



Harlington School

Desk Study and Preliminary Risk Assessment

Project No: 735292

Client: Wates Construction Ltd

JULY 2020

DOCUMENT ISSUE RECORD

Project No.:	735292
Report No.:	735292-01 (00)
Project Name:	Harlington School
Document Title	Desk Study and Preliminary Risk Assessment
Client:	Wates Construction Ltd
Status:	Final

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Report Issue Date

31 July 2020

REVISION RECORD

Revision	Date	Description of revisions	Prepared by

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CONTENTS

1 INTRODUCTION.....	1
1.1 Information Sources	
2 SITE DETAILS.....	2
2.1 Location and Topography	
2.2 History of Site and Surrounding Area	
2.3 Previous Site Investigation	
3 PHYSICAL SETTING.....	4
3.1 Geology	
3.2 Mining, Extraction and Natural Cavities	
3.3 Hydrogeology and Hydrology	
3.4 Ground Gas	
3.5 Archaeology / Ecology	
3.6 Utilities	
4 ENVIRONMENTAL SETTING.....	8
4.1 Environmental Data	
5 GEOENVIRONMENTAL ASSESSMENT.....	9
5.1 Initial Conceptual Model	
5.2 Preliminary Risk Assessment	
5.3 Conclusions and Recommendations	
6 SUMMARY.....	13
7 REFERENCES.....	14
APPENDIX A - PLANS AND DRAWINGS	I
(i) Existing Site Layout Plan	
(ii) Proposed Development Layout Plan	
APPENDIX B - DESK STUDY INFORMATION.....	II
(i) Risk Assessment Guidelines	
(ii) Groundsure Data Sheets.	
(iii) Historical Mapping	

1 INTRODUCTION

This report was prepared by Structural Soils Ltd on the instructions of Wates (the Client). The purpose of the work was to obtain information for the proposed redevelopment of Harlington School.

A desk study and Preliminary Risk Assessment was undertaken which included research into the past uses of the site and its surrounding area, with regards its physical, historical and environmental setting. The report identifies potential issues at the site leading to the production of a Conceptual Site Model (CSM) which considers both geoenvironmental and geotechnical aspects including other pertinent ground hazards which could affect the development.

This desk study has been prepared in accordance with British Standards BS 5930:2015 and BS 10175:2011+A2:2017 and all normative references, including Environment Agency guidance report CLR 11, *Model Procedures for the Management of Land Contamination*.

All information, comments and opinions given in the desk study in this report are based on the information obtained. The information search cannot be exhaustive and there may be records that have not come to light. There may also be circumstances at the site that are not documented.

This report was prepared by Structural Soils Ltd for the sole and exclusive use of Wates in response to particular instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded. No liability will be accepted after a period of 6 years from the date of the report.

1.1 Information Sources

The following sources of information have been used in the preparation of this report.

- Extracts of available historical Ordnance Survey (OS) maps covering the period from 1866 to 2020 which are presented in Appendix B.
- An Enviro Insight report produced by Groundsure for an area up to 1 km from the centre of the site which is reproduced in Appendix B. The EnviroInsight report is compiled from the database of information maintained by various statutory bodies listed within Appendix B.
- A Geo Insight report produced by Groundsure for an area up to 1 km from the centre of the site which is reproduced in Appendix B. The GeoInsight report is compiled from the database of information maintained by various statutory bodies listed within Appendix B listed data together with details on geology, ground workings, mining and extraction, borehole records and estimated background soil chemistry.
- Previous report on site by Opus International Consultants Ltd (Opus).- *Intrusive Geo-environmental and geotechnical site investigation: Factual and Interpretive Report*. Opus April 2018

2 SITE DETAILS

2.1 Location and Topography

The site is located on the southern outskirts of Hayes on the south side of Pinkwell Lane (see Site Location Map in Appendix A). The British National Grid Reference of the site is 508700,178700.

The site is approximately 200 m by 200 m. It consists of the existing school site, with the single storey school buildings at its western end. There is a large car park in the north-east, a hardstanding playground in the centre, and a large grass playing field to the east.

The site is level and set at an elevation of approximately 25 m above Ordnance Datum (AOD).

The site is bounded by Pinkwell Lane to the north, residential properties on Dudley Place and Oakington Avenue to the east, and playing fields and recreation ground to the south and west.

2.1.1 Site Reconnaissance

No site walkover has been carried out at the time of writing this report.

2.2 History of Site and Surrounding Area

2.2.1 Historic Mapping

A search of Ordnance Survey maps was undertaken to establish the land-use history of the site and surroundings. Extracts of the maps that are discussed below can be found in Appendix B of this report. Unless otherwise stated, all quoted distances are measured from the site boundary that is marked on the maps.

TABLE 1 :SUMMARY OF HISTORICAL MAP DATA			
Dates	Scale	Significant features, changes and developments:	
		On site	In surroundings [distance(m)]
1868	1:10,560 & 1:2,500	Open fields	<i>Pinkwell Lane</i> forms N boundary. Surrounding area is rural. No evidence for industry or mineral extraction.
1881-1920	1:10,560 & 1:2,500	No change	No significant changes
1935-38	1:10,560 & 1:2,500	Now <i>Allotment Gardens</i> . East of site within same land boundary as School buildings immediately NE	Extensive housing developments to N and E with School immediately NE

TABLE 1 :SUMMARY OF HISTORICAL MAP DATA			
Dates	Scale	Significant features, changes and developments:	
		On site	In surroundings [distance(m)]
1960	1:10,560 & 1:2,500	Small structure in N – possible shed.	School developed to W. M4 motorway constructed 200m S trending E-W.
1966-74	1:10,000 & 1:2,500	No changes	Further development in vicinity. Land to south now recorded as a recreation ground.
1987	1:10,000 & 1:2,500	School built in NW corner of site, Tennis Courts in SW. Part of site remains as allotments.	Further development in vicinity
1992-93	1:10,000 & 1:2,500	School extended to S over tennis courts, new Games court in centre. Electricity sub station on W side of buildings.	No significant changes
2020	1:10,560 & 1:2,500	No change	No significant changes

Note: N = north, S = south, E = east, W = west.

2.2.2 Summary of Site History

The site was open fields in a rural area at the time of the earliest maps in the 1860s. It became allotment gardens between 1920 and 1938, at the same time as extensive residential developments took place to the north and east. The current school was built in the north-west of the site between 1974 and 1987, and then extended to the south to take its current form between 1987 and 1993.

As noted below in section 4.1, the area to the south-west of the site was a sand and gravel pit, which was infilled with inert waste. The licence for infilling ran from 1982 to 1990.

2.3 Previous Site Investigation

A ground investigation was carried out on the site by Opus International Consultants Ltd in 2018 (Reference 7.9), consisting of 2 boreholes and 7 window sample holes, of which both boreholes and 3 window sample holes had gas monitoring wells installed.

No evidence of contamination was noted in the exploratory holes, beyond some fragments of plastic at 2 locations. Contamination testing was carried out on soils (10 samples), leachate (6 samples) and groundwater (2 samples). No elevated concentrations of contaminants were recorded. One sample contained asbestos (chrysotile fibres) but quantification indicated an asbestos level less than the laboratory detection limit of 0.001%. It was concluded that no remedial action was required.

Gas monitoring was carried out on 2 visits. Elevated levels of landfill gas were not encountered, but the report recommended that further visits be made to confirm this.

3 PHYSICAL SETTING

3.1 Geology

Information on the geology of the site was obtained from the following sources published by the British Geological Survey (BGS):

- BGS map (sheet 269, scale 1:50,000 published 1998).
- The BGS digital geology map, which utilises the most up to date names for geological units (www.bgs.ac.uk/data).
- The BGS Lexicon of Named Rock Units, which provides typical descriptions for most geological units (www.bgs.ac.uk/lexicon).

The site is shown to be underlain by the following descending sequence of strata:

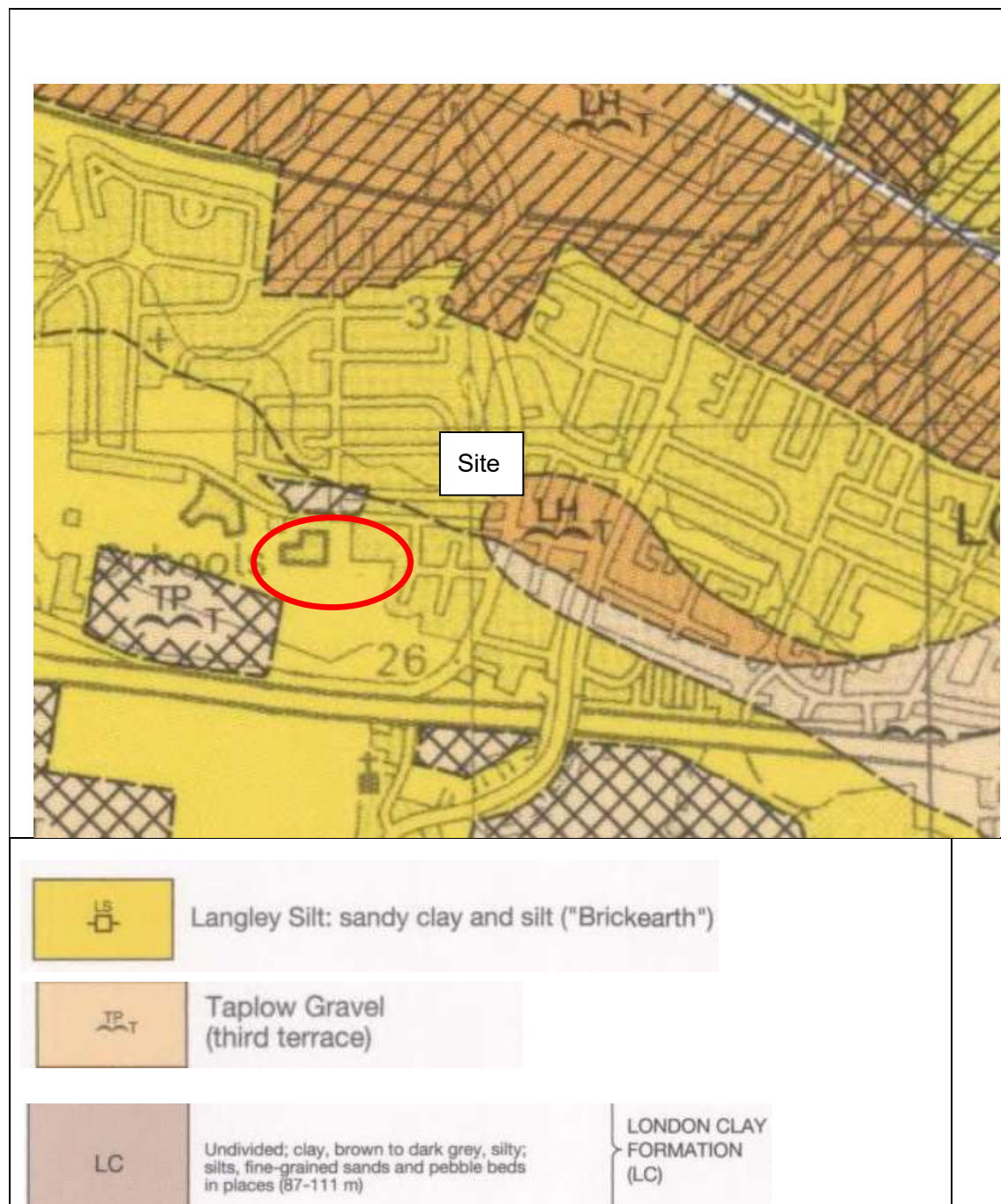
TABLE 2 : SUMMARY OF EXPECTED SITE GEOLOGY	
Geological Unit Name	Description
ANTHROPOGENIC GROUND	
Artificial Ground shown	None recorded on site.
SUPERFICIAL DEPOSITS	
Langley Silt Member	Silt to clay, commonly yellow-brown and massively bedded
Taplow Gravel Member	Sand and gravel, locally with lenses of silt, clay or peat.
SOLID GEOLOGY	
London Clay Formation	Blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.

Note: Information obtained from BGS digital records © NERC.

The geological map also shows that there are infilled workings to the south-west of the site, as shown on the extract below.

The Lynch Gravel lies outcrops just to the north, but is a higher terrace than the Taplow Gravel, and will not underlie the site.

The BGS online maps portal provides access to scans of almost all maps produced by the BGS since 1932. An extract of the most recent available scanned map for the site is included below:



Note: Above images contain British Geological Survey materials ©NERC [2020].

3.2 Mining, Extraction and Natural Cavities

Information on mining, extraction and natural cavities has been obtained from the GroundSure report and show the site to be within 1km of the following recorded mineral sites:

TABLE 3 : SUMMARY OF MINING, MINERAL EXTRACTION AND NATURAL CAVITIES			
Site Name	Commodity	Distance from site	Status
W Drayton Gravel Pit	Sand & Gravel	246 m W	Ceased
Sipson Lane Quarry	Sand & Gravel	344 m SW	Ceased
W Drayton (from planning records)	Sand & Gravel	12 m	

3.3 Hydrogeology and Hydrology

3.3.1 Aquifer Designation

The Groundsure Report has classified the geological units underlying the site as follows:

- Superficial Deposits (Langley Silt Member) as Unproductive Strata.
- Superficial Deposits (Taplow Gravel Member) as Secondary B Strata.
- Bedrock (London Clay Formation) as Unproductive Strata.

‘Secondary’ aquifers include a wide range of rock layers or superficial deposits with an equally wide range of water permeability and storage. Secondary ‘A’ Aquifers are 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.

‘Unproductive Strata’ are rock layers or superficial deposits with low permeability that have negligible significance for water supply or river base flow.

3.3.2 Groundwater Vulnerability Zones

Information on the leaching potential of the soils directly under the site is given on the Groundsure Report. They are described as

Secondary superficial aquifer, low vulnerability

This must refer to the Langley Silt Member. By inference from where it outcrops in nearby workings, the underlying Taplow Gravel Member would be Principal Superficial Aquifer, Medium vulnerability.

3.3.3 Source Protection Zones

The site does not lie within a source protection zone.

3.4 Ground Gas

3.4.1 Radon

According to the GroundSure report the estimated proportion of homes near the site that are above the radon action level is <1%. Therefore no radon protection measures are considered necessary in the construction of new buildings (including extensions, conversions and refurbishment projects).

3.4.2 Made Ground / Landfill

There is a landfill immediately south-west of the site. The details are listed on page 24 of the Groundsure report. The landfill was licenced to take inert waste, and the licence was issued in 1982 and surrendered in 1990.

3.4.3 Natural Soils

The natural soils in the vicinity of the site are not considered to be potential sources of ground gas.

3.5 Archaeology / Ecology

No archaeological or ecological consultation has been undertaken for this study.

3.6 Utilities

The site and surrounding area are likely to contain underground services; a copy of the some utility data has been / has not been provided by the Client at the time of writing this report. Other utilities not included in this data may be present.

4 ENVIRONMENTAL SETTING

4.1 Environmental Data

Environmental features such as landfills, groundwater abstraction points, etc, are detailed in the GroundSure EnviroInsight report that can be found in Appendix B of this report. 'Notable' features in these data sets are listed below.

TABLE 4 : SUMMARY OF SIGNIFICANT ENVIRONMENTAL DATA					
Data Types Showing <u>Notable</u> Issues	No. of <u>Notable</u> Listings (or Yes/No) and Distance (m) from Site				Details of <u>Notable</u> Listings
	On site	0-250	250-500	>500	
ENVIRONMENTAL PERMITS, INCIDENTS & REGISTERS					
EA/NRW Recorded Pollution Incidents				4	389 m SW
LANDFILL AND OTHER WASTE SITES					
EA/NRW Historic and Non-Operational landfills		3			Immediately SW of site. Inert waste: the licence was issued in 1982 and surrendered in 1990. Other sites also inert.
CURRENT LAND USE					
Industrial Site Data					Substation on site.
HYDROGEOLOGY & HYDROLOGY					
Abstraction Licences					None within 500 m

Note: N = north, S = south, E = east, W = west.

4.1.1 Summary of Environmental Data

The only potential contamination source brought to light on the site itself is the presence of an electricity substation.

The site is adjacent to an old mineral working which was backfilled as a landfill licenced to accept inert waste.

5 GEOENVIRONMENTAL ASSESSMENT

5.1 Initial Conceptual Model

The information presented in Sections 2, 3 and 4 has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 5.2. The risk classification has been estimated in accordance with information in Appendix B.

5.1.1 Summary of Potential Contamination Sources

Potential source and their associated contaminants of concern are summarised in the table below.

TABLE 5 :SUMMARY OF POTENTIAL SOURCES AND CONTAMINANTS	
On Site (Historical)	Contaminants of Concern
Made Ground	Heavy metals, asbestos, hydrocarbons
Electricity substation	PCBs
Off Site (Historical)	Contaminants of Concern
Landfill	Landfill gases – methane, carbon dioxide, carbon dioxide, carbon monoxide, hydrogen sulphide

5.1.2 Summary of Potential Receptors

Considering the setting of the site and the proposed redevelopment, sensitive receptors are considered to include:

- future site users – pupils and staff
- water supply pipes

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures including CDM regulations.

5.1.3 Pathways

Pathways that could results in a potentially complete contaminant linkage include:

- direct contact (soil and dust ingestion, dust inhalation and dermal contact)
- root uptake
- permeation of plastic water supply pipes
- preferential pathways including permeable pipe surrounds
- migration of ground gases

5.1.4 Potentially Complete Contaminant Linkages

The potentially complete contaminant linkages identified for the proposed end use are:

1. direct contact by future site users with soil that may be impacted by asbestos, heavy metals or hydrocarbons.
2. Ingress of ground gases into buildings leading to Inhalation or generation of explosive or asphyxiating atmospheres.

No potentially complete linkage has been identified for the electrical sub-station on the site as it is very small and is to be retained at this time. The use of PCBs containing dielectric fluid within the transformers in the substation is plausible as it was not banned in the UK until after the construction of the school. However, the loss of such fluid to the ground is considered to be unlikely, and if such an incident did occur, it would likely have been so small as to be contained within the immediate confines of the sub-station.

5.2 Preliminary Risk Assessment

5.2.1 Risk Estimation for Potentially Complete Contaminant Linkages

The potentially complete contaminant linkages are detailed above with the estimated risk associated with each being detailed in Table 8 below. The risk classification has been undertaken in accordance with CIRIA C552, with a summary of the relevant section being included in Appendix B.

TABLE 6 :RISK ESTIMATION FOR POTENTIALLY COMPLETE CONTAMINANT LINKAGES			
Contaminant Linkage	Probability	Consequence	Risk and justification
1 - Direct contact by future site users with soil that may be impacted by asbestos, heavy metals or hydrocarbons	Unlikely	Medium	Low: Most of the school has undergone a single phase of development and was formerly allotments. Some contamination is possible, particularly from asbestos products used in the construction of the school, however the hard surfacing around buildings reduces the scope for direct contact with soils. Most school users would have very limited contact with soils in areas of soft landscaping. Widespread contamination of soils in playing fields are unlikely which is supported by the findings of the Opus investigation.
2 - Ingress of ground gases into buildings leading to Inhalation or generation of explosive or asphyxiating atmospheres	Low Likelihood	Severe	Moderate / Low: The school is located adjacent to an inert waste landfill which was filled in the 1980s and 90s. Inert waste landfills are often capable of producing elevated concentrations of ground gas but less commonly at the pressures and rates required to drive pressure driven flow laterally for a significant distance. The landfill is within a former gravel working in the Taplow Gravel which also underlies the site. These gravels and the overlying Langley Silt could form a pathway in which gas could migrate.

The review of the available information and the production of the initial conceptual model and risk assessment has identified risks associated with potentially complete pollutant linkages that vary from low to moderate/low.

5.3 Conclusions and Recommendations

Linkages with risk estimations of moderate or above would typically require further investigation. These linkages are:

- Linkage 2 - Ingress of ground gases into buildings leading to Inhalation or generation of explosive or asphyxiating atmospheres.

Gas monitoring wells have already been installed as part of the Opus investigation, and these give good coverage of the area of the school playing field, where the new school buildings will be. No further installations are recommended. At least 4 further rounds of gas monitoring should be carried out with at least one during period of low and/or falling atmospheric pressure.

No information on soil types or potential contamination is available within the built part of the school as the Opus works were undertaken around the playing field. It is

recommended that should there be any proposed works within this area, either in the form of changes to soft landscaping, routing of services, construction of new roads or buildings etc, it may be prudent to undertake additional investigation and contamination analysis to confirm the assessment of linkage 1, and to provide information for the costing of waste disposal.

6 SUMMARY

- 6.1** The existing Harlington School is to be redeveloped. New buildings will be on the existing playing field. Once these are built, the existing buildings will be demolished, and this are used as sports pitches.
- 6.2** A Preliminary Risk Assessment that included research into the past uses of the site and the surrounding area and production of a contamination conceptual model identifying potentially complete pollutant linkages was undertaken.
- 6.3** This showed the site to be open fields, before becoming allotment gardens in about 1930, and developed as a school in about 1980. Sand and gravel workings immediately south-west of the site were licensed for filling with inert waste between 1982 and 1990.
- 6.4** A ground investigation was carried out by others in 2018 covering the area of the school playing fields. The site was generally uncontaminated although one sample contained asbestos (chrysotile fibres: (less than 0.001%). 5 monitoring wells were installed and 2 rounds of gas monitoring carried out.
- 6.5** At least 4 further rounds of gas monitoring are recommended from the existing wells.
- 6.6** A further phase of intrusive investigation is to be carried out for geotechnical purposes. Any evidence for contamination encountered in this investigation would need to be further assessed.
- 6.7** Consideration should be given to the coverage of the contamination analysis available as the likely presence of made ground in the built-up area of the school makes the risk of contamination higher than the playing fields which have been investigated previously. If the proposed scheme is to break ground and complete works within the school buildings, then consideration should be given to undertaking additional analysis to inform on contamination risks and potential waste disposal costs.

7 REFERENCES

- 7.1 BS 5930:2015 *Code of practice for ground investigations*
- 7.2 BS EN 1997-1:2004 *Eurocode 7 — Geotechnical Design Part 1 - General Rules* incorporating corrigendum Feb 2009 and Amendment A1 2013
- 7.3 BS EN 1997-2:2007 *Eurocode 7 — Geotechnical design Part 2: Ground Investigation and testing*
- 7.4 BGS map (sheet 269, scale 1:50,000, published 1998).
- 7.5 British Geological Survey Lexicon of Named Rock Units, www.bgs.ac.uk/lexicon
- 7.6 Environment Agency website, www.environment-agency.gov.uk
- 7.7 CIRIA Report C552 (2001), *Contaminated Land Risk Management; A Guide to Good Practice*
- 7.8 R & D Publication CLR 11 (September 2004). *Model Procedures for the Management of Contaminated Land*. Environment Agency
- 7.9 *Intrusive Geo-environmental and geotechnical site investigation: Factual and Interpretive Report*. Opus April 2018.

APPENDIX A - PLANS AND DRAWINGS

- (i) Existing Site Layout Plan
- (ii) Proposed Development Layout Plan

APPENDIX B - DESK STUDY INFORMATION

- (i) Risk Assessment Guidelines
- (ii) Groundsure Data Sheets.
- (iii) Historical Mapping