

Tier 1 Hydrological Impact Assessment

St John the Baptist Church, Wetley Rocks, Stoke
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Job No. M24-117

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PHASE 1 DESK STUDY

St John the Baptist Church, Wetley Rocks, Stoke

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Revision	Date	Prepared By	Signed
Final	September 2024	E Fee <i>Engineering Geologist</i>	
		Checked By	
		L Cassidy <i>Principal Environmental Engineer</i>	
		Approved By	
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1 EXECUTIVE SUMMARY

Site Address	Mill Ln, Wetley Rocks, Stoke-on-Trent ST9 0BG
Site Description	Site is a 0.02Ha grassy area of land used as part of a field, currently with fencing on three sides of the site.
Site History <i>On Site</i> <i>Offsite</i>	The earliest maps (1880) show that the site was used as agricultural land. The latest map (2024) shows no change since the earliest maps. From the earliest mapping the area adjacent to the South of site was occupied by a church with an adjacent burial ground and farmhouse. The surrounding area was occupied by fields with lanes and sparse housing, predominantly at Wetley Rocks. There were quarries being worked in the area pre 1880 which ceased operation by 1963. Housing was constructed at a similar time opposite the church South across Mill Lane plus a town hall. A school was constructed by 2000 to the West of the site.
Proposed End Use	The proposed development is a burial ground.
Environmental Setting	
<i>Geology</i>	Solid geology is Pennine Lower Coal Measures Formation and South Wales Lower Coal Measures Formation (Undifferentiated) (PSLCM) most likely comprising interbedded mudstone, siltstone and sandstone with coal seams. The drift deposits on site are likely to consist of Glacial Till from the Devensian – Diamicton.
<i>Hydrogeology</i>	Using the Environment Agency's Policy and Practice for the Protection of Groundwater the solid geology beneath the site is classified as a Secondary Aquifer – A. The overlying drift is classified as a Secondary Aquifer – Undifferentiated. The site does not lie within a source protection zone. There is one Groundwater Abstractions located within 1km of the site used for agriculture and domestic.
<i>Hydrology</i>	The nearest surface water feature is an unnamed pond located 55m Northwest of the site. There are no Surface Water Abstractions within 1km of the site.
<i>Flooding</i>	The Envirocheck Report states the site is not at risk of Flooding from Rivers and the Seas without defences, and there are no flood defences, flood water storage areas or areas benefiting from flood defences and flood storage present within 250m of the site.
<i>Radon Gas</i>	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protection measures are necessary for new buildings or extensions on the site.
Preliminary Contamination Assessment	The desk study has shown that the site is unlikely to have been exposed to any contamination. Potential historic waste may be found from the church construction, or more recently St John's Drive.

2 INTRODUCTION AND SCOPE OF INVESTIGATION

Solmek were instructed by Mr Andrew Cooper to undertake a desk study on a parcel of land at St John the Baptist Church, Mill Ln, Wetley Rocks, Stoke-on-Trent, ST9 0BG. The proposed development is a burial ground.

The purpose of this Hydrological Impact Assessment is to evaluate likely ground conditions and determine whether the proposed development will impact the surrounding area through groundwater. This phase 1 hydrological impact assessment is designed to comply with the Environment Agency Guidance on groundwater risk assessments for cemeteries and burials.

This report may be regarded as a Preliminary Risk Assessment in accordance with respect to the Environment Agency's guidance document Environment Agency *Land Contamination Risk Management*, which replaced the now-withdrawn *Contaminated Land Report 11 – Model Procedures for the Management of Land Contamination (2004)*.

This Phase 1 Desk Study has been undertaken with due regard to current contaminated land guidance issued by the Royal Institution of Chartered Surveyors (RICS) together with BS 10175:2011+A1:2013, "*Investigation of Potentially Contaminated Land - Code of Practice*" and relevant sections of BS 5930:2015+A1:2020, "*Code of Practice for Ground Investigations*".

The objectives of the investigation are as follows:

- Determine the land use history of the site from an inspection of available Historical Maps
- Determine the environmental setting of the site from available sources, focussing on geology and hydrogeology.
- Determine whether the site has previously been used for purposes that may have given rise to significant ground contamination

2.1 Relevant Legal Information and Legislation

The Cemeteries Clause Act 1847 in conjunction with Town and Country Planning Act 1990 and Planning and Compensation Act 1991 allows Local Planning Authority governance over location, development and operation over cemeteries. Conditions set in a Decision Notice will outline the wishes of the relevant Local Planning Authority.

Environment Agency Guidance should always be followed for best practice. A list of relevant guidance is below:

- Protect Groundwater and Prevent Groundwater Pollution 2017
- Cemeteries and Burials: Groundwater Risk Assessments 2017
- The Environment Agency's Approach to Groundwater Protection 2018 (Section L)

3 SITE WALKOVER AND DESCRIPTION

3.1 General

The centre of the site is located at OS Grid Ref 396415, 349320 and covers an area of approximately 0.02Ha. The area is located on Land adjacent to St John the Baptist Church, Mill Ln, Wetley Rocks, Stoke-on-Trent ST9 0BG

The preliminary site inspection was undertaken on the 19th September 2024 and site photographs are presented in Appendix A.

3.2 Site Description

The desk study area is located on a parcel of land adjacent to the northern boundary of St John the Baptist Church, Mill Ln, Wetley Rocks, Stoke-on-Trent ST9 0BG. It is currently part of a larger field used for livestock, so ground is grassy mud. The perimeter is enclosed by wire fencing with the exception of the Eastern

boundary. Plans show the burial ground will be separated from the livestock field by suitable fencing and hedge once development commences, and a gate will be added to provide access to the site.

3.3 Off Site Features

The historic St John the Baptist Church and burial ground is adjacent to the Southern boundary of the site, separated by a wire fence for livestock and a dry-stone wall. Wetley Rocks village is approximately 100m to the East, a school is 150m to the West. Lodge farm is 500m to the West. There is a pond 370m Southwest which drains Northwest to river Churnet 4.25km North. There is a fishpond 600m West associated with Millbrook Fisheries.

4 SITE HISTORY

4.1 Map Descriptions

In order to determine the history of the site, previous editions of Historical Maps and Ordnance Survey Plans were inspected. The Historical Maps are presented in Appendix B.

Table 1 presents a summary of the history of the area which includes plots from 1880 to 2024. The summary focuses on the historical land uses and changes relevant to the site and the proposed end use. Measurements are taken from the nearest boundary of the site and all distances quoted are approximate.

TABLE 1: SUMMARY OF SITE HISTORY

OS Map Edition	On-site Features	Off-site Features
1880 1:2,500 & 1888 1:10,560	Land used for agriculture.	St John's Church and associated graveyard and Church house Farm are adjacent to the Southern boundary of site. Wetley Rocks is to the East, with housing and a quarry approximately 150m to the East. The Masons Arms and Powiss Arms to the Northeast. There is a Methodist Chapel approximately 200m to the Southeast. Fox brewery is 300m to the West.
1963 1:2,500 & 1966 1:10,000	No significant change.	Church buildings are also being used as a school. Housing has been constructed opposite the church along Mill Lane. Quarries have ceased operation to the East. Housing has been built 500m to the Northwest.
1990 1:2,500 & 1990-1991 1:10,000	No significant change.	Further housing development in Wetley Rocks.
2000 1:10,000	No significant change.	A school has been constructed approximately 150m West on Mill Lane.
2024 1:10,000	No significant change.	No significant change.

4.2 Potential Contamination Sources Identified via Historical Plans

Possible contamination from historical land uses which may have impacted the site have been identified:

Made ground from materials used to infill depressions and form a level area for access or building. This may include brick, concrete, timber, ash, slag, coal and metals.

Construction/demolition waste from construction and demolition immediately around the site over the documented history. This may include brick, concrete, timber, asbestos and metals.

Roads/Parking Areas may have utilised coal tar, which can result in high levels of PAHs and Phenols and may require disposal as hazardous waste. In addition, historically road construction used ash as a sub-base material, which could be a further source of PAHs.

Infilled quarries Infilled quarries have potential for ground gas generation, depending on the materials used to infill the pits and also the time that has elapsed since deposition. The materials utilised as infill may themselves be contaminated with metals, hydrocarbons or asbestos.

5 ENVIRONMENTAL SETTING

5.1 Information Sources

The environmental setting of the site was determined through reference to the following:

- Envirocheck Report (including historical map extracts)
- British Geological Survey (BGS): 1:50 000 geological map series sheet 124 Ashbourne Solid with Drift 1983 edition.
- LandIS Soilscales
- Magic.defra.gov.uk: Aquifer Designation Map (Bedrock) (England) and Aquifer Designation Map (Superficial Drift) (England).
- BRE Publication BR211 Radon: Guidance on Protective Measures for New Dwellings

5.2 Landfill and Waste

There are no Landfills or any other facilities handling or managing waste located within 250m of the site.

5.3 Significant Nearby Regulated Industries

The Envirocheck Report indicates that there are 3 inactive Contemporary Trade Directory Entries located within 250m of the site, and 1 active entry located 224m NE detailed as a Texaco petrol filling station.

The Envirocheck Report indicates that the Texaco petrol filling station is the only Recorded Fuel Sites located within 250m of the site.

The Envirocheck Report indicates that there is 1 record of Local Authority Pollution Prevention and Control located 244m from the site described as The Rocks Filling Station (petrol filling station) dated April 2003.

The Envirocheck Report indicates that there are no sites dealing with Hazardous, Explosive or Radioactive Substances located within 500m of the site.

The Envirocheck Report indicates that there are no Substantiated Pollution Incidents located within 500m of the site.

The Envirocheck Report indicates that there are no Sites Determined as Contaminated Land under Part 2A EPA 1990 entries located within 500m of the site.

5.4 Geology and Soils

Slowly permeable seasonally wet acidic and loamy clayey soils are found on site, with medium Carbon content. It has low fertility hence its use as grassy pasture for sheep. Overland flow is the greatest concern for water protection, as this carries organic slurry and pathogens from livestock to streams. Land approximately 20m uphill East of the site is described as freely draining very acidic sandy and loamy soil, with free drainage to groundwater.

The drift deposits on site are likely to consist of Glacial Till from the Devensian – Diamaticon. This comprises a heterogeneous mix of clay, sand, gravel, and boulders, often unsorted and varying in size and shape (Figure 3). Dependant on depth and local constituents, groundwater flow will increase with lower clay % or reduce with lower clay %.

The site is shown to be underlain by solid geology of Pennine Lower Coal Measures Formation and South Wales Lower Coal Measures Formation (Undifferentiated) (PSLCM) most likely comprising interbedded mudstone, siltstone and sandstone with coal seams (Figure 4).

The Coal Authority Map Viewer indicates the site sits in a Surface Coal Resource Area, with coal outcrops 500m Northwest and 1.6km Southeast. There is an abandoned mine entry recorded 850m South-southwest and two more 1.4km South-southeast.

The nearest fault is located 2km South with a downthrow to the West.

A very low risk of landslide ground stability hazard on site has been identified in the Envirocheck Report, and a moderate risk 115m East.

5.5 Hydrogeology

Using the Environment Agency's Policy and Practice for the Protection of Groundwater the solid geology beneath the site is classified as a Secondary Aquifer – A (Figure 5). It is described as a cyclic multi-layered aquifer with moderate yields from sandstones and springs. The overlying drift is classified as Secondary Aquifer – Undifferentiated (Figure 6).

The groundwater vulnerability is categorised as Secondary Bedrock Aquifer – Medium Vulnerability. The bedrock aquifer and superficial aquifer are classed as productive, with well connected fractures.

The site does not lie within a Source Protection Zone.

The Envirocheck Report indicates that there is one Groundwater Abstraction located within 1km of the site. This is found 720m Northeast at Spout House Farm and detailed as general farming and domestic use.

5.6 Hydrology

The nearest surface water feature is a pond located 55m North of the site.

The Envirocheck Report states there are no Licensed Discharge Consents entries within 500m of the site.

The Envirocheck Report states there are no Records of Water Industry Act Referrals (potentially harmful discharges to the public sewer) located within 500m of the site.

The Envirocheck Report indicates that there are no Surface Water Abstractions located within 1km of the site.

5.7 Flooding

The Envirocheck Report states the site is not at risk of Flooding or Extreme Flooding from Rivers and the Seas without defences.

The Envirocheck Report indicates that there are no flood defences, flood water storage areas or areas benefiting from flood defences and flood storage present within 250m of the site.

The Envirocheck Report states that there is Limited Potential for Groundwater Flooding on site and the surrounding area, and Potential for Groundwater Flooding for property situated below ground level.

5.8 Sensitive Land Use

The site is within the boundaries of a Nitrate Vulnerable Zone as it is in the drainage basin of some tributaries to the River Trent. The River Trent is a Nitrate Vulnerable Zone from source to its confluence with the River Derwent.

The site is within the boundaries of Green Belt land, adopted under the authority of Staffordshire Moorlands District Council from the 30th September 1998.

The site does not lie within 2km of any other form of Designated Environmentally Sensitive Sites or Protected Areas.

5.9 Radon Gas

The site is not in a Radon Affected Area, as less than 1% of properties are estimated to be at or above the Action Level.

In accordance with the procedure described in BRE Publication BR211 Radon: Guidance on Protective Measures for New Dwellings, no radon protection measures are necessary for new buildings or extensions on the site.

6 CONCEPTUAL SITE MODEL

6.1 General

Based on the information presented in the preceding Sections, and in accordance with the LCRM guidance noted in Section 1, a Preliminary Conceptual Site Model has been produced.

The main features of the model are discussed in the following sections together with preliminary recommendations where appropriate.

6.2 Likely Ground Conditions

It is expected that, based on available information, the site will be underlain by topsoil overlying Glacial Till comprising clays, sands, gravels, and boulders in an unsorted fashion. These are overlying the interbedded mudstones, siltstones, sandstones and coals of the Pennine Lower Coal Measures Formation and South Wales Lower Coal Measures Formation (Undifferentiated) (PSLCM).

The site is unlikely to contain made ground, however there is potential for historic construction waste from St John the Baptist Church and more recently from St John's Drive.

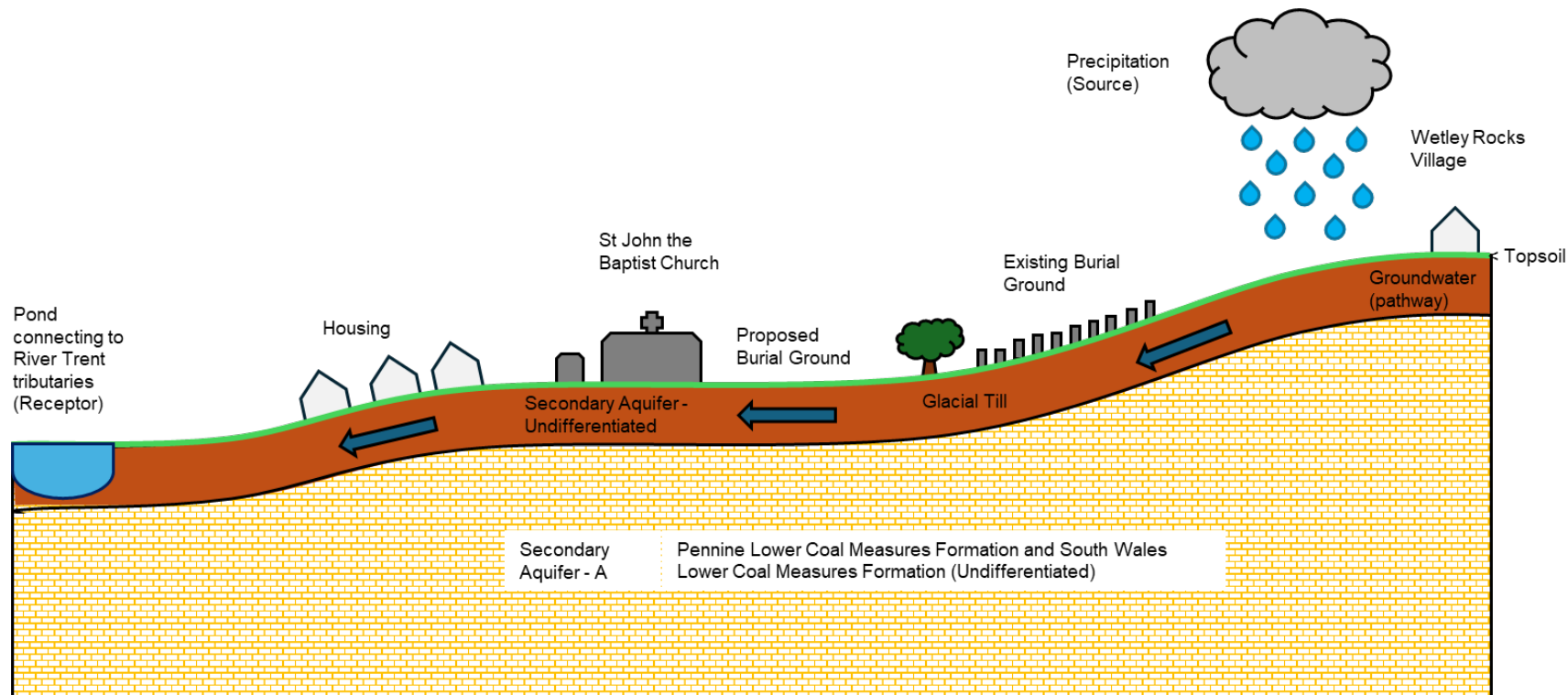
6.3 Conceptual Site Model

The conceptual site model aims to present the characteristics of the site, provide a systematic indication of potential risks caused by the proposed land use, and identify any needs for further investigation.

The conceptual model has been produced in accordance with guidance presented by the Environment Agency.

TABLE 2: CONCEPTUAL MODEL

Source	Pathway	Receptor	Risk Rating	Rationale
Precipitation	Groundwater	• Stream • Aquifers	Very Low	Any pollution caused by proposed burial ground will be negligible. Aquifers and streams do not provide water for human consumption.
	Surface runoff	• Pond • Stream	Very Low	Surface runoff will not become polluted by burial ground as sources of pollution will be underground.
Springs	Groundwater	• Stream • Aquifers	Very Low	There are no mapped springs flowing through the site.



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