Another school and college were noted to the east of the site.
Boundary features	Northern Boundary: Residential Houses. Eastern Boundary: An open boundary comprising a school playing field. Southern Boundary: Residential Houses. Western Boundary: Residential Houses.
Site covering	The majority of the central and western areas of the site was covered with tarmac hardstanding with small soft landscaped areas. The eastern portion of the site comprised a grass playing field.
Contamination sources onsite	None noted
Contamination sources off-site	None noted
Vegetation onsite	Large playing field on the eastern side of the site. Small vegetation area that looks like an old allotment on the northern portion of the site.
Vegetation off-site	Large playing field on the eastern side of the site.
Services	A few drains around the development area, along with lighting too.

2.3. Proposed Development

At the time of reporting, April 2023, the proposed development was understood to comprise the construction of a new two storey Arts and Design Building at the Barton Peveril Sixth Form College. The surrounding area around the building is to comprise hard landscaping areas.

The proposed development plan can be seen within Figure 4.

2.4. Geology

The British Geological Survey Solid and Drift Geology Map for the Eastleigh area (Southampton Sheet No. 315) revealed that the western portion of the site was underlain by superficial River Terrace Deposits 1 (Sand and Gravels) whereas the eastern portion of the site was underlain by superficial River Terrace Deposits comprising mainly loamy Clay. The entire site was underlain by bedrock deposits of the London Clay Formation. No areas of Made Ground or Reworked Ground were noted within a 250m radius.

Superficial deposits (Drift) are the youngest geological deposits formed during the most recent period of geological time. They rest on older deposits or rocks referred to as bedrock (Solid), which are the main mass forming the Earth. Bedrock is present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

River Terrace Deposits (Southampton area)

Extensive spreads of River Terrace Deposits occur along the Rivers Test and Itchen. Eleven terraces have been provisionally recognised in the area. The deposits are variable in thickness, ranging from 1 to 5m, and generally consist of gravels, predominantly sub-angular to sub-rounded flints, with a considerable sand content. Poorly sorted clayey and sandy silts and silty clays overlie some of the terraces.

London Clay Formation

In the Hampshire Basin area the London Clay Formation comprises blue, brown and grey clay with yellow and grey sands and silts interspersed with pebble beds. Localised developments of sandstone also occur. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of Gypsum (Selenite) are often found within the weathered part of the London Clay Formation, and precautions against sulphate attack to concrete are sometimes required. The basement beds of the London Clay Formation are sandy with rounded flints.

A BGS borehole (SU41NW/706) located ~270m west of the site revealed a 1.00m capping of Topsoil comprising a soil with gravel and tarmac over a soft grey silty clay with some fine to coarse gravel to 1.90m bgl followed by a loose fine to coarse sandy Gravel to 2.60m bgl. From 2.60 to 7.00m (base of the borehole) a stiff heavily fissured grey silty Clay was recorded. Groundwater was noted at 1.60m bgl rising to 0.80m bgl in 15 minutes.

2.5. Hydrogeology and Hydrology

A study of the aquifer maps on the DEFRA website revealed the western and central areas of the site was underlain by a **Secondary A Aquifer** whilst the eastern portion of the site was underlain by a **Secondary (Undifferentiated) Aquifer** comprising the superficial River Terrace Deposits, underlain by **Unproductive Strata** comprising bedrock deposits of the London Clay Formation.

Examination of the Environment Agency records showed that the site **did not** fall within a Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater.

No surface water features were present within a 250m radius of the site. The nearest surface water feature was the Monks Brook located 260m west of the site flowing in a north to south direction. A lake associated with the Lakeside country park was noted approximately 370m south of the site.

From analysis of hydrogeological and topographical maps it was anticipated that groundwater was, present within the seasonal aquifer of the superficial River Terrace Deposits. Water may be perched within Made Ground at shallower depths. It was considered that groundwater was flowing in a westerly direction toward the Monks Brook in line with local topography.

Examination of the Environment Agency records showed that the site was located within a Flood Zone 1, i.e. an area with a low probability of flooding.

The Groundsure Datasheets revealed the site was at a very low risk of flooding from rivers and the sea. The datasheets also revealed the central portion of the site was at risk of a high risk of groundwater flooding, while the western portion had a moderate risk and the eastern portion a moderate to high risk. The central area of the site had a 1 in 30 year 0.30-1.00m risk of surface water flooding.

2.6. Radon

BRE 211 (2015) Map 4 of the Hampshire, Berkshire and South Oxfordshire area indicated that the site **was not** located within an area where mandatory protection measures against the ingress of radon were likely to be required.

A review of the freely available UK Health Security Agency radon database, UK Radon, indicated that the site was located within a 1km grid square, where the maximum radon potential of 3 – 5% was recorded. Basic radon protection measures are required in areas where more than 3% of houses are at or above the Action Level. **Basic radon protection measures might be required (subject to the risk assessment).**

The site is in an area where a risk assessment is required.

This risk assessment will be taken further and a BGS report will be obtained for the site.

2.7. Internet Search (Site Setting)

2.7.1. Available Unexploded Ordnance (UXO) Map Review

A review of the data available on www.zeticauxo.com/ revealed the site was located within a moderate-risk area associated with unexploded ordnance (UXO), as indicated by having 15 – 49 bombs dropped per 1000 acres. 1No. known UXO find was recorded 420m north-west of the site as well as an Industrial Strategic target located 100m north of the site.

2.7.2. Historical Landfill Tool Review

A review of the data available on www.groundsure.io/ revealed an area of Historical Landfilling approximately 315m south of the site. This historical landfill was referenced Land at the West of Wilde Lane and was active from 19/01/1983 with no last input date provided. No information regarding the type of waste that was stored has been provided.

3. HISTORICAL REVIEW

3.1. Historical Map Review

The object of this search was to report on the history of the site and its environs from available County Series and Ordnance Survey Maps dating from the mid to late 19th Century to the present day and

downloaded from Groundsure. In the following sections dealing with individual maps, only features considered to have a potential contaminative impact on the site and usually within a notional 250 metre radius of the site boundaries are discussed. Any distances quoted for features remote from the site have been scaled from the maps and are only approximate. The north point and approximate extent of the site are indicated on each figure. The historical maps referred to are given within Appendix D. The implications of the map search are discussed later within this report.

Environmental Significance of Data from Historical Maps		
Maps Dated Between	Site	Environs
1868 – 1909	The site comprised a part of an undeveloped open plot of land, likely agricultural land/fields, a fence line split the site roughly in two.	The site environs generally comprised undeveloped agricultural land/fields. A road named Smithy's lane, later re-named Stoneham lane was noted directly to the south of the site. A Gasholder station was noted approximately 500m north-west of the site from 1908 onwards.
1931 – 1938	No significant change recorded, the site remained undeveloped.	The land directly to the east of the site was allotment gardens. Residential houses had been constructed approximately 120m north-east, north and north-west of the site. By 1938 the land directly to the north of the site had new residential buildings/flat buildings constructed on it. The remaining land surrounding the site remained undeveloped fields.
1950 – 1954	No significant change recorded.	The land directly to the west of the site had been built upon with residential properties. The road to the south of the site was now referenced Chestnut Avenue. The land directly to the south of the road had also been built upon with residential properties by 1953. Remainder as previous map.
1957 – 1969	The Barton Peveril Grammar School had been constructed on the central area of the site with the southern and eastern portion of the site comprising playing fields. By 1967 a number of new buildings had been built to the north-east of the main school buildings.	A swimming pool was noted just off site to the west. A new Secondary school had been constructed approximately 80m east of the site. The school was referenced Alderman Quilley Secondary School. Remainder as previous map.
1981 – 2003	The school was referenced as a college from 1989 onwards. The school/college underwent a number of stages of redevelopment with new buildings constructed on the northern portion of the site between 1981-1992 and major redevelopment occurred on the southern and central portion of the site with new buildings between 1992 and 2003. A new entranceway was created off Chestnut Avenue by 2003. The swimming pool just off site had been demolished by 2003.	Eastleigh Technical college had been constructed approximately 250m east of the site. No significant changes off site, remainder as previous map.
2010 - 2023	Additional buildings had been constructed on the central and southern portion of the site. A number of the buildings just to the	No significant changes off site, remainder as previous map.

	north-east of the main college buildings had been demolished.	
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3.2. Historical Aerial Photography Review

The object of this search was to report on the history of the site and its immediate environs from available Aerial Photography dating from the mid-20th Century to the present day and downloaded from Google Earth and Groundsure. Any distances quoted for features remote from the site have been scaled from the photography and are only approximate.

The 1999 aerial photography indicates that the site comprised Barton Peveril Sixth form college comprising college buildings a tennis court and playing fields to the south and east of the buildings. The site was accessible to the north and west. The surrounding land generally comprised residential buildings with a secondary school and another college located to the east of the site. By 2005 significant development had occurred on site with new college buildings located on the central and southern portion of the site. A new car park and entranceway had been created on the southern portion of the site via Chestnut Avenue. The eastern portion of the site remained as playing fields.

The 2013-2014 photos show that another new building was constructed on the central area of the site with the tennis courts being relocated to the north-east. A number of smaller buildings were demolished to make way for the new building. No other significant changes were recorded on site or to the site environs between 2014 and 2023.

4. ENVIRONMENTAL AND GEOLOGICAL INSIGHT

4.1. Groundsure Datasheets

Groundsure Environmental and Geological Datasheets were obtained for the site. Unless the data indicates a significant risk, only information within a 250m buffer zone has been included. The GroundSure Datasheets are also presented in Appendix E and a summary is given below and overleaf(s).

Environmental Insight	
Source	Nearest Distance from Site/Dated/Type
Past Land Use	
Historical industrial land uses	1 off-site record within a 250m radius: 1x Nursery- 142m south-east (1976).
Historical Tank Database	1x record within a 250m radius: 1x records of unspecified tank 152m east (1967-1997).
Historical Energy Features Database	2x off-side records within a 250m radius: 2x records of electricity substations 63m south-east (1968-1997) and 75m south-east (1967-1991).
Waste and Landfill	
Waste exemptions	1x record within a 250m radius: 167m south- Use of waste in construction.
Current Industrial Land Use	
Recent Industrial Land Uses	13x records within a 250m radius: 2x on site records- 1x electricity sub-station and 1x Gas governor. 5x off site electricity substations- 78m south-east, 121m east, 123m north, 224m south, 236m east, 1x Tank- 155m east, 2x Sewage pumping station/pumping station- 158m south-east, 160m south-east, 2x Gas Governors 211m east, 237m east 1x Distribution and haulage- 244m north.
Hydrogeology	
Superficial Aquifer	2 records on-site: 1x Secondary Undifferentiated Aquifer-eastern portion of the site. 1x Secondary A Aquifer- central and western portion of the site.
Bedrock Aquifer	1 record onsite: 1x Unproductive strata.
Groundwater Vulnerability	2 records onsite: 1x Secondary superficial aquifer – medium vulnerability, leaching class: intermediate. 1x Unproductive strata.
Hydrology	
Surface Water Features	2x records within a 250m radius.
WFD Surface Water Body Catchments	1 record within a 250m radius: 1x Monks Brook -onsite (Management catchment-Test and Itchen).
Environmental Designations	
Visual and Cultural Designations	
Agricultural Designations	
Agricultural Land Classification	1x record within a 250m radius: 1x Urban on-site.
Habitat Designation	
Priority Habitat Inventory	2x records within a 250m radius: 2x Coastal and floodplain grazing marsh 215m south-west and 242m south-east.

Geological Insight	
Source	Nearest Distance from Site/ Type
Superficial Geology (1:10,000 Scale)	2x on-site records: 1x record on-site – River Terrace Deposits (Sand and Gravel) Western and central portion of the site. 1x record on-site- River Terrace Deposits (Undifferentiated) (Silt) 3x off site records: River Terrace deposits (Undifferentiated) Silt 181m east and 183m north-west, Alluvium (Silt) 231m west.
Bedrock Geology (1:10,000 Scale)	1x on-site record: 1x London Clay Formation (Clay, silt and sand).
Superficial Geology and Permeability (1:50,000 scale)	2 on-site record: 1x River Terrace Deposits 1- Sand and Gravel. Flow Type: Intergranular, Maximum Permeability: Very High, Minimum Permeability: High. 1x River Terrace Deposits 1 Clay and Silt. Flow Type: Mixed, Maximum Permeability: Low, Minimum Permeability: Very Low. 2x off site records: River Terrace deposits (sand and gravel) 174m north-west, Alluvium (clay, silt, sand and gravel) 222m west.
Bedrock Geology and Permeability (1:50,000 scale)	1 record onsite: 1x London Clay Formation (Clay, Silt and Sand). Flow Type – Mixed, Maximum Permeability – Moderate, Minimum Permeability – Very Low.
Boreholes	
BGS recorded boreholes	3 records within a 250m radius: 76m east (4.11m depth), 148m east (3.00m depth), 243m west (7.00m depth).
Natural Hazard Findings	
Shrink-Swell Clay	Negligible hazard (western and central area) to Very Low hazard (eastern area) onsite.
Running Sands	Very Low hazard (western and central area) to Negligible hazard (eastern area) onsite.
Compressible Deposits	Negligible hazard onsite.
Collapsible Deposits	Very Low hazard (western and central area) to Low hazard (eastern area) onsite.
Landslides	Very Low hazard onsite.
Ground Dissolution of Soluble Rocks	Negligible hazard onsite.
Mining, Ground Working and Natural Cavities	
Records of Surface Ground Workings	3x records within a 250m radius: 3x Ponds 209m west (1888), 210m west (1985), 211m west (1868).
Radon	
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The western portion of the site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. The eastern portion of the site is in an area where between 3 and 5% of properties are above the action level.
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary on the western portion of the site. Basic Radon measures are required on the eastern portion of the site.
Estimated Background Soil Chemistry	
Records of BGS estimated background soil chemistry	3 records within a 250m radius: On-site (x2), 22m south-west: Arsenic: 15mg/kg Lead 100mg/kg (60mg/kg bioaccessible)

	Cadmium: 1.8mg/kg Chromium: 60 – 90mg/kg Nickel: 15 – 30mg/kg
Railway Infrastructure and Projects	

5. ONLINE REVIEW AND HISTORICAL INVESTIGATIONS

5.1. Online Council Planning Database

A review of the Eastleigh Borough Council Planning Database revealed that 26 planning applications had been filed for the Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA. Those pertinent to the site development area are tabulated below.

Planning Applications for the site		
Application No./Date	Proposed	Decision
F/22/94434 28/03/2023	Construction of a two-storey building to accommodate the College's Art and Design school	Decided

5.2. Internet Search

An internet search did not identify any other information pertinent to this report.

6. PRELIMINARY RISK ASSESSMENT

6.1. Contaminant Source-Pathway-Receptor Model

In the UK, the assessment of risk from contamination follows the source-pathway-receptor (SPR) approach. For a risk to be present there must be a source of contamination, a receptor or receptors, and a pathway for contaminants to migrate or be absorbed. If one of these three elements are absent, it is considered that there is no risk of harm. If, however, there is a linkage between any given source and any given receptor, then a risk-based approach is used to assess the significance or impact of the pollutant linkage.

This Phase 1 Desk Study has been used to identify potential on-site and off-site sources of contamination, which are summarised in this section of the report. Additional potential sources of contamination identified within the Desk Study have been discounted based on the absence of a realistic SPR linkage (i.e. the distance from the site or the nature or age of any potential contamination sources).

In line with the requirements of BS 21365:2020, *Soil Quality – Conceptual site models for potentially contaminated sites*, the Conceptual Site Model (CSM) can be described in text, tabulated or presented as a figure. A tabulated CSM is provided in Section 6.6 of this report, where each component is discussed in the following sections. A diagrammatic CSM is provided within Figure 5.

6.2. Potential On-site Sources of Contaminants

This Desk Study revealed that at the time of the earliest historical mapping (1868) the site comprised a part of an undeveloped open plot of land, likely agricultural land/fields, a fence line split the site roughly in two. The site remained undeveloped until 1957 when the Barton Peveril Grammar School had been constructed on the central area of the site with the southern and eastern portion of the site comprising playing fields. By 1967 a number of new buildings had been built to the north-east of the main school buildings. The school was refenced a college from 1989 onwards. The school/college underwent a number of stages of redevelopment with new buildings constructed on the northern portion of the site between 1981-1992 and major redevelopment occurred on the southern and central portion of the site with new buildings between 1992 and 2003. A new entranceway was created off Chestnut Avenue by 2003. Between 2010 and 2023 Additional buildings had been constructed on the central and southern portion of the site. A number of the buildings just to the north-east of the main college buildings had been demolished.

The Phase 1 Desk Study revealed the following on-site sources of contamination:

- The site has undergone various phases of construction/demolition and as a result various thicknesses of Made Ground resulting from these activities are likely to be encountered.

Contaminants of concern associated with Made Ground deposits include; metals, Petroleum Hydrocarbons (TPHs), Polycyclic aromatic hydrocarbons (PAHs), asbestos, sulphates, volatile organic compounds (VOCs) and ground gases.

Electricity Sub-Station

The Groundsure datasheets recorded an electricity substation on the northern portion of the site. PCB oils and other cable/transformer oils, together with a series of waxes are commonly used in mainly

high voltage applications. PCBs are generally toxic; however, newer forms of non-toxic oils and waxes have replaced the use of PCBs. All cable oils are extremely viscous and adhere strongly to soil particles and do not tend to migrate far from the point of leakage or spillage. Therefore, due to the age of the sub—station (new) and the potential contamination from the sub-station being very localized the potential risk of encountering PCBs on the site development area was negligible.

Gas Governor

The Groundsure datasheets recorded a gas governor on the northern portion of the site. Likely contaminants associated with a gas governor include metals and semi-metals such as lead, zinc, cadmium, mercury, arsenic; cyanide; asbestos; phenol; aromatic hydrocarbons, PAHs and ammonia. The risk was considered to be low to negligible due to the small scale of the gas governor.

6.3. Potential Off-site Sources of Contaminants

This Desk Study revealed that at the time of the earliest historical mapping (1868) the site environs comprised undeveloped agricultural land/fields. A road named Smithy's lane, later remained Stoneham lane was noted directly to the south of the site. A Gasholder station was noted approximately 500m north-west of the site from 1908 onwards. Between 1931 and 1938 The land directly to the east of the site was allotment gardens. Residential houses had been constructed approximately 120m north-east, north, and north-west of the site. By 1938 the land directly to the north of the site had new residential buildings, flat buildings constructed on it. The remaining land surrounding the site remained undeveloped fields. The 1957 to 1969 plans recorded a swimming pool was noted just off site to the west. A new Secondary school had been constructed approximately 80m east of the site. The school was referenced Alderman Quilley Secondary School. By 1981 Eastleigh Technical college had been constructed approximately 250m east of the site. The swimming pool just off site had been demolished by 2003. No other significant changes were recorded to the sites environs from 2003 up to the present day.

Electricity Sub-Station

The Groundsure datasheets recorded 2 historical and 5 recent electricity substations within a 250m radius of the site. The nearest was 63m south-east of the site. PCB oils and other cable/transformer oils, together with a series of waxes are commonly used in mainly high voltage applications. PCBs are generally toxic; however, newer forms of non-toxic oils and waxes have replaced the use of PCBs. All cable oils are extremely viscous and adhere strongly to soil particles and do not tend to migrate far from the point of leakage or spillage. Therefore, the potential risk of encountering PCBs on the site was negligible.

Allotment gardens

The Groundsure historical maps recorded the land directly to the east of the site between 1931 and 1957 was used as allotment gardens. Pesticides/herbicides may have been used on a regular basis during the site's occupation as allotment gardens. Heavy metals and semi-metals may also have been used. Isolated leaks from farm machinery and storage containers may have resulted in fuel/lubrication oil contamination. Therefore, it was considered likely that there may be remnants of these chemicals

left in the near surface soils. The risk was considered to the site was considered to be negligible due to the distance to the development area and the age of the land use.

ASTs & Potential UST

The Groundsure datasheets recorded a Tank 152m east of the site. ASTs and the UST, if present, may have contained oil/fuel hydrocarbons to operate light plant machinery around the site. Spillages/leakages may have occurred over time and affected the soils and groundwater underlying the site. If hydrocarbons are present within the soils underlying the site and are slowly attenuating over time, the anaerobic biological breakdown of hydrocarbons can produce harmful bio-gases such as methane and carbon dioxide which could affect the site. The risk to the site was considered to be negligible due to the distance from the site.

Sewage Works

The Groundsure Datasheets recorded 2 sewage pumping stations/ pumping stations within a 250m radius of the site, the nearest being approximately 158m south-east of the site. As a result of the sewage treatment process that may have taken place, any metals, organic pollutants and pathogens that have not been removed during treatment are concentrated in the sludge and comprise the most common forms of contamination. Furthermore, biodegradable material in sludges can and does provide a source for methane and carbon dioxide, which could affect the site.

Potential contaminants could include metals such as cadmium, chromium, copper, lead, mercury, nickel and zinc and semi-metals such as arsenic and organic compounds such as oil/fuel hydrocarbons (Ref: "R&D Publication CLR 8").

Compounds such as ammonia and bacterial compounds such as faecal coliforms and faecal streptococci are also likely to be associated with a sewage works.

The risk to the site from sewage related contaminants was considered to be negligible due to the distance from the site.

Surface Ground workings

The Groundsure datasheets recorded 3 surface Ground workings within a 250m radius of the site which included ponds, the nearest being 209m west of the site. Contaminants of concern associated with Made Ground deposits include; metals, Petroleum Hydrocarbons (TPHs), Polycyclic aromatic hydrocarbons (PAHs), asbestos, sulphates, volatile organic compounds (VOCs) and ground gases. It is thought that these surface ground workings are of a negligible risk to the site due to the distance from site.

Gas Governors

The Groundsure datasheets recorded two gas governors within a 250m radius of the site, the nearest being 211m east of the site. Likely contaminants associated with a gas governor include metals and semi-metals such as lead, zinc, cadmium, mercury, arsenic; cyanide; asbestos; phenol; aromatic hydrocarbons, PAHs and ammonia. The risk was considered to be negligible due to the distance from the site.

(Gasworks, Coke Works and Other Coal Carbonisation Plants – Potential Contaminants for the Assessment of Land, R&D Publications CLR 8, 2002).

6.4. Potential Receptors

At the time of reporting, April 2023, the proposed development was understood to comprise the construction of a new two storey Arts and Design Building at the Barton Peveril Sixth Form College. The surrounding area around the building is to comprise hard landscaping areas.

The proposed development plan can be seen within Figure 4.

Based on the proposed development, the potential receptors are presented below and comprise:

Human Health

- End users of the site (Future site visitors);
- Construction workers during redevelopment;
- Site operatives during maintenance works; and
- Neighbours and members of the public.

Flora and Fauna

- Vegetation within soft landscaped areas;

Building Materials and Services

- Buildings;
- Buried concrete;
- Confined spaces; and
- Underground services (Water Pipes).

Controlled Waters

- Secondary A Aquifer and Secondary Undifferentiated Aquifer (River Terrace Deposits); and
- Monks Brook (~260m west).

6.5. Contaminant Absorption Pathways

The potential pathways for contaminant absorption between the identified sources and the identified receptors are as follows:

Human Health:

- Direct ingestion of soil and soil derived dust;
- Dermal contact of soil and soil derived dust;
- Inhalation of dust (indoors and outdoors) with elevated concentration of determinands;
- Direct ingestion of groundwater;
- Inhalation of volatile vapour (indoors and outdoors);
- Inhalation of ground gases.; and
- Explosion.

Flora and Fauna

- Direct uptake of groundwater; and
- Direct uptake of contaminants in the soil.

Building Materials and Services

- Direct contact;
- Explosion.

Controlled Waters

- Vertical and lateral migration in permeable strata horizons;
- Via anthropogenic pathways (infilled ground and service runs);
- Surface water Runoff.

6.6. Tabulated Conceptual Site Model

The tabulated Conceptual Site Model developed as part of this Desk Study is outlined overleaf. For ease of reference and understanding, the risks have been classified within this risk assessment against four possible levels / categories, summarised in the table below.

Risk Categories used in the Tabulated CSM	
Negligible	Regarding this potential SPR linkage, the site is considered suitable for the proposed end-use and there is no plausible risk. Therefore, there is no need to further assess this potential source of contamination.
Low Risk	Regarding this potential SPR linkage, the site is considered suitable for the proposed end-use and there is not considered to be an unacceptable risk to receptors. However, it is considered that further investigation to confirm this is recommended.
Moderate Risk	Regarding this potential SPR linkage, the site may not be suitable for the proposed end-use in its current condition and there may be an unacceptable risk to receptors. Further investigation is required to confirm this.
High Risk	Regarding this potential SPR linkage, the site is probably or certainly not suitable for proposed end-use and there is likely to be an unacceptable risk to receptors. Contaminants probably or certainly present and urgent action required in the short term.

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(On-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from construction/ demolition activities: - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals.	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Ingestion of home-grown produce, and soils attached - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Low
	- Direct uptake of groundwater - Direct uptake of determinands in the soil	Flora and Fauna Vegetation within soft landscaped areas	Low
	- Anthropogenic (man-made) pathways - Vertical and lateral migration in permeable strata - Surface water runoff	Controlled Waters - Secondary A Aquifer and Secondary Undifferentiated Aquifer (River Terrace Deposits) - Monks Brook	Low
Gas Governor - Metals and semi metals - Phenols - Ammonia - PAHS's	Migration through anthropogenic & natural pathways	Human Health - End Users (Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Low – negligible
Electricity Sub-Station PCB oils and other cable/transformer oils	Migration through anthropogenic & natural pathways	Human Health End Users (Residents/Future site visitors)	Negligible
Aggressive ground conditions with Made Ground and natural ground, including groundwater: - Sulphates, - PAH/TPH.	Direct contact with aggressive ground conditions	Building Materials and Services - Buried Concrete - Underground services (water pipes)	Low - Moderate
Ground gases generated by Made Ground: - Methane, - Carbon Dioxide, - Hydrogen Sulphide, and	- Migration through anthropogenic & natural pathways - Inhalation of Asphyxiating gases - Explosion (methane only)	Human Health - End Users (Future site visitors) - Construction workers during development (especially in confined spaces) - Site operatives during maintenance works in confined spaces	Low

Carbon Monoxide.		Neighbours and public	
	- Migration through anthropogenic & natural pathways - Explosion (methane only)	Building Materials and Services - Buildings - Confined spaces - Underground services	Low
Radon	- Migration	Human Health End Users (Residents/Future site visitors)	Moderate – see relevant sections for protection needed

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from sewage works, surface ground workings and allotment gardens: - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals. - Herbicides and pesticides	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Future site visitors) - Construction workers during development - Site operatives during maintenance works	Negligible
	Direct uptake of groundwater	Flora and Fauna Vegetation within soft landscaped areas	Negligible
Made Ground from Tank - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals.	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Future site visitors) - Construction workers during development - Site operatives during maintenance works	Negligible
Electricity Sub-Station PCB oils and other cable/transformer oils	Migration through anthropogenic & natural pathways	Human Health End Users (Residents/Future site visitors)	Negligible
Gas Governor - Metals and semi metals - Phenols - Ammonia PAHS's	Migration through anthropogenic & natural pathways	Human Health - End Users (Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Negligible
Aggressive ground conditions associated with impacted groundwater; - Sulphates, - PAH/TPH.	Direct contact with aggressive ground conditions	Building Materials and Services - Buried Concrete - Underground services (water pipes)	Low

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Ground gases generated by Made Ground: • Methane, • Carbon Dioxide, • Hydrogen Sulphide, and • Carbon Monoxide.	• Migration through anthropogenic & natural pathways • Inhalation of Asphyxiating gases • Explosion (methane only)	Human Health • End Users (Future site visitors) • Construction workers during development (especially in confined spaces) • Site operatives during maintenance works in confined spaces	Negligible
	• Migration through anthropogenic & natural pathways • Explosion (methane only)	Building Materials and Services • Buildings • Confined spaces	Negligible

7. RECOMMENDATIONS AND PHASE II OBJECTIVES

This section of the report will present recommendations for the further investigation of each plausible pollutant linkage identified by the Conceptual Site Model.

It is recommended that an intrusive ground investigation is undertaken at the site to evaluate the risk that contaminants of concern within the soils and groundwater may affect end-users. This should determine the underlying ground and groundwater conditions and include an assessment of the level of contamination to enable the quantification of the ground-related risks associated with the proposed redevelopment.

Consideration should be given to the testing of soil samples recovered from exploratory holes for chemical laboratory testing. The testing should be for a broad range of contaminants in accordance with DEFRA / CLEA methodologies and include the contaminants of concern identified within the Conceptual Site Model.

7.1. Soils

It is possible that asbestos and asbestos containing materials will be incorporated within any Made Ground. An asbestos management strategy should be implemented to ensure that any asbestos uncovered during the investigation does not pose a risk to members of the public that use the site.

On the basis of the Phase 1 Site Assessment the following contaminants of concern have been identified and should be included in the chemical analysis suite for the ground investigation:

- Asbestos.
- Semi-metals and heavy metals;
- Poly-cyclic aromatic hydrocarbons (PAHs);
- Speciated TPH including full aliphatic/aromatic split;
- Volatile/semi-volatile organic compounds – BTEX Used as marker compounds;
- Sulphates;
- Cyanide;

The list above does not imply that these determinands are present on-site or that they are likely to cause contamination issues at the site. The ground investigation will be used to prove the presence or absence of these contaminants. The sampling and testing strategy must be in line with current standards. Given the site has undergone various phases of building and demolition, random sampling should be adopted across the site. Targeted sampling of proposed soft landscaped areas may be deemed appropriate. Results should be assessed against suitable assessment criteria to be protective of human health as well as vegetation.

Sub-surface concrete may be damaged due to being in contact with aggressive ground conditions. Sampling should be undertaken where the proposed foundations will be in contact with Made Ground and/or natural ground and tested for aggressive ground conditions (sulphates/pH). Classification should then be undertaken of the ground conditions in accordance with Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground'.

7.2. Services

The CSM has identified a low/moderate risk for aggressive ground conditions that may affect water supply pipes as part of the development. Consideration should be given to the targeted sampling (0.75 – 1.50m bfgl) and scheduling for contaminants of concern: TPH, Naphthalene, Phenols, BTEX, VOCs and SVOCs.

7.3. Groundwater

If analytical results show elevated concentrations of contaminants of concern in the soil samples, then there might be a requirement to assess the potential risks of leachability of contaminants migrating into the Secondary A Aquifer groundwater underlying the site. This might mean leachate testing on soils samples is required or groundwater sampling and testing.

7.4. Ground-gas & Radon

The CSM has identified a low risk from ground gases at the site as a result of limited Made Ground on-site and negligible from off-site sources/Made Ground. Analysis of soil samples will include Total Organic Carbon (TOC) testing in order to enable a pragmatic ground gas risk assessment to be undertaken at the site. This approach will only quantify the risk associated with on-site sources.

Radon Protection measures might be required. Further risk assessment will be carried out via a BGS radon Report.

7.5. Vapours

The CSM has identified a low risk from vapours at the site as a result of limited Made Ground. No other off-site sources have been identified. Analysis of soil samples should include BTEX compounds (used as a marker compound for VOCs) as an initial screen. This approach will only quantify the risk associated with on-site sources. No monitoring of standpipes or direct VOC testing is required.

7.6. Geotechnical Review

7.6.1. General

The BGS have identified the following natural hazards on-site and within a 50m buffer.

Natural Hazards	
Shrink-Swell Clay	Negligible hazard (western and central area) to Very Low hazard (eastern area) onsite.
Running Sands	Very Low hazard (western and central area) to Negligible hazard (eastern area) onsite.
Compressible Deposits	Negligible hazard onsite.
Collapsible Deposits	Very Low hazard (western and central area) to Low hazard (eastern area) onsite.
Landslides	Very Low hazard onsite.
Ground Dissolution of Soluble Rocks	Negligible hazard onsite.

No pits/quarrying or mining features were identified on-site, 3No. surface ground working features were recorded within a 250m radius of the site. These comprised Ponds all located 200m away from the site. The risk from these surface ground workings was considered to be negligible.

When designing foundations, the potential presence of aggressive ground conditions should be taken into consideration. Further investigation may be required in accordance with the guidance established

in BRE Special Digest 1 (SD1) (2005) 'Concrete in aggressive ground'. The BGS do not record any details regarding the potential for aggressive ground conditions within shallow units identified at the site.

It is recommended that as part of the site-specific ground investigation on-site, geotechnical testing is undertaken to determine the underlying ground conditions and to evaluate any geotechnical related risks associated with the proposed redevelopment of the site.

The Groundsure datasheets have indicated that the superficial River Terrace Deposits comprising the sand and gravel (central and western portion of the site) is likely to have a high to very high permeability and is likely to be suitable for surface water disposal. The superficial River Terrace Deposits comprising the clay and silt (eastern portion of the site) is likely to have a very low to low permeability and therefore would unlikely be suitable for surface water disposal. The underlying bedrock deposits of the London Clay Formation is likely to have a very low to moderate permeability and therefore would unlikely be suitable for surface water disposal. These will be subject to on-site testing.

FIGURES




Site Location

Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA

Barton Peveril Sixth Form College c/o Bidwells

April 2023

Figure 1 – Site Location Plan

GWPR5268





◇ Site Boundary

Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA

Barton Peveril Sixth Form College c/o Bidwells

April 2023

Figure 2 – Site Development Area

GWPR5268





NTS

Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA

Barton Peveril Sixth Form College c/o Bidwells

April 2023

Figure 3 – Aerial Photograph

GWPR5268





NTS

Barton Peveril Sixth Form College, Chestnut Avenue, Eastleigh SO50 5ZA

Barton Peveril Sixth Form College c/o Bidwells

April 2023

Figure 4 – Proposed Site Development Plan

GWPR5268



GENERAL AREA

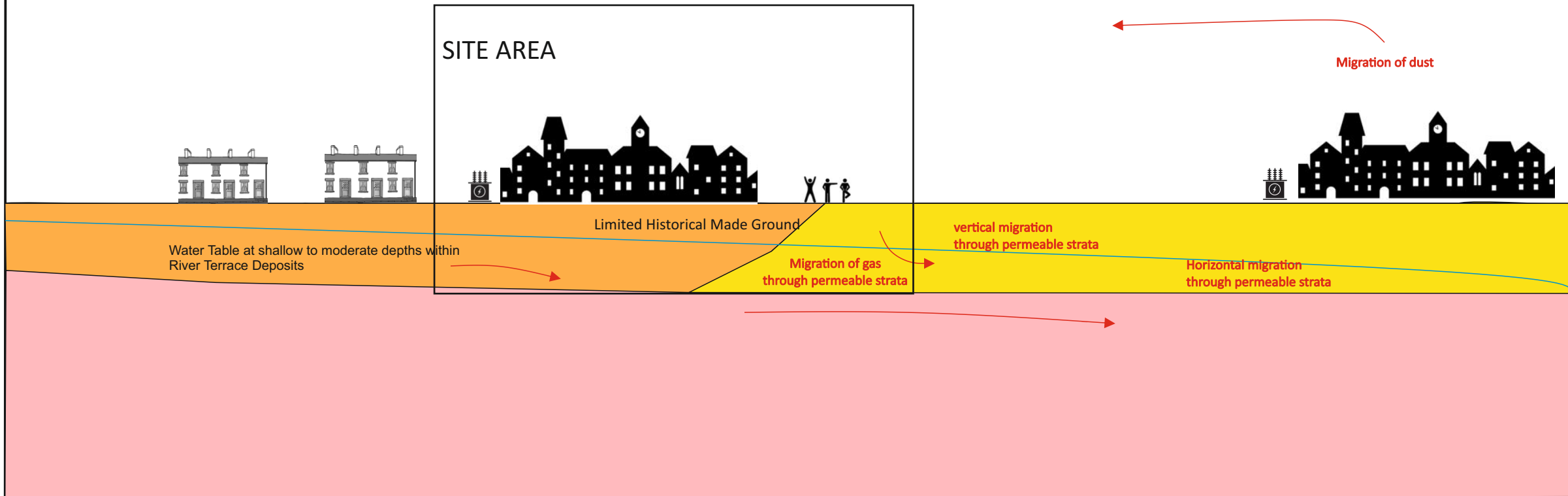
W

Land Use including: Undeveloped Land Until 1950's when a school was constructed on the site, development area comprises temporary classroom buildings, school playing fields and a car parking area. Electricity sub-station and gas governor noted on the northern portion of the site.

E

Historical/Current Land-uses including: Infilled land from surface ground workings, electricity sub-stations, Allotment gardens, AST's and UST's Sewage works and Gas Governors.

SITE AREA



KEY:

River Terrace Deposits-Sand and Gravel

River Terrace Deposits-Clay and Silt

London Clay Formation

Made Ground Source

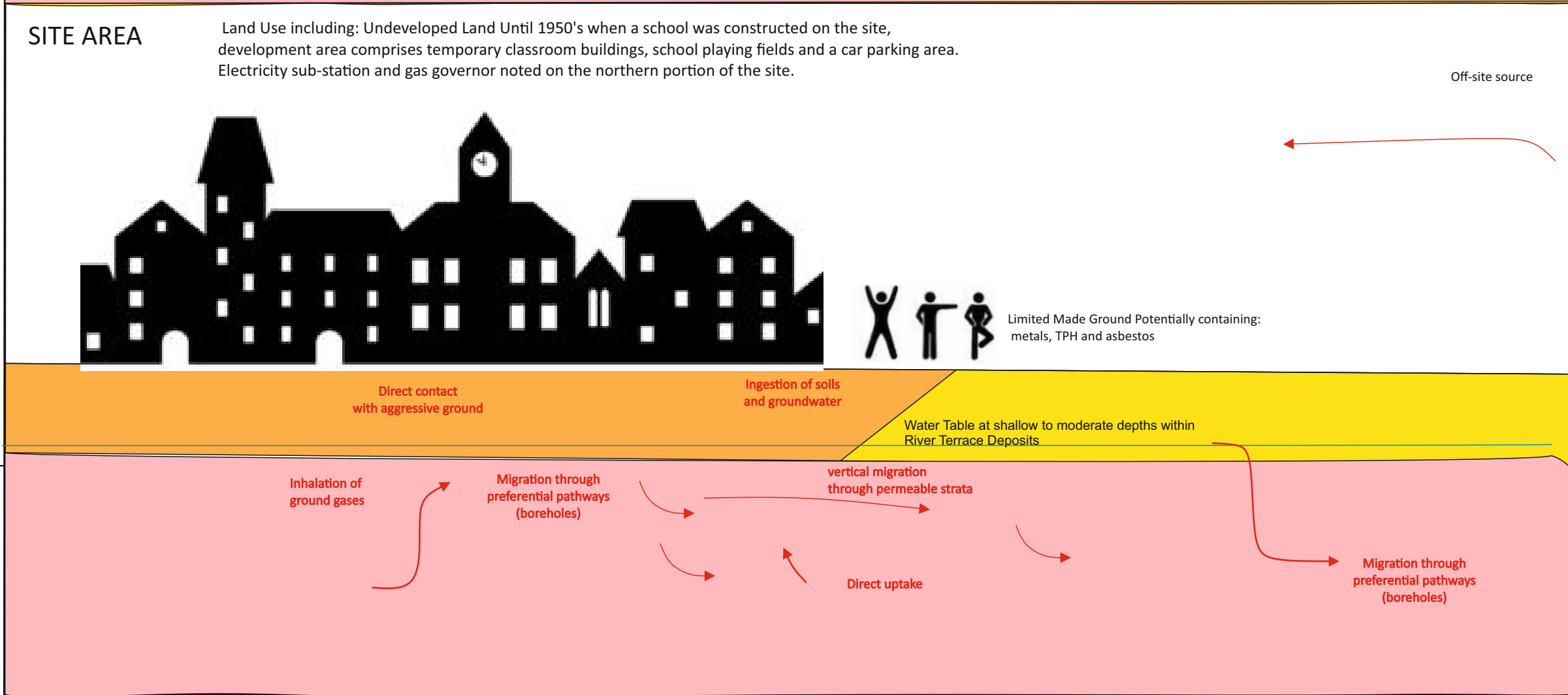
Potential Pathways

boreholes Pathways

SITE AREA

Land Use including: Undeveloped Land Until 1950's when a school was constructed on the site, development area comprises temporary classroom buildings, school playing fields and a car parking area. Electricity sub-station and gas governor noted on the northern portion of the site.

Off-site source



PROJECT Barton Peveril Sixth Form College	
CLIENT Bidwells C/O Barton Peveril Sixth Form College	
DRAWING TITLE Conceptual Site Model	
DRAWING NUMBER GWPR5268 - Figure 5	DATE April 2023
DRAWN BY AS	CHECKED BY MM

2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB