

PHASE I GEO-ENVIRONMENTAL ASSESSMENT



BUXTON ROAD

PREPARED FOR GREENERGY RENEWABLES UK LIMITED



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EXECUTIVE SUMMARY

Site Information	The site covers an area of approximately 1.5 ha and is currently occupied by agricultural farmland.
Proposed Development	The proposed development comprises a BESS facility incorporating containerised batteries, access track and ancillary infrastructure.
Historical Development	The sites' historical and current use is agricultural which has largely remained unchanged since 1882. The surrounding area has typically comprised agricultural land with the exception of Bibbington lime works and associated quarrying to the north and east of the site. A railway line has been present adjacent to the western boundary of the site since 1882 and Buxton Road has been present adjacent to the eastern boundary of the site since 1882.
Environmental Sensitivity	The site is underlain by bedrock deposits comprising the Bowland Shale Formation across the majority of the site which consists of mainly dark grey fissile and blocky mudstone and the Monsal Dale Limestone Formation in the far east of the site which consists of pale to medium grey biosparite - limestone containing sporadic chert nodules. The nearest surface water features are a drainage ditches located 38 m south of the site. The site is not located within a Total Catchment Source Protection Zone. There are no groundwater abstractions license records within 250 m. The EA 'Flood map for planning' service designates the site as a 'flood zone 1'. Locations in flood zone 1 have a low probability of flooding which means in any year land has a less than 0.1% chance of flooding from rivers or the sea. The site is not located in an area affected by coal mining. The site is located in a higher probability radon area (maximum radon potential is greater than 30%). According to the Defra MAGIC website the site is not located within any ecologically sensitive areas such as Sites of Special Scientific Interest (SSSI), Ramsar sites etc. Defra indicate that the site is classed as Grade 4 agricultural land.
Landfill & Waste	There are no records current landfills, waste transfer or treatment sites, or waste management facilities within 500 m of the site. There is 1 no. recorded historical landfill for Derbyshire County Council, located 406 m north-east of the site.
UXO	Based on the Zetica UXO Risk Maps, the site is located in a low bomb risk area.

Environmental Risk Assessment Following a review of the available information and the site inspection, the preliminary qualitative risk assessment identified a very low and low risk to human health, groundwater and surface water from the on site and off site sources identified. The potential for off site migration of any contaminants was considered to be very low.

Recommendations An intrusive investigation should be completed to confirm the absence of contamination and provide geotechnical parameters for the proposed development.

The investigation should include window sample boreholes with in-situ and laboratory geotechnical analysis and limited contamination analysis.

This executive summary is intended to provide an outline of the site assessment and is not intended to provide a definitive analysis of the information obtained.

1.0 INTRODUCTION

1.1 Instruction

- 1.1.1 Oracle Environmental Experts Ltd (OEE) were commissioned by Grenergy Renewables UK to undertake a Phase I Geo-environmental Assessment of a site known as Buxton Road.
- 1.1.2 The rectangular shaped site is located on the western side of the A6 and encompasses an area of approximately 1.5 ha currently comprising a single grass field.
- 1.1.3 The objectives of this report are:
- To undertake a site inspection to establish the current site condition and to identify any contemporary potential sources of contamination or environmental issues; and,
 - To review and assess all relevant information in relation to historic and contemporary activities and operations and to advise on the potential environmental risks associated with the freehold purchase; and,
 - Identify potential geotechnical constraints and provisional geotechnical recommendations.

1.2 Information Sources & Guidance

- 1.2.1 The following drawing was provided by the client to OEE:
- 'Red Line Boundary Drawing' Provided by Grenergy Renewables UK, dated April 2024.
- 1.2.2 This report has been prepared considering the requirements and recommendations of appropriate UK guidance including the Environment Agency's Land Contamination Risk Management (LCRM) guidance and BS 10175:2011+A2:2017 'Investigation of potentially contaminated sites. Code of practice'.
- 1.2.3 'Contaminated Land' is defined under section 78A of Part 2A of the EPA (1990) as 'any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that (a) significant harm is being caused or there is a significant possibility of such harm being caused; or (b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused'.
- 1.2.4 The statutory guidance accompanying Part 2A of the Environmental Protection Act (1990) was updated in 2012 and advises that enforcing authorities should only seek to use Part 2A where no appropriate alternative solution exists and it is generally considered to be a last resort for Local Authorities when dealing with contaminated land.
- 1.2.5 Land that has been subject to the planning process should, as a minimum requirement, not be capable of being determined as 'Contaminated Land' under Part 2A.

1.3 Methodology

1.3.1 The works undertaken by OEE comprised the following:

- A site walkover survey to identify any potential geo-environmental or regulatory issues relating to the current site use or surrounding land uses;
- A review of the regional geological, hydrogeological and hydrological information to determine the environmental sensitivity of the site;
- A review of the historical development of the site and surrounding area to determine the potential for historical contamination issues;
- The development of a preliminary conceptual site model and qualitative risk assessment to identify potential contaminant sources, pathways and receptors and any pollutant linkages;
- Preliminary geotechnical site appraisal and recommendations;
- Recommendations for further works and/or remedial measures if required; and,
- Provision of a report documenting the above.

1.4 Limitations

1.4.1 Limitations to the scope of this report are presented in Appendix D.

2.0 SITE INFORMATION

2.1 Site Location

2.1.1 The rectangular shaped site is located on the western side of the A6, centred at grid reference 407379E, 376634N, approximately 3 km north of the town of Buxton.

2.1.2 A site location plan is presented as Figure 1 in Appendix A.

2.2 Site Description and Current Use

2.2.1 A site survey was undertaken by OEE on 23 April 2024 and a photographic record is presented as Appendix B.

2.2.2 The site encompasses an area of approximately 1.5 ha and comprises a single grass field. Access was made via a metal farm gate off the A6 in the south-east of the site. The site boundaries comprise a 1 m high post and wire fence with a hedgerow along the southern boundary.

- 2.2.3 The east and centre of the site is generally flat, ranging from heights of approximately 355.0 to 356.5 metres above ordnance datum (m aod). The western side of the site steeply drops by 6 m in an uneven slope from 355 m aod down to 349 m aod. A depression with remnants of stone block work is located on the slope towards the north of the site. It is not clear what this was previously used for, however, the ground at its base was very waterlogged. In the same depression was a pile of scrap wire and wooden post fencing and a heavily rusted metal drum of unknown usage and there was no sign of staining or sheens on the underlying ground/water.
- 2.2.4 At the time of the site visit, the grass field was largely waterlogged with areas of visible surface water and channels of run-off typically flowing to the west of the site. Significant portions of the site were surfaced with marsh grasses.
- 2.2.5 An area approximately 30 m x 3 m of discoloured pale orange and dead grass was present in the north-west corner of the site which appeared to be caused by run-off of sediment from potential historical earthworks to the north of the site.
- 2.2.6 Overhead electricity cables supported on wooden poles cross the centre of the site in a south-east – north-west orientation.

2.3 Surrounding Area

- 2.3.1 A summary of the surrounding land uses is presented in Table 1 below.

Table 1. Summary of Surrounding Land Uses	
Direction	Land Use (Distance)
North	A 50 m wide strip of mature deciduous trees on uneven ground at a slightly higher elevation than the site. Further grass fields are located beyond this.
East	The A6 road runs adjacent to the eastern boundary with further grass fields located beyond.
South	An unnamed access track runs adjacent to the southern boundary leading to the storage area to the west of the site. The parcel of land beyond the track comprises a 30 m x 30 m area of conifer trees and stockpiles of wood chippings and soil.
West	The access track running along the southern boundary continues up to the west along a 12 m strip of land adjacent to the site used for storage. The storage area comprises 13 no. shipping containers, several vehicles in various states of disrepair, external storage of construction equipment and materials, and domestic items. Beyond this are railway lines running in a north-south orientation in an approximately 5 m deep cutting.

2.4 Proposed Development

- 2.4.1 The proposed development comprises a Battery Energy Storage Systems (BESS) facility incorporating containerised batteries, access track and ancillary infrastructure.

3.0 HISTORICAL DEVELOPMENT

3.1 Site

- 3.1.1 **1880** - The earliest available historical maps show the site to occupy a single field which remains the same in the present day.
- 3.1.2 **1898** - No significant changes noted.
- 3.1.3 **1921** - No significant changes noted.
- 3.1.4 **1955** - Overhead cables with associated pylons are now located running in a north-west to south-east orientation, continuing over the site.
- 3.1.5 **1973** - The overhead cables have moved approximately 200m south-west of the site and no longer continue over the site itself.
- 3.1.6 **1994** - No significant changes noted.
- 3.1.7 **1996** - No significant changes noted.
- 3.1.8 **1999 (Aerial Photography)** - No significant changes noted.

3.2 Surrounding Area

- 3.2.1 **1882-1883** - The earliest available mapping shows the surrounding environment to comprise agricultural land. The L & N. W. R Stockport & Buxton Railway line is located immediately adjacent to the west of the site, running in a north to south orientation. A road is located immediately adjacent to the east of the site. 'Bibbington Lime Works' is located 250 m north of the site. A reservoir associated with an 'Old Quarry' is located 365 m north-west of the site. A large quarry associated with 'Bibbington Works' is located 205 m to north-east and 300 m east of the site. There are two ponds located 80 m and 100 m south-east of the site. 'Blackedge Farm' and its associated buildings is located 420 m south-west of the site.
- 3.2.2 **1899** - The large quarry located 205 m north-east of the site is now labelled 'Victory Quarry'. A tramway is noted to be operating within the vicinity of 'Victory Quarry'. 'Blackedge Reservoir' associated with 'Fairfield U.D.C. Water Works' is located 430 m south-west of the site.

- 3.2.3 **1923** - No significant changes noted.
- 3.2.4 **1955** - Overhead cables with associated pylons are now located running in a north-west to south-east orientation, continuing over the site.
- 3.2.5 **1977** - 'Bibbington Works' is no longer labelled on the mapping. The tramway in association with 'Victory Quarry' is no longer labelled on the mapping. The overhead cables have moved approximately 200m south-west of the site and no longer continue over the site itself. The two ponds located 80 m and 100 m south-east of the site are no longer shown on the mapping and appear to have been infilled. 'Old Quarry' is no longer labelled on the mapping, 365 m north-west of the site.
- 3.2.6 **2000** - 'Victory Quarry' is now shown on the mapping and a large body of surface water. 'Quarry (disused)' is now labelled on the mapping, 365 m north-west of the site, in place of 'Old Quarry'. The road located immediately adjacent to the is now labelled as 'Buxton Road'.
- 3.2.7 **2006** - No significant changes noted.
- 3.2.8 **2009-2013** - The disused quarry located 365 m north-west of the site is now labelled as 'Quarry'
- 3.2.9 **2016** - The 'Quarry' located 365 m north-west of the site is now labelled as 'Quarry (disused)' again.
- 3.2.10 **2024** - No significant changes noted.

4.0 ENVIRONMENTAL SENSITIVITY

4.1 Geology

- 4.1.1 The British Geological Survey (BGS) and the Landmark Envirocheck report have been consulted to determine the geological succession beneath the site.
- 4.1.2 There are no superficial deposits mapped beneath the site.
- 4.1.3 The underlying bedrock geology comprises the Bowland Shale Formation across the majority of the site which consists of mainly dark grey fissile and blocky mudstone and the Monsal Dale Limestone Formation in the far east of the site, which consists of pale to medium grey biosparite - limestone containing sporadic chert nodules.
- 4.1.4 The site is located in a higher probability radon area (maximum radon potential is greater than 30%). The proposed development comprises a BESS facility incorporating containerised batteries, access track and ancillary infrastructure which are unlikely to require radon

protection measures, however, should new dwellings or extensions be constructed in the area, then full radon protection measures are considered to be necessary.

- 4.1.5 The Coal Authority Interactive Map shows that the site is not located in an area affected by coal mining, however, it is located approximately 300 m east of a coal mining reporting area.
- 4.1.6 The BGS Estimated Soil Chemistry for the site includes concentrations of arsenic at 15-25 mg/kg, cadmium <1.8 mg/kg, chromium at 90-120 mg/kg, lead at 100-200 mg/kg and nickel 15-30 mg/kg over the majority of the site and 45-60 mg/kg in the far east.
- 4.1.7 There are 2 no. records of ceased BGS Recorded Mineral Sites located 444 m north-east and 449 m north-west of the site for the extraction of limestone and sandstone.
- 4.1.8 The site is classified as exhibiting no hazard or very low hazard potential with respect to collapsible ground, shrinking or swelling clay, landslides and running sand.
- 4.1.9 With reference to the BGS GeoIndex mapping, there are 2 no. borehole records located 100 m to the north-east boundary of the site (BGS references SK07NE18 dated 1945 and SK07NE43 dated 1977). The recorded geology consisted of biopelsparite and limestone. Groundwater levels do not appear to have been recorded.

4.2 Hydrogeology

- 4.2.1 The Environment Agency (EA), BGS and the Envirocheck report have been consulted to determine the hydrogeological regime beneath the site.
- 4.2.2 The bedrock geology of the Bowland Shale Formation has been classified by the EA as a 'Secondary A' Aquifer across the majority of the site and the Monsal Dale Formation has been classified by the EA as a 'Principal' Aquifer, in the far east of the site. Secondary A aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers, and are generally aquifers formerly classified as minor aquifers. Principal aquifer designations are assigned where geology is of high permeability and therefore maintain high levels of water storage potential.
- 4.2.3 The bedrock geology maintains a high groundwater vulnerability.
- 4.2.4 The site is not located in or within 1 km of a groundwater source protection zone for a public water supply.
- 4.2.5 There are no groundwater abstractions license records within 250 m of the site.

4.3 Hydrology

- 4.3.1 The nearest surface water features are considered to be drainage ditches running in a north to south orientation, alongside the L & N. W. R Stockport & Buxton Railway line, located 38 m south of the site.
- 4.3.2 There is 1 no. discharge consent within 500 m of 'sewage effluent' into 'groundwater' at 486 m south of the site.

4.4 Flood Risk

- 4.4.1 The BGS groundwater flooding susceptibility data indicates that the site is located within an area of potential for groundwater flooding at surface level and of property below ground level.
- 4.4.2 The EA 'Flood map for planning' service designates the site as a 'flood zone 1'. Locations in flood zone 1 have a low probability of flooding which means in any year, land has a less than 0.1% chance of flooding from rivers or the sea.

4.5 Ecology

- 4.5.1 According to the Defra MAGIC website the site is not located within any ecologically sensitive areas such as Sites of Special Scientific Interest (SSSI), Ramsar sites etc.
- 4.5.2 The site is located within a drinking water safeguard zone (surface water).

5.0 ENVIRONMENTAL DATABASE RECORDS

5.1 Environmental Permits, Incidents and Registers

- 5.1.1 There are 4 no. records of Local Authority Pollution Prevention and Controls within 500 m of the site associated with 'mobile screening and crushing processes' at Barry Wood Plant Hire Ltd located approximately 388 m south-east of the site.
- 5.1.2 There are no recorded pollution incidents to controlled waters within 500 m.
- 5.1.3 There are no registered radioactive substances permit records within 1000 m.
- 5.1.4 There are no registered Control of Major Accident Hazards Sites (COMAH) permit records within 1000 m.

5.2 Landfill and Waste Sites

- 5.2.1 There are no records of current landfills on or near the site, however, there is 1 no. recorded historical landfill for Derbyshire County Council, located 406 m north-east of the site. This historical landfill was recorded to have consisted of inert, industrial, commercial and household waste – the first input was recorded in 1987. There is a registered landfill located 219 m to the south-east of the site licensed to Barry Wood Plant Hire Ltd which receives Construction and Demolition Wastes. There are no waste transfer or treatment sites recorded within 500 m of the site.

5.3 Contemporary Trade Directory

- 5.3.1 There are no records within 250 m of the site for contemporary trade directory entries.

5.4 Unexploded Ordnance (UXO) Risk

- 5.4.1 Based on the Zetica UXO Risk Maps, the site is located in a low bomb risk area.

5.5 Published Agricultural Land Classification

- 5.5.1 A review of the published Agricultural Land Classification (ALC) for the site from the Defra Magic application indicates that the site is classed as Grade 4 agricultural land.

6.0 ENVIRONMENTAL RISK ASSESSMENT

6.1 Introduction

- 6.1.1 The technical approach presented in LCRM is applicable to the development or redevelopment of land under the planning regime and provides a framework for applying a risk management process to the assessment of land affected by contamination.
- 6.1.2 Risk is defined in LCRM as ‘a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence. In the context of land contamination there are 3 no. elements to risk:
- Contaminant (or source) – a substance in, on or under the land with the potential to cause harm or to cause pollution of controlled waters;
 - Receptor – something that could be adversely affected by a contaminant such as people, an ecological system, property or a water body; and
 - Pathway – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

- 6.1.3 Each of the 3 no. elements can exist independently but a potential risk exists when a contaminant, pathway and receptor are linked together and this is termed a pollutant linkage. The initial phase of the risk management process is to establish the potential for the presence of pollutant linkages and to undertake a qualitative assessment of the risk from each pollutant linkage.

6.2 Potential Sources

6.2.1 On Site

6.2.1.1 The following are considered potential on-site sources of contamination;

- Potential spills and leaks of fuels and oils from farm machinery.
- Possible use of pesticides and herbicides from arable use.

6.2.2 Off Site

6.2.2.1 The following are considered potential off-site sources of contamination;

- Current and historical farming activities with the potential for spills and leaks of fuels and oils.
- Construction and activities associated with the 'L & N. W. R Stockport & Buxton Railway' line. Potential for hydrocarbons, heavy metals and herbicides.
- Processes and activities associated with the construction and maintenance of Buxton Road including Made Ground.
- Infilled ponds located 80 m and 100 m south-east of the site.
- Registered landfill located 219 m to the South-east of the site and the Historical landfill located 406 m north-east of the site.

6.2.2.2 Any potential sources previously mentioned in the report that are not listed in 6.2.2.1 are considered to be too far from site to present a risk to the proposed development.

6.3 Potential Pathways

6.3.1 Based on the current site layout and proposed end use, the following are considered potential pathways for contaminants to impact identified receptors:

- Dermal contact and ingestion of potential contaminants.
- Inhalation of vapours and ground gas
- Infiltration and leaching/mobilisation of mobile contaminants.
- Vertical and lateral migration of mobile contaminants in unsaturated zone.

- Vertical and lateral migration of dissolved phase contaminants in groundwater.

6.4 Potential Receptors

- 6.4.1 Based on the current site layout and proposed end use, the following are considered potential receptors which could be impacted by contaminants during and following the proposed development:

Human health – Public, construction workers, site staff/operators, visitors and trespassers;

Groundwater – Secondary A (Bowland Shale Formation) and Principal Aquifer (Monsal Dale Limestone Formation) designation of the bedrock geologies. The site is not located within a groundwater Source Protection Zone and it is noted that there are no groundwater abstraction licences within 250 m of the site.

Surface water – The nearest surface water features are considered to be drainage ditches running in a north to south orientation, alongside the L & N. W. R Stockport & Buxton Railway line, located 38 m south of the site.

6.5 Preliminary Conceptual Site Model and Qualitative Risk Assessment

- 6.5.1 The identification of potential contaminant sources, pathways and receptors are used to formulate a conceptual site model which identifies the potential pollutant linkages. The qualitative risk assessment process assigns a risk rating (very low risk to very high risk) to each pollutant linkage and identifies those which require further assessment and/or investigation.
- 6.5.2 The qualitative risk assessment has been carried out in accordance with the methodology presented in the NHBC and EA R&D 66 publication¹.
- 6.5.3 The preliminary conceptual site model and qualitative risk assessment are presented in Table 2.

¹ NHBC and Environment Agency (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D Publication 66: 2008.

Table 2 – Preliminary Conceptual Site Model and Qualitative Risk Assessment

Source	Pathway	Receptor	Consequence	Probability	Risk Rating
Farming activity including spills and leaks of fuels/oils, and the potential use of herbicides and pesticides.	Dermal contact and ingestion	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Mild	Unlikely	Very low risk Given the limited sources identified it is considered that significant concentrations of contamination are unlikely to be present in the soils. Furthermore, the proposed development is likely to be largely surfaced in hardstanding.
	Inhalation of vapours indoors	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Minor	Unlikely	Very low risk Given the limited sources of contamination identified and the current absence of indoor spaces and anticipated limited indoor space in the proposed development the risk to human health via the inhalation of vapours indoors is considered to be very low.
	Inhalation of vapours outdoors	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Minor	Unlikely	Very low risk Given the limited sources of contamination identified and that the site is unlikely to be occupied for extended periods of time the risk to human health via the inhalation of vapours outdoors is considered to be very low.
	Infiltration and vertical migration in unsaturated zone	Groundwater – Secondary A and Principal Aquifer. No SPZ.	Mild	Unlikely	Very low risk Given the limited potential sources identified and anticipated cohesive composition of the soils on site.
	Lateral migration in saturated zone	Surface water (off site drainage ditches/streams)	Mild	Unlikely	Very low risk Given the limited potential sources identified it is considered that significant concentrations of contamination are unlikely to be present on site.
	Infiltration and lateral migration in unsaturated zone	Third Party	Mild	Unlikely	Very low risk Given the limited potential sources identified it is considered that significant concentrations of contamination are unlikely to be present on site.

Table 2 Continued – Preliminary Conceptual Site Model and Qualitative Risk Assessment

Source	Pathway	Receptor	Consequence	Probability	Risk Rating
Processes and activities associated with the 'L & N. W. R Stockport & Buxton Railway' line.	Lateral migration leading to dermal contact and ingestion	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Medium	Unlikely	Low risk Whilst it is acknowledged that there is the potential for contamination associated with the construction and operation of the railway it is considered that given the time that has passed since its construction and the use of modern trains it is considered that only a low risk remains.
	Inhalation of vapours indoors	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Mild	Unlikely	Very low risk Given the current absence of indoor spaces and anticipated limited indoor space in the proposed development.
	Infiltration and vertical migration in unsaturated zone	Groundwater – Secondary A and Principal Aquifer. No SPZ.	Mild	Unlikely	Very Low risk Whilst it is acknowledged that there is the potential for contamination associated with the construction and historical operation of the railway, it is considered that the anticipated cohesive composition of the soils on site will limit potential migration.
Processes and activities associated with Buxton Road.	Lateral migration leading to dermal contact and ingestion	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Mild	Unlikely	Very Low risk Whilst it is acknowledged that there is the potential for contamination associated with the source it is considered that it is unlikely to be in significant concentrations and that the cohesive stratum is likely to limit potential migration.

Table 2 Continued – Preliminary Conceptual Site Model and Qualitative Risk Assessment

Source	Pathway	Receptor	Consequence	Probability	Risk Rating
Processes and activities associated with the Buxton Road.	Infiltration and vertical migration in unsaturated zone	Groundwater – Secondary A and Principal Aquifer. No SPZ.	Mild	Unlikely	Very Low risk Whilst it is acknowledged that there is the potential for contamination associated with the source to be present, it is considered that significant concentrations of contamination are unlikely to be present and the cohesive strata is likely to limit potential migration.
Infilled ponds (80 m and 100 m south-east of the site).	Inhalation of ground gas	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Minor	Unlikely	Very low risk Given the distance to the sources and the current absence of indoor spaces and anticipated limited indoor space in the proposed development.
Historical landfill located 406 m north-east of the site and registered landfill 219 m south-east.	Inhalation of ground gas	Human health (Public, construction workers, site staff/operators, visitors and trespassers)	Minor	Unlikely	Very low risk Given the distance to the sources and the current absence of indoor spaces and anticipated limited indoor space in the proposed development.

7.0 ENVIRONMENTAL CONCLUSIONS

7.1 Conclusions

- 7.1.1 The sites' historical and current use as farmland has remained unchanged since 1882. The surrounding area to the north and east consisted of a lime works and associated quarrying. The railway line was built by 1882 and is located adjacent to the western boundary of the site and Buxton Road was built by 1882 and is located adjacent to the eastern boundary of the site.
- 7.1.2 A site inspection did not identify any significant potential on site sources of contamination.
- 7.1.3 Beyond general use as farmland and off site activities associated with the railway line and Buxton Road, and infilled ponds there were no significant environmental issues associated with the site or its immediate surrounds.
- 7.1.4 The site is directly underlain bedrock geology comprising the Bowland Shale Formation under the majority of the site and the Monsal Dale Limestone Formation in the far east of the site.
- 7.1.5 The site is not located within a Total Catchment Source Protection Zone and there are no groundwater abstractions license records within 250 m of the site.
- 7.1.6 The nearest surface water features are considered to be drainage ditches located 38 m west of the site.
- 7.1.7 The site is not located within a coal mining area, however, it is located approximately 300 m east of coal mining reporting area. Despite the sites proximity to a coal mining reporting area it is unlikely to be affected by coal mining activities or associated gas generation.
- 7.1.8 According to published information from Defra, the site is classed as Grade 4 agricultural land.
- 7.1.9 Following a review of the available information and the site inspection, the preliminary qualitative risk assessment identified very low and low risks to human health, groundwater and surface water from the on site and off site sources identified. The potential for off site migration of any contaminants was considered to be very low.

8.0 GEOTECHNICAL CONSIDERATIONS

8.1 Geohazards

- 8.1.1 As detailed in Section 4.1, the site is classified as exhibiting no hazard or very low hazard potential with respect to collapsible ground, shrinking or swelling clay, landslides and running sand.

8.2 Foundations

- 8.2.1 Based on the anticipated geology it is considered likely that traditional strip/trench foundations will be suitable on site for the proposed development. This will require confirmation through an intrusive investigation.

8.3 Floor Slabs

- 8.3.1 Ground bearing floor slabs are potentially suitable to use on site. However, should variable ground conditions be encountered or the boundary between the Bowland Shale Formation and Monsal Dale Limestone be spanned then suspended floor slabs may need to be considered.

8.4 Soakaways

- 8.4.1 Given the waterlogged state of the site during the walkover it is considered that soakaways may not be suitable however the bedrock geology may be sufficiently fractured that at depth soakaways could be utilised. This would need confirming through in-situ testing and groundwater monitoring.

8.5 Desiccation

- 8.5.1 Consideration should be given to potential desiccation for foundations along the northern and southern boundary of the site where trees and a hedgerow are present. Foundation design should be undertaken in accordance with NHBC guidance 4.2 Building near trees when designing foundations.

9.0 RECOMMENDATIONS

- 9.1 Based on the findings of this report and the proposed development, it is recommended that the following is undertaken as part of an intrusive site investigation.
- 5 no. window sample boreholes with SPT/CPTs to a depth of 5.00 m to provide geotechnical information and allow the installation of groundwater and standpipes.
 - 5 no. California Bearing Ratio (CBR) tests to confirm highway/pavement design parameters.
 - It would be considered prudent to complete limited chemical analysis of shallow soils to confirm the absence of potential contamination on site.
 - Geotechnical analysis including Atterberg Limits, pH/SO₄ suite and Particle Size Distribution to assist in the geotechnical interpretation of the sites ground conditions.
 - Groundwater monitoring to determine the depth of groundwater across the site for potential drainage and/or implications for earthworks and foundations.

- Provision of an interpretive report detailing the findings of the above recommendations, providing a geotechnical assessment and an updated conceptual site model.