



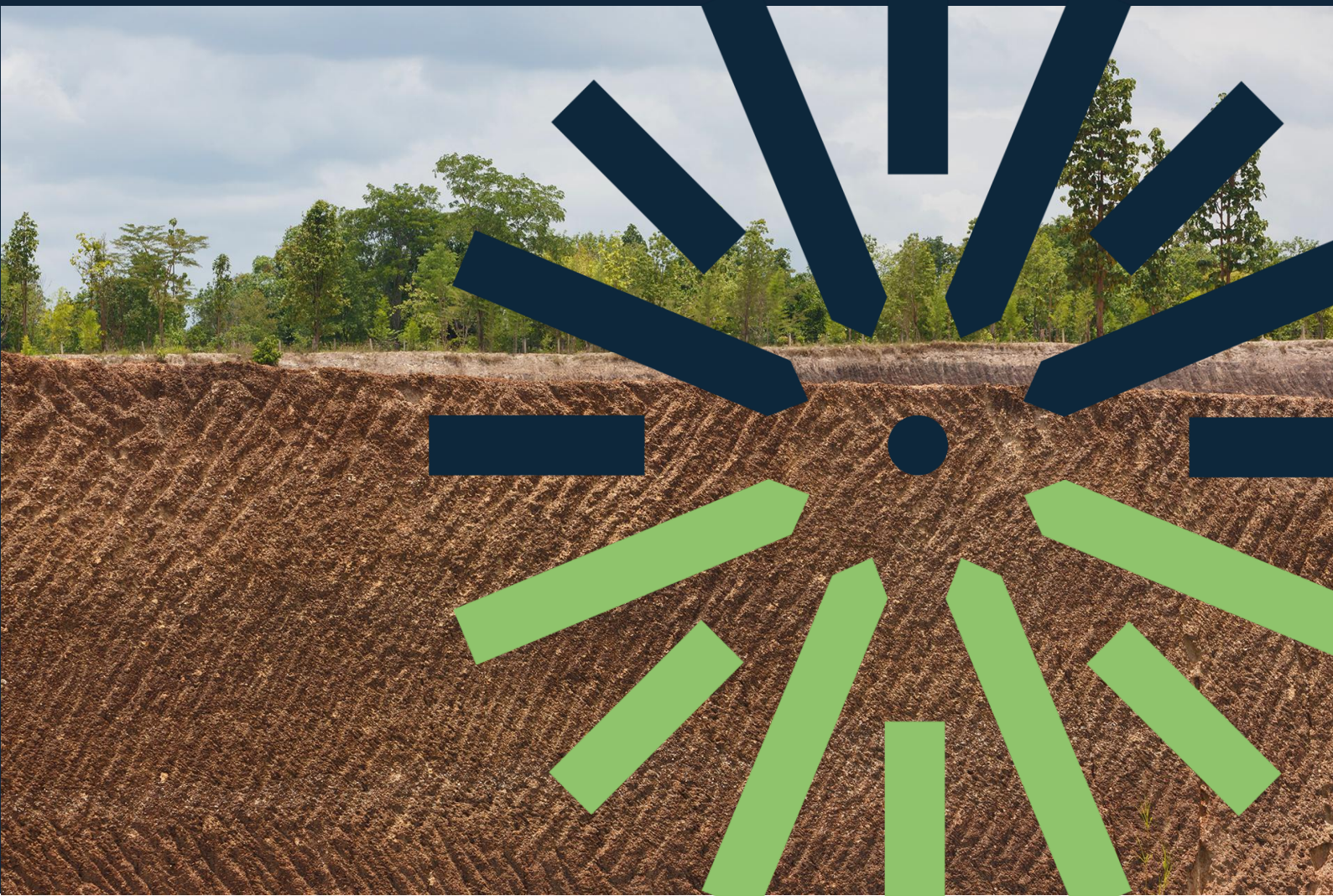
GROUND RISK

Desk Based Ground Gas Risk Assessment

Hilcrest House, Thingwall Hall

29/08/2025

Report Ref: GR00215-GGRA-1.0



Document Details and Revisions

**Prepared For:**

Brothers of Charity Services
Thingwall Hall,
Broadgreen,
Liverpool
L14 7NY

Project No:

GR000215

Report Status:

First Issue

Issue No:

1.0

Date:

29/08/2025

Author:

O Hinds

Signature:

Document Revision Record

Rev	Date	Status	Author	Checked	Approved
1.0	29/08/2025	First Issue	O Hinds	D Roberts	J Greene

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Executive Summary

The following risk assessment presents a conceptual evaluation of the risks posed by ground gases at Hilcrest House, Thingwall Hall (the 'Site'). The proposed development at the site comprises the refurbishment of the existing structure and a change of use from a learning institution to a residential institution for supported residential accommodation.

The only potentially significant source of ground gases identified in proximity to the property is an area of buried tipped waste to the south of the Site. Although, Ground Risk is not aware of any previous ground gas issues at the property or any other properties surrounding the area of tipped waste.

The gas generation potential of the area of tipped waste is considered to be low due to the following key factors:

- The waste is in excess of 70 years old. Any deposited waste will have reached its maturation phase and any gas generation will be at residual, very low levels. This is evidenced by the low Gas Screening Values calculated between 2008 and 2009 by White Young Green.
- The waste is primarily composed of ash, clinker and inorganic material with limited quantities of degradable material. This is typical of waste deposited before the 1960s, which has limited potential for generating ground gas.

The potential for offsite migration of ground gases from the area of tipped waste to within the Site boundary will be limited by the following key factors:

- The historic nature of the filling activities, which placed material at the former ground level, will result in landgas venting to the surface rather than migrating downward/laterally through the low permeability Glacial Till and moving offsite.
- The site is located c.100m from the closest encountered area of tipped waste. At this location, the waste is typically <1.0m in thickness. Gas migration is unlikely to extend more than 100m from the boundary of deposited waste unless significant preferential pathways are present. The site is underlain by predominantly cohesive Till, which will limit the migration of any ground gases.

Given the above, the site is not considered to be at risk from ground gases and no further risk assessment is deemed necessary.

1. Introduction

Ground Risk Ltd were commissioned by CUBE Architects on behalf of Brothers of Charity Services to undertake a Desk Based Ground Gas Risk Assessment for a site referred to as Hilcrest House, Thingwall Hall (the "site"). The site comprises an individual single-storey structure and nearby external areas within a limited area of the wider Thingwall Hall estate. The site location is indicated in Figure 1.1.

1.1. Site Details

Table 1.1 - Site Details

Site name	Hilcrest House, Thingwall Hall
Site address	Hilcrest House, Thingwall Lane, Broadgreen, Liverpool, L14 7NY
National Grid Reference	341042, 390858
Site Area	0.14ha
Location description	The site is located within the centre of the wider Thingwall Hall estate in the Broadgreen suburb of Liverpool, approximately 6km east of Liverpool City Centre.
Site shape	The site is irregularly shaped.
Existing structures	The site is occupied by an individual single storey structure.
Surrounding land use	The site is immediately surrounded by disparate structures and gardens of the wider Thingwall House estate. The wider Thingwall Hall estate is bordered by residential housing to the north, east, south and west.

1.2. Site Location

Figure 1.1 Site Location





1.3. Proposed Development

The proposed development comprises the refurbishment of the existing structure and a change of use from a learning institution to supported residential accommodation.

1.4. Report Objectives

The objectives of the report are to conduct a desk study to assess the potential for ground gas risk to the proposed development.

1.5. Sources of Information

In the production of this Ground Gas Risk Assessment, the following key sources of information have been consulted in detail:

- Historical mapping;
- BGS GeoIndex mapping;
- Publicly Available Third Party boreholes;
- The Local Authority Planning Portal;
- Third Party reports for the former landfill to the south of the site:
 - WYG Environmental - Geo-environmental Report, Thingwall Hall, Broad Green, Liverpool - Ref: A050826/01 Dated: October 2009.
 - WYG Environmental - Supplementary Ground Investigation Report, Thingwall Hall, Broad Green, Liverpool - Ref: A050826 Dated: October 2009.
 - WYG Environmental - Land Gas Risk Assessment, Thingwall Hall, Broad Green, Liverpool - Ref: A050826 Dated: October 2009.
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2015);
- Mining Remediation Authority Interactive Viewer;
- NHBC Foundation Hazardous ground gas - an essential guide for housebuilders. NHBC Foundation. April 2023. Published by the NHBC Foundation ISBN 987-1-7399956-2-1.

1.6. Limitations

For the work, reliance has been placed on available data obtained from the sources identified. When using the information, it has been assumed it is correct. No attempt has been made to verify the accuracy of the information. This report has been produced in accordance with current UK policy and legislative requirements for land contamination, which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and require advice from legal professionals.

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2. Site Setting

The following section details the geological, historical and contemporary environment of the site area as derived from publicly available third-party sources, including the BGS GeoIndex, adjacent site ground investigations and historical maps. This forms the basis of the site setting and ground model in relation to the potential risks posed by ground gases to the site.

2.1. Geological Setting

Publicly available maps indicate the site to be underlain by Till and subsequently sandstone of the Wilmslow Sandstone Formation, with Made Ground shown to be absent beneath the property. No faults are identified within the site area.

2.2. Historical Setting

The wider Thingwall Hall estate was established in the early 1800s, with the earliest available mapping (1830) displaying a manor house roughly in the centre, ancillary structures located to the north, along with limited woodland and grounds. The site remained in this configuration until sometime between 1914 and 1940, when additional ancillary structures were constructed. The site has remained in this configuration, with only minor changes, until the present day.

The earliest available maps show the Site to be surrounded by farmland and a small hamlet located to the southwest. Only residential housing, road and rail are shown to have been constructed around the site until 1937.

Between 1937 and the mid 1950s, the land to the south of the site is known to have been used for domestic waste tipping. The waste tipping is understood to have taken place on the surface level rather than in a former quarry or pit. The tipped material was subsequently covered with top and subsoil and returned to use as playing fields and agricultural/grazing use. More recently, residential properties have been constructed on the land to the south.

Ground Risk are not aware of any ground gas issues within Thingwall Hall or any of the properties surrounding the area used for waste tipping. All of these buildings were constructed before the advent of ground gas protection measures and were in place during and after the placement of the tipped material, when the generation potential would have been at its greatest.

Historic map extracts are provided in Appendix B.

2.3. Environmental Setting

The following information regarding the environmental setting is considered pertinent to the Ground Gas Risk Assessment:

- No infilled ponds or similar features have been identified within 250m of the site.
- The site is not located within a coal mining area.
- The site is located within an area where fewer than 1% of structures exceed the action level for radon.

2.4. Adjacent Landfill Site Investigation Findings

Numerous ground investigations have been conducted on the land used for waste tipping located to the south of the site prior to its redevelopment into residential housing. The following report has been taken from the planning portal and is considered the key reference for ground gas risk within the area:

- WYG Environmental - Land Gas Risk Assessment, Thingwall Hall, Broad Green, Liverpool - Ref: A050826 Dated: October 2009.

It should be noted that only aspects of the reports relevant to the ground gas risk assessment for this Site have been summarised in this report.

2.4.1. Ground Conditions Across the Area of Landfilling

During the previous investigations, the tipped waste was found to comprise mostly ashy fill with gravel constituents of coal, clinker and ceramics, along with other inorganics including pottery, bottles, metal, glass and brick. Minor constituents of wood, textiles, straw, rubber, leather, carpet and paper were also reported.

The thickness of the tipped waste was observed to vary significantly, extending to depths of up to 4m across the south of the area (c. 390m from the Hilcrest House site boundary), and shallowing towards the north. No tipped waste was encountered within c.100m of the location Hilcrest House.

Previous investigations undertaken in the area of waste tipping to the south of the Site found that the Till soils comprise slightly sandy, slightly gravelly clay with lenses of sand. These soils were typically found to extend to depths of more than 15m below ground level (bgl). With a minimum reported thickness of 6.5m in the south of the area and a maximum reported thickness of 51m in the north. The bulk permeability of the Till was reported to be low.

2.4.2. Findings of Ground Gas Risk Assessment Across the Area of Landfilling

A total of 42 ground gas boreholes were monitored 18 times between April 2005 and December 2007 as part of the risk assessment undertaken by White Young Green. Based on the findings of the ground gas risk assessment, the area to the south of the site was determined to represent Characteristic Situation 2, based on maximum CO₂ concentrations of 18%, CH₄ concentrations of 7.3%, with corresponding Gas Screening Values of between 0.188l/hr and 0.027l/hr, respectively. However, this was upgraded to Characteristic Situation 3 based on NHBC guidance at the time of writing due to elevated gas concentrations.

White Young Green notes in their risk assessment that the potential for offsite migration of ground gases will be limited by the historic nature of the filling activities, which placed material at ground level, resulting in landgas venting to the surface rather than migrating downward through the low permeability Glacial Till and moving offsite.

3. Ground Gas Risk Assessment

3.1. Assessment of Potential Ground Gas Sources

This assessment will focus on the viability of potential ground sources in relation to the proposed development using the most recent guidance (including the most recent NHBC Guidance). A summary of the potential sources and their risk rating is presented in Table 3.1 below. The table indicates that the available sources are considered to be of negligible to very low risk.

Table 3.1 Assessment of Potential Ground Gas Sources

Potential Ground Gas Source	Key Considerations	Risk Rating
Made Ground beneath the site.	Historical mapping indicates that the site underwent a single phase of development, marked by the construction of the existing structure. Limited Made Ground soils are anticipated. Made Ground soils are not inherently a significant source of hazardous ground gas. Typically, substantial proportions of putrescible materials such as vegetation, food waste, paper, cardboard, wood are required to be a source of gas in the ground, and these are not anticipated in any Made Ground present beneath the Site due to their unsuitability to construction. Additionally, the ground beneath the site has been in place since the early 1900s, an age considered to significantly reduce the risk of ground gas generation. The natural soils underlying the site comprise Till, which does not present a potential gas source.	Negligible Risk
Waste Tipping from c. 100m south of the site	The tipped material contains limited quantities of organic debris amongst a predominantly ashy Made Ground of clinker, coal and ceramic. The boundary of the tipped material extends to within c.100m of the site boundary. At the northern extent of the historic tip, the waste material is of limited thickness (<1m). The maximum thickness of the tipped material is c.4m towards the southern boundary. The raising of land with tipped waste is understood to have ceased in the mid-1950s. This means that any deposited waste will be at least 70 years old. After 70 years, any deposited waste will have reached its maturation phase and any gas generation will be at residual, very low levels. This is evidenced by the low Gas Screening Values calculated between 2008 and 2009. In such cases, the risk of gas migration is negligible unless there are open, highly permeable pathways. In all published cases where gas migration has resulted in ingress to off-site properties, the landfill has been either operational or closed for only a few years. Houses were constructed within the surrounding area to the east, north and west of the site between the early and mid-1900s and will not have had ground gas protection measures included in their construction. Ground Risk are not aware of any reported instances of ground gas ingress within these properties. Some are equidistant or closer to the area underlain by tipped waste. Even with high-generation-rate landfills, gas migration is unlikely to extend more than 100m from its boundary unless significant preferential pathways are present. The landfill is separated from the underlying sandstone bedrock by in excess of 6.5m of Till (typically >15m). The Till predominantly comprises low-permeability clay which will restrict the downward and lateral migration of any ground gases.	Very Low Risk
Vapour Risk	There are no known potential sources of vapours at the site.	Negligible Risk
Coal Mine Gas	The site is not located within a coal mining area. As such, the site is not at risk from mine gas.	Negligible Risk
Radon	The site is located within an area where less than 1% of structures are above the action level for radon. As such, radon protection measures are not required.	Negligible Risk



3.2. Ground Gas Risk Assessment

The proposed development comprises the conversion of an existing property into supported residential accommodation.

The only potentially significant source of ground gases identified in proximity to the property is an area of buried tipped waste to the south of the Site. Ground Risk is not aware of any previous ground gas issues at the property or any other properties surrounding the area of tipped waste.

The gas generation potential of the area of tipped waste is considered to be low due to the following key factors:

- The waste is in excess of 70 years old. Any deposited waste will have reached its maturation phase and any gas generation will be at residual, very low levels. This is evidenced by the low Gas Screening Values calculated between 2008 and 2009 by White Young Green.
- The waste is primarily composed of ash, clinker and inorganic material with limited quantities of degradable material. This is typical of waste deposited before the 1960s, which has limited potential for generating ground gas.

The potential for offsite migration of ground gases from the area of tipped waste to within the Site boundary will be limited by the following key factors:

- The historic nature of the filling activities, which placed material at the former ground level, will result in landgas venting to the surface rather than migrating downward/laterally through the low permeability Glacial Till and moving offsite.
- The site is located c100m from the closest encountered area of tipped waste. At this location, the waste is typically <1.0m in thickness. Gas migration is unlikely to extend more than 100m from the boundary of deposited waste unless significant preferential pathways are present. The site is underlain by predominantly cohesive Till, which will limit the migration of any ground gases.

Given the above, the site is not considered to be at risk from ground gases and no further risk assessment is deemed necessary.



4. Regulatory Approval

The conclusions and recommendations presented above are considered reasonable based on the available information; however, the conclusions and recommendations cannot be guaranteed to gain regulatory approval and, therefore, the report should be passed to the appropriate regulatory authorities and/or other organisations for their comment.



APPENDIX A – REFERENCES AND GUIDANCE

BRE BR211 (2013). Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects). BRE Electronic Publications.

BRE SD1 (2005). Concrete in Aggressive Ground. Special Digest 1 (revised edition). IHS BRE Press, Bracknell.

BRE 414 (2001) Protective measures for housing on gas-contaminated land. BRE.

BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites - Code of Practice. British Standards Institution, London.

BS EN 1997-1:2004 Eurocode 7. Geotechnical Design. General Rules. British Standards Institution, London.

BS EN 1997-2:2007 Eurocode 7. Geotechnical Design. Ground Investigation and Testing. British Standards Institution, London.

BS5930:2015+A12020 Code of practice for ground investigations BSI

BS EN ISO 17892-1-12:2018 Geotechnical investigation and testing BSI

BS EN ISO 14688-1:2018 Geotechnical Investigation and Testing. Identification and Classification of Soil. Identification and Description. British Standards Institution, London.

BS EN ISO 14688-2:2018 Geotechnical Investigation and Testing. Identification and Classification of Soil. Principles for a Classification. British Standards Institution, London.

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BS8485 2015 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases in new buildings. British Standards

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CIRIA Rep R 97 (2001) Trenching Practice. Report 097, 2nd edition, CIRIA, London.

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- UK Water Industry Research (2010) Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (report no. 10/WM/03/21)
- WHO (2000) Air Quality Guidelines for Europe. 2nd edition, WHO Regional Office for Europe, Copenhagen.
- World Health Organisation (2017) Guidelines for Drinking Water Quality (4th edition).



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<http://www.warstateandsociety.com/Bombing-Britain>

<https://www.epa.gov/pfas/basic-information-pfas>

UK Maps of Radon, <http://www.ukradon.org/information/ukmaps>

Health and Safety Executive (2015) Construction (Design and Management) Regulations.

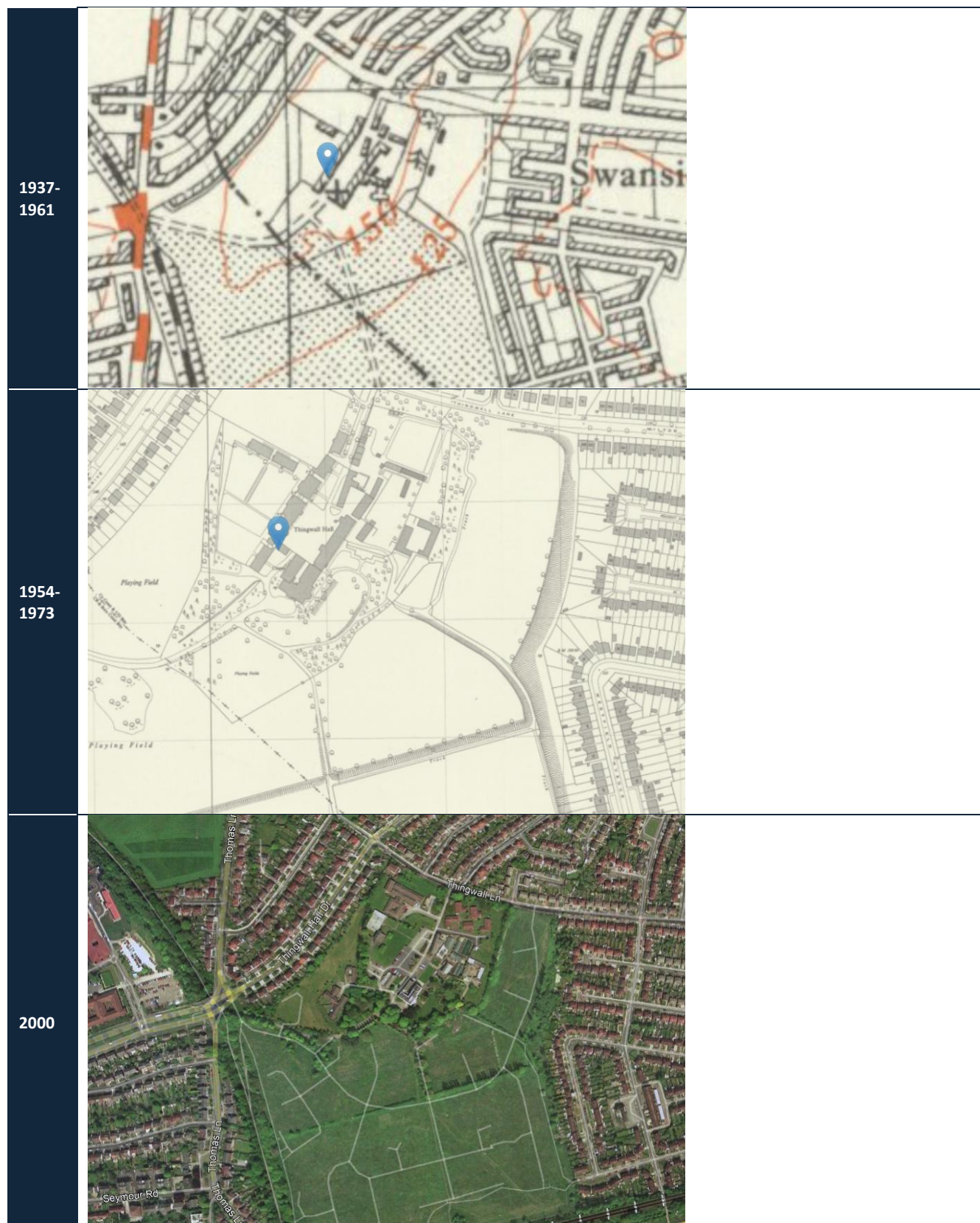
Coal Authority Interactive Map Viewer, <http://mapapps2.bgs.ac.uk/coalauthority/home.html>

BGS Geology of Britain Viewer <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>



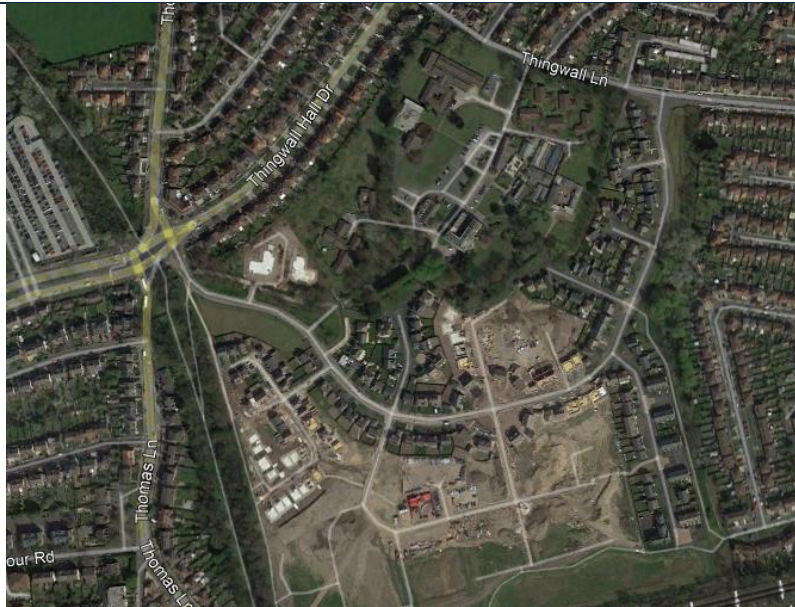
APPENDIX B - HISTORICAL MAP EXTRACTS

Year	Map Extract
1830	
1888 - 1914	
1900-1940	





2015



2025

