



Land Adjacent to The Mill, Gurney Slade, Radstock

Desk Study and Preliminary Risk Assessment

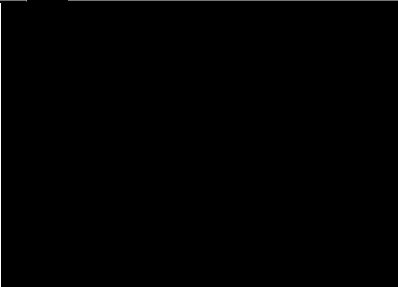
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1 INTRODUCTION

This report was prepared by Structural Soils Ltd (SSL) on the instructions of and on behalf of LKAB Minerals Limited (the Client) at the site of The Mill, Gurney Slade, Radstock. The purpose of the work was to obtain information for the proposed redevelopment of the site for a commercial end use (modular style offices) following demolition of the existing structures.

The purpose of the work was to undertake a desk study and Preliminary Risk Assessment (PRA) 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 *Land contamination risk management (LCRM)*.

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 SSL for the sole and exclusive use of LKAB Minerals Limited 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 1886 to 2021 which are presented in Appendix B.
- An Envirocheck report produced by Landmark for an area up to 1 km from the centre of the site which is reproduced in Appendix B. The Envirocheck report is compiled from the database of information maintained by various statutory bodies listed within Appendix B. It also includes a series of maps showing the approximate position of the listed data together with details on geology, ground workings, mining and extraction, borehole records and estimated background soil chemistry.
- Defra, The Environment Agency (EA) and British Geological Survey (BGS) websites.

2 SITE DETAILS

2.1 Location and Topography

The site is located on the southern side of Tape Lane, Gurney Slade, Somerset, approximately 0.5 km east from the A37 at Gurney Slade (see desk study mapping in Appendix B). The British National Grid Reference of the site is ST628493.

A site walkover was undertaken on 15 July 2021 and photographs with index are included in Appendix A. The site is irregularly shaped and approximately 145 m by 55 m in size at its widest points (see Red Line Boundary Plan & Annotated Plan in Appendix A). In the north-east it comprises two adjacent residential bungalows and front gardens ('Myrtledene' on the west and 'Alwyn' on the east), part of an overgrown grassed area in the south-east, a row of former residential garages and workshops/storage sheds along the central southern boundary and a former shed/stable in the central area. The remainder of the site is parking/access and primarily concrete and gravel surfaced. Access into the site is via a sloping access road up from Tape Lane to the central area of the site. The top of the access road is bound in part by a low bund of limestone chippings, and is being used to store a conveyer. The lower slope of the access road is retained for a short section.

The site is located within a former quarry cutting on the northern facing side of Tape Hill. Tape Lane runs along the base of the hillside, with land beyond rising to the north as Cock and Shore's Hills. The resulting valley is called Gurneyslade Bottom and to the east of the site carries a small stream in addition to the lane. Tape Lane forms the northern site boundary at approximately 185 mAOD, with the quarry cutting, which is still evident in places where unvegetated, beyond the southern site boundary at approximately 200 mAOD. The central and south-eastern area of the site including the garages, workshops and grassed area is level, and set at an assumed elevation of around 192-195 mAOD. The bungalows in the north-eastern area are set approximately 1 m below this elevation, with the change in height accommodated by a breeze block retaining wall on their northern and western sides. Beyond the bungalows the front gardens to the north and the northern side of the site access road slope steeply down to road level. The slope steps in (to the south) between the site access road and the remainder of the site.

The bungalows are vacant and in partial disrepair with the windows and doors largely boarded up. The front gardens are overgrown and slope down to north, with a stepped path and terraces cut in to accommodate planting beds and level garden areas. A decked area and greenhouse are set at a lower level to the front of Myrtledene. The gardens have recently been fenced off to prevent access into the properties from Tape Lane.

Each property has a heating oil tank to the rear (south). Alwyn has a metal tank (presumed single skin), estimated at 750-1000 litres in capacity, sat on raised bricks piers and located on the upper level of the site. Myrtledene has a modern plastic integrally banded 1000 litre tank which looks to be only recently installed, on a slightly raised concrete slab sat at the same level as the bungalows. Both tanks were full, with no evidence of surface staining or leaks and no obvious hydrocarbon odour. Discussions with LKAB Minerals Ltd indicate that the tanks will be appropriately decommissioned and removed as part of the bungalow demolition works. A heating oil tank was also visible on the adjoining property to the east of the site.

The row of garages and workshops along the central southern boundary are of breeze block construction with a corrugated asbestos cement sheet roof and concrete floor slab. LKAB Minerals Ltd confirmed that the asbestos present is to be removed by an appropriately licenced contractor as part of the demolition works. The workshops/storage sheds were largely clear aside from two small drums of lubricating oil present inside one. LKAB Minerals Ltd confirmed that they would be removed and disposed of appropriately. A very slight hydrocarbon odour was encountered within this and an adjoining garage with limited possible surface staining, however the concrete floor slab looked to be intact and there is likely to be limited scope for contamination of the underlying ground from this potential source. Those garages that were open and accessible were empty or being used to store old paperwork. The external area of the workshops and garages included a small pile of lorry/tractor and bicycle tyres and various other disused items/rubbish, none of which were considered to represent a potential source of contamination.

The shed in the central area of the site is of similar construction to those along the southern boundary and appears to have been used as storage and/or stables/animal shelters. The area between the shed and the fence line at the top of the slope down to road level is covered with bark chippings.

Mature trees line the north-eastern boundary of the site including semi-mature beech, horse chestnut and cyprus. Felling/vegetation clearance works have been undertaken on the north-western slope below the site access road. There was no evidence of the spring noted on the historical mapping (see following section) on the northern slope of the site, unless culverted at source below the adjacent road, or seasonal/ephemeral, or perhaps lost during quarrying/infill operations. The slope to the west of the gardens is not uniform and steps in from the line of the gardens. The foot of the quarry slope and the majority of the face is vegetated and/or obscured by shrubs and trees. Utilities are present on site including foul water and drainage, with manholes evident adjacent to the buildings and in the southern slope of the site.

The site is bound to the east by residential properties along Tape Lane. Immediately adjoining the west of the site is a bagging plant building owned and operated by LKAB Minerals Ltd where crushed limestone is bagged for onward transport/sale, and external storage silos for crushed material. Beyond this is a concrete surfaced parking/turning area for lorries, including a dust suppression system, and a further storage warehouse with adjoining AdBlue filling point. There was no evidence of storage or use of oils or chemicals aside from the AdBlue point and a plastic heating oil tank (estimated 1500 to 2000 litres in capacity) mounted on bricks to the rear of the main bagging plant. An old metal tank was discarded adjacent to the plastic tank, however there was no evidence of spillages, staining or odour present. To the north-west of the site are the LKAB Minerals Ltd offices, and infrastructure and silos associated with the crushing of limestone/marble, with Gurney Slade Quarry beyond (operated by Morris & Perry Ltd). On the northern side of Tape Lane opposite the site is a water filled settlement pit which captures limestone dust from surface water run-off from adjacent operations and the road, allowing excess water to drain to a culverted stream which emerges to the east and flows eastwards. The stream was flowing and clear on the day of the walkover, and the banks well vegetated. To the south of the site beyond the quarry cut is open farmland.

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)]
1886 - 1904	1:10,560 & 1:2,500	<p>The south-eastern third of the site is occupied by part of a cutting/quarry extending off-site to the east – by 1903 mapping the cutting to the east of the site is labelled <i>Old Quarry</i>.</p> <p>A path/track runs through the cutting towards buildings outside the site boundary to the east.</p> <p>A <i>Spring</i> is labelled centrally.</p> <p>The western third of the site forms part of a wider field/farmland. The north-eastern third of the site is featureless but may also be part of the property to the east.</p>	<p>Tape Lane forms the northern site boundary. The site sits within an area labelled <i>Gurneyslade Bottom</i>.</p> <p><i>Gurney Slade</i> village is shown to the west.</p> <p>Approx 40 m NE a small quarried area is shown, with <i>Limekiln</i> labelled. Expansion of quarry to E by 1904 mapping.</p> <p>Building of unknown use immediately S of W boundary.</p> <p>Several <i>Wells</i> in local area, closest 75 m E.</p> <p><i>Limekiln</i> 100 m E.</p> <p>Majority of wider area fields and farmland. <i>Gurney Slade Iron Works</i> shown 360 m NE.</p>
1930 - 1932	1:10,560 & 1:2,500	<p>The quarry in the east has expanded and the southern half of the site is now all part of the quarry/cutting.</p> <p>The spring on site also appears to be in a small cutting.</p> <p>A <i>Limekiln</i> is labelled in the western area of the site, adjacent to <i>Tape Laney</i>. A tramway or incline is present in the western half of the site leading from the top tier of the quarry to the limekiln.</p>	<p>The quarry north of the site has also expanded, including additional limekilns, and is labelled <i>Gurneyslade Bottom Quarry</i> (later <i>Gurney Slade Quarry</i>).</p> <p><i>Pumping Station</i> 190 m NE (later sewage works, including tank).</p> <p><i>Binegar Quarry</i> 600 m W (disused by 1959-1970 mapping).</p>
1959 - 1972	1:10,000 & 1:2,500	<p>The quarry in the east may have been regraded and partially infilled. The cut face to the south of the site boundary is still evident on the mapping. Some small cuttings remain in the north-western area and in the vicinity of the spring.</p> <p>Two buildings in the approx. footprint of the existing bungalows are shown towards the eastern boundary.</p>	<p>Small quarried area remains immediately SW of site. <i>Gurney Slade Quarry (limestone)</i> to the north has further expanded by approx. 150 m N and includes areas of presumably waste rock/spoil.</p> <p>Expansion of buildings south of the quarry along <i>Tape Lane</i>, labelled <i>Limeworks</i> (not labelled as such by 1995).</p> <p>By 1972 additional (residential) buildings are shown to the east of the site, including <i>Goravon</i>.</p>

TABLE 1 :SUMMARY OF HISTORICAL MAP DATA			
Dates	Scale	Significant features, changes and developments:	
		On site	In surroundings [distance(m)]
		A hairpin track is shown running up from Tape Lane to the rear of the bungalows. Limekiln and spring no longer shown.	
1988 - 2006	1:10,000 & 1:2,500	Bungalows on site are labelled <i>Myrtledene</i> and <i>Alwyn</i> . Two smaller buildings are shown in the centre and adjacent to the southern boundary (assumed workshops/garages/shed present currently). Hairpin track now straight track running from north-western corner towards the middle of the site as per the current footprint.	Large building immediately adjacent to the SW boundary within the remaining cutting (in footprint of current bagging plant). Additional residential building immediately E (<i>Treetops</i>). Infrastructure labelled within Gurney Slade Quarry including silos, conveyors, tanks and a substation >50 m from site (by 2021 mapping silos are shown 25 m from northern site boundary)
1999	Aerial photo	An access road is shown running from north-western corner (Tape Lane) into central area of site. Trees/vegetation line the area between the track and Tape Lane Bungalows have front gardens extending down to Tape Lane in the north, but no rear gardens. An access track/parking area extends along the southern site of the bungalows, beyond which is a grassed area bound by trees.	The building immediately west of the site includes an area of hardstanding with numerous (assumed) lorries parked, as does an area on the northern side of Tape Lane. Gurney Slade Quarry extends beyond the limit of the photograph in excess of 300 m north to south and 500 m east to west. Several water filled areas are evident within the quarry, as are the cut slopes and areas of spoil. The land to the south and north-east remains predominantly farmland.
2021	1:10,000 & aerial photo	No significant change.	Two silos/tanks shown 25 m W of site, beyond which are two additional small buildings. Two small ponds labelled 8 m N of the site. Additional tanks/silos 20 m NW. A stream is evident along the line of Tape Lane to the N of the site, and another stream is shown issuing 300 m NE of the site and flowing E, and another spring is shown issuing 390 m west. Gurney Slade Quarry is shown to be approximately 800 m N to S.

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

2.2.2 Planning History

There are no planning records pertaining to the site on the Mendip District Council planning portal.

2.2.3 Summary of Site History

The earliest available mapping (1886) shows the site was originally part of a small quarrying operation to the east, with a spring labelled centrally. The remainder of the site was undeveloped. By 1930s the quarry had expanded to include the southern half of the site and a limekiln was present in the western half. By the 1960s the bungalows currently present are shown along with an access road/track up from Tape Lane, and the limekiln and spring no longer shown. It is likely that some regrading or infilling activities have been undertaken to level the site, although the cut face of the quarry is still mapped in the south. By the late 1980s the site footprint is as shown today, along with the adjacent bagging plant building.

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 280, scale 1:50,000 published 1984).
- 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 strata:

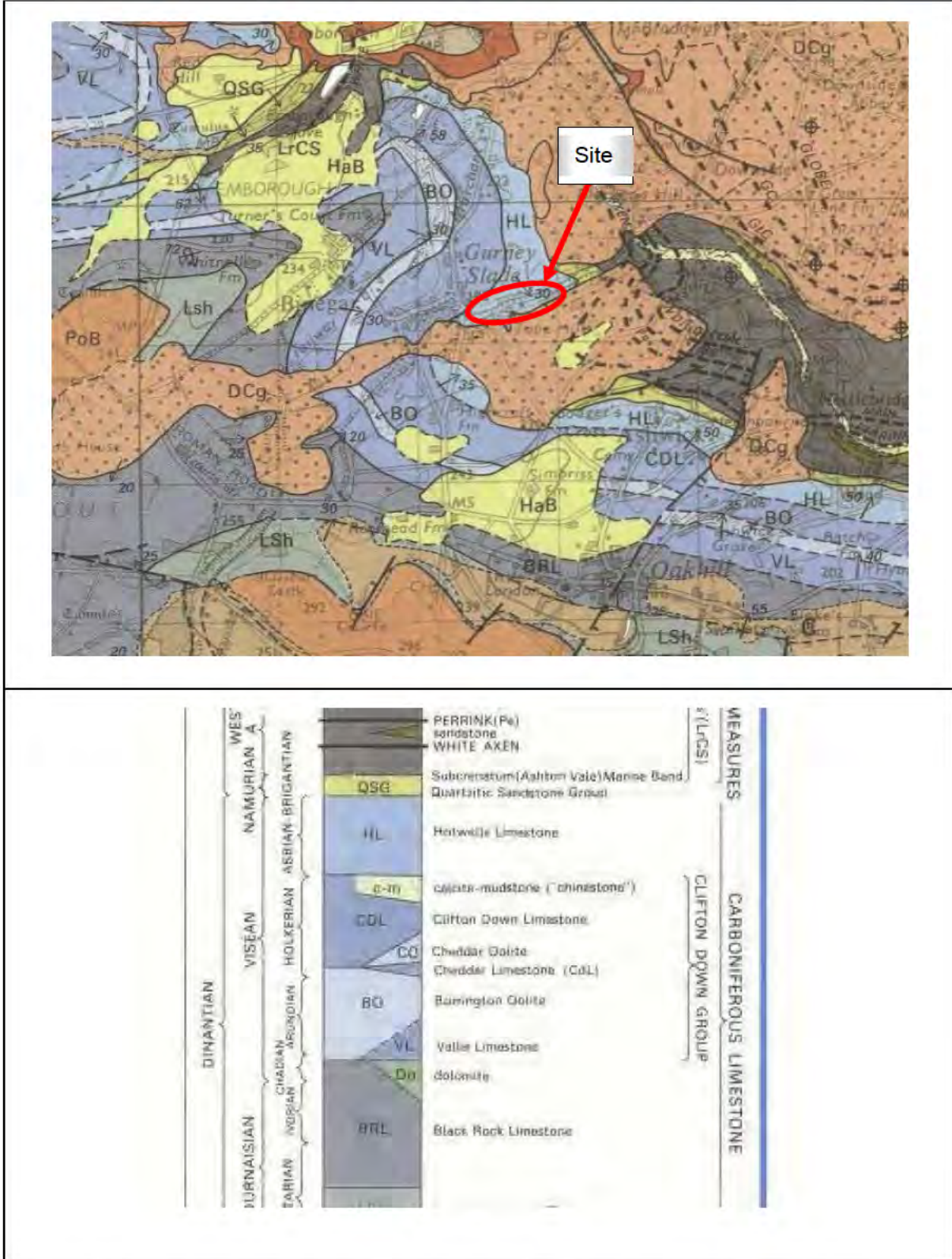
TABLE 2 : SUMMARY OF EXPECTED SITE GEOLOGY	
Geological Unit Name	Description
ARTIFICIAL GROUND	
None shown; however desk study information suggests quarry has likely been at least part infilled and therefore made ground should be anticipated.	
SOLID GEOLOGY	
Oxwich Head Limestone Formation of the Pembroke Limestone Group (Carboniferous Limestone Supergroup)	Thick bedded fine to coarse grained, recrystallised, bioturbated skeletal packstones with distinctive pale to dark grey mottling and pseudobrecciation and ooidal limestones.

Note: Information obtained from BGS digital records © NERC.

The Oxwich Head Limestone is shown to be dipping at approximately 30 degrees south in the area of the site. Immediately south of the site younger Conglomerate of the Mercia Mudstone Group (Marginal Facies) is shown outcropping which overlies the inclined Carboniferous rocks in the area. Given the quarrying history of the site and the cut face visible beyond the site boundary to the south-east, it is unlikely that the conglomerate outcrops significantly on site. As indicated by the historical mapping, the site is likely to be underlain at least in part by made ground, which may comprise quarry waste or alternative infill materials. To the north-west the Clifton Down Limestone Formation is shown outcropping and is likely present below the Oxwich Head Limestone.

Further east the Quartzitic Sandstone and beyond the South Wales Lower and Middle Coal Measures are shown. The Envirocheck report indicates that the site is in an area of potential mining instability (inconclusive coal mining), and is 95 m west of an area which may be affected by coal mining activity and therefore recommends a coal mining report is obtained from the Coal Authority. However, examination of the geology indicates the rocks become progressively younger and dip away moving east/north-eastwards away from the site, and therefore coal is not anticipated below the site. Additionally the Coal Authority website (<https://mapapps2.bgs.ac.uk/coalauthority/home.html>) indicates the site falls just outside the Coal Authority Coal Mining Reporting Area (the area within which the Coal Authority recommends a mining report is purchased).

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. This shows the site to be underlain by the Hotwells Limestone (obsolete name, equivalent to as the Oxwich Head Limestone Formation).



Note: Above images contain British Geological Survey materials ©NERC [2021].

There are no nearby BGS borehole records relevant to the site and a check of the SSL archive does not provide any data aside from near surface soil investigations at Gurney Slade Sewage Treatment works to the east of the site.

3.2 Geological Hazards

According to the Envirocheck report the site is within an area where the risk of the various geological hazards are categorised as follows.

TABLE 3 : SUMMARY OF GEOLOGICAL HAZARDS	
Hazard	Risk Category
Non-coal mining area	Highly unlikely
Collapsible ground subsidence	Very low
Running sand	Very low
Compressible ground subsidence	No hazard
Landslip	Very low
Swelling and shrinkable clay	No hazard
Ground dissolution	Low
Mining instability	Listed as inconclusive coal mining. However, reference should be made to the previous Section 3.1 on risk from coal mining – considered unlikely that coal will exist below the site.
Ground workings - on site	Historic mapping indicates former quarrying activities on site and Table 5 below lists historic open cast quarrying on or in close proximity to the site (Abingdon's Farm and Grunter's Farm)
Mining, extraction and natural cavities	Yes – see Table 5 below for further detail.
Artificial and made ground	The site is listed as potentially infilled land (unknown filled ground – pit, quarry etc), and therefore it is likely that made ground is present.

Note: The definition of Low / Medium / High risk for each category is given in the Envirocheck report.

The presence or absence of these hazards, and their significance if present would normally be determined by completing a suitable ground investigation.

3.3 Mining, Extraction and Natural Cavities

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

TABLE 4 : SUMMARY OF MINING, MINERAL EXTRACTION AND NATURAL CAVITIES			
Site Name	Commodity	Distance	Status
Opencast:			
Abingdon's Farm Quarry	Oxwich Head Limestone Formation	2 m W	Ceased
Grunter's Farm	Oxwich Head Limestone Formation	11 m SW	Ceased
Gurney Slade Bottom	Oxwich Head Limestone Formation	71 m NW	Ceased
Gurney Slade Quarry	Pembroke Limestone Group	100 m W	Active
Gurney Slade Quarry	Oxwich Head Limestone Formation	302 m N	Dormant
Gurney Slade Quarry	Clifton Down Limestone Formation	381 m N	Active
Gurney Slade Quarry (Binegar)	Clifton Down Limestone Formation	513 m W	Ceased
Binegar	Clifton Down Limestone Formation	676 m W	Ceased
Stone Edge Farm	Clifton Down Limestone Formation	774 m NW	Ceased
Cockhill	Oxwich Head Limestone Formation	738 m N	Ceased
Highcroft Quarry	Clifton Down Limestone Formation	944 m SW	Dormant
Highcroft Quarry	Clifton Down Limestone Formation	960 m SW	Dormant
Underground:			
Old Morewood Colliery	South Wales Lower Coal Measures – coal, deep	987 m E	Ceased
Old Morewood Colliery	South Wales Lower Coal Measures – coal, deep	992 m E	Ceased
Natural Cavities:			
Spring outlet cave	Upper Carboniferous Limestone	480 m W	NA
Spring outlet cave	Dolomitic Conglomerate	782m SE	NA
Solution widened joint or fissure	Upper Carboniferous Limestone	817 m NW	NA
Solution widened joint or fissure	Dolomitic Conglomerate	846 m E	NA
Gulls/fissures due to cambering	Dolomitic Conglomerate, Lower Coal Measures	891 m NE	NA

3.4 Hydrogeology and Hydrology

3.4.1 Aquifer Designation

The Defra website (<https://magic.defra.gov.uk/MagicMap.aspx>) has classified the bedrock (Oxwich Head Limestone Formation) underlying the site as a Principal Aquifer (highly permeable).

‘Principal’ Aquifers are layers of rock or superficial deposits that have high inter-granular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

Groundwater is anticipated to flow in the same direction as the local topography in a north/north-east direction towards the stream beyond the northern boundary of the site.

3.4.2 Groundwater Vulnerability Zones

The bedrock aquifer below the site is classed as high vulnerability in relation to the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties.

3.4.3 Source Protection Zones

The site is not in a groundwater source protection zone. A Zone 1 (Inner Protection Zone) is located 779 m south of the site. This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table. Additionally, the zone has as a minimum a 50-metre radius. It is based principally on biological decay criteria and is designed to protect against the transmission of toxic chemicals and water-borne disease.

3.4.4 Hydrology

The nearest surface water feature is a stream (tributary of the River Mells) opposite the site on the northern side of Tape Lane and flowing in an easterly direction. The stream is topographically downgradient of the site.

3.5 Ground Gas

3.5.1 Radon

According to Envirocheck the site is in a higher probability radon area where the estimated proportion of homes near the site that are above the radon action level is 10-30 %. Therefore radon protection measures are considered necessary in the construction of new buildings (including extensions, conversions and refurbishment projects).

3.5.2 Made Ground

The area of the former quarry on site is listed as infilled ground. Made ground and/or landfilled material may give rise to ground gases such as methane and carbon dioxide depending on the nature of the fill and putrescible/organic content.

3.6 Archaeology / Ecology

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

3.7 Unexploded Ordnance (UXO)

The Zetica unexploded bomb (UXB) map indicates a low potential for unexploded bombs to be present as a result of World War II bombing.

3.8 Utilities

Consideration of utilities, aside from those noted during the site walkover, is outside the scope of this desk study.

4 ENVIRONMENTAL SETTING

4.1 Environmental Data

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

TABLE 5 : 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	
AGENCY AND HYDROLOGICAL					
BGS Flooding Susceptibility	Yes				Potential for groundwater flooding of property situated below ground level. Limited potential for groundwater flooding to occur.
Discharge Consents		2	3	2	Nearest 26 m W at Gurney Slade Lime & Stone for making of glass/ ceramic/ cement/ cutting stone. Trade effluent discharge to tributary of River Mells. 87 m W at Morris and Perry, for mineral/ gravel extraction/ quarrying. Trade discharge – mineral workings to River Mells.
Local Authority Pollution Prevention and Controls (and enforcements)		4	1		Nearest permitted 156 m W at Gurney Slade Quarry for Morris & Perry Ltd and Francis Flower and Son, both for quarry processes.
Nearest Surface Waters		Yes			7 m NW.
Prosecutions Relating to Authorised Processes				2	Nearest 917 m SW.
River Quality		1		1	95 m E Tributary of River Mells, River Quality A.

TABLE 5 : SUMMARY OF SIGNIFICANT ENVIRONMENTAL DATA					
Data Types Showing Notable Issues	No. of Notable Listings (or Yes/No) and Distance (m) from Site				Details of Notable Listings
	On site	0-250	250-500	>500	
Water Abstractions (Licensed)		1		1	248 m NE potable water supply from groundwater at Gurney Slade Well, Binegar, operated by Bristol Water Plc. 714 m NE from river. No other data available.
*Risk of Flooding/Flood Storage Areas			Yes		The stream immediately north of the site is at high risk of flooding from surface water and is within Zone 3 for flooding from rivers without defences, but the area does not extend inside the site boundary. Several areas around the ponds within Gurney Slade Quarry to the north are also at low to high risk from surface water flooding, and extreme risk of flooding from rivers without defences.
WASTE					
Landfill Sites (recorded by BGS & Local Authority)			1	1	LA site 354 m NE at Gurney Slade, closed. Waste included inert and degradable. Construction & demolition wastes, tar, pitch, bitumen, asphalt.
Historical Landfill Sites			1		304 m NE at Gurney Slade Pumping Station, Stock Hill. Waste included inert and industrial. First input Dec 1976, last input March 1988.
Potentially Infilled Land	1		1	1	On site: unknown filled ground (pit, quarry) 517 m W: unknown filled ground (pit, quarry)
INDUSTRIAL LAND USE					
Fuel Station Entries			1		Gurney Slade Garage 295 m W (obsolete).

TABLE 5 : SUMMARY OF SIGNIFICANT ENVIRONMENTAL DATA					
Data Types Showing Notable Issues	No. of Notable Listings (or Yes/No) and Distance (m) from Site				Details of Notable Listings
	On site	0-250	250-500	>500	
Contemporary Trade Directory Entries		9	3	3	Nearest 34 m NE – Francis Flower, commercial vehicle bodybuilders & repairers (inactive). 60 m W – LKAB mineral merchants – (active). Other activities within 250 m include quarries (active) and concrete & mortar ready mixed & road haulage services (all inactive)
Points of Interest		8	-	-	Commercial services: 156 m W CRW Transport Ltd, distribution & haulage (inactive). Manufacturing & production: 60 m E, limekilns, 146 m NW tanks, 155/6 m W quarrying, extraction & ore mining.
SENSITIVE LAND USE					
Ancient Woodland			1	1	390 m E Abingdon's Wood.

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

*N.B. the risk of flooding is not considered further within this report.

4.1.1 Summary of Environmental Data

In the context of this preliminary risk assessment, the pertinent features from the environmental data can be summarised to include:

- Presence of infilled ground on site
- Presence of a surface water course immediately north of the site
- Potable water supply 248m north-east of the site

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

TABLE 6 :SUMMARY OF POTENTIAL SOURCES AND CONTAMINANTS	
On Site (Historical)	Contaminants of Concern
Limekiln	Heavy metals & PAH from fuel source. It is not known whether waste material was disposed of off or on-site, or whether any historic contamination would remain in the near surface post filling of the quarry.
On Site (Current)	Contaminants of Concern
Quarry infill/cut and fill activities to create a level building area	Heavy metals, hydrocarbons, asbestos, other unknown contaminants depending on origin of fill, ground gas – carbon dioxide and methane
Heating oil tanks, lubricating oil containers	Hydrocarbons – tanks are currently full but will be appropriately decommissioned by LKAB Minerals Ltd as part of the redevelopment of the site and therefore are not considered to represent a source of contamination, particularly as there is no evidence of surface staining or leakage. Similarly the small lubricating oil containers will be appropriately disposed of by the client. Discounted.
Off Site	Contaminants of Concern
Quarry operations, including asphalt and cement production	Fugitive dust/atmospheric emissions – not considered further as deemed controlled under Environment Agency permitting (Environmental Permitting (England and Wales) Regulations 2010). Discounted.
	Atmospheric deposition from historic operations possible (heavy metals, PAH).
Quarry infill	Ground gas – carbon dioxide and methane
Quarrying operations, including asphalt and cement production	Heavy metals, hydrocarbons, asbestos within soils/groundwater – downgradient of the site therefore no exposure pathway. Discounted.

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 – commercial
- adjacent site users
- potable water supply pipes
- groundwater beneath the site
- groundwater in wider principal aquifer body (including abstraction to NE)
- surface watercourse – stream to north of site

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 result in a potentially complete contaminant linkage include:

- direct contact (soil and dust ingestion, dust inhalation and dermal contact)
- inhalation of ground gas
- leaching and migration to groundwater or direct run-off
- plastic water supply pipes laid in organics contaminated ground

5.1.4 Data Gaps and Uncertainty

It is not known whether the site has been filled using waste material with a putrescible or organic content capable of generating ground gas including methane and carbon dioxide. It is considered most likely that the site was regraded using quarry spoil, but the presence of imported poor quality fill is possible and could significantly affect the risks.

The spring noted on the historic mapping is not present on site, although may be culverted where it rises, or perhaps lost due to quarrying activities including reprofiling and dewatering; shallow groundwater should be expected in the north of the site close to Tape Lane.

5.1.5 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 heavy metals, PAH, asbestos.
2. migration and accumulation of ground gas in properties potentially resulting in asphyxiation or explosion.
3. leaching of contaminants from the unsaturated zone to groundwater in the Principal Aquifer/adjacent surface water stream/potable water abstraction to NE.
4. direct run-off of contaminants to surface water stream.
5. permeation of plastic water supply pipes.

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. The risk assessment has been completed for a proposed commercial development and would require revision for a more sensitive end use, such as residential.

TABLE 7 : RISK ESTIMATION FOR POTENTIALLY COMPLETE CONTAMINANT LINKAGES			
Contaminant Linkage	Probability	Consequence	Risk and justification
1a. Direct contact by future site users by soils that may be impacted by heavy metals or PAH	Low likelihood	Medium	Moderate/low: Heavy metals and PAH may be present as common contaminants within made ground or fill materials, particularly if wood or coal was used to fire historic kilns on site and waste deposited on site. However, exposure to future site users is only possible where contaminants are present within the near surface and areas of existing or proposed soft landscaping are included in the development which is likely to be limited.
1b. Direct contact by future site users by soils that may be impacted by asbestos	Low likelihood	Severe	Moderate: Asbestos cement is currently present as a roofing material to the workshops/garages on site. It will be disposed of by the Client by a licenced contractor ahead of development of the site and therefore is not considered to represent a risk. There is potential for asbestos to be present within any made ground on site relating to previous construction works or within infill material. However, exposure to future site users is only anticipated where contaminants are present within the near surface and areas of existing or proposed soft landscaping are included in the development which is likely to be limited.
2. Migration and accumulation of ground gas in properties potentially resulting in asphyxiation or explosion.	Low likelihood	Severe	Moderate: The environmental data indicates that the site has been infilled, however it is not listed as landfill. The fill material is likely derived from local limestone quarrying operations and therefore of low gas generation potential, although the presence of a more organic/putrescible fraction cannot be ruled out without investigation.

3. leaching of contaminants from the unsaturated zone to groundwater in the Principal Aquifer (including potable abstraction) and adjacent surface water stream	Low likelihood	Mild	Low: The site sits within an area that has been quarried for at least a century and therefore the historic operations on site and any residual contaminants are likely to have minimal impact on ground and surface water quality when compared with the potential impact from surrounding operations. The proposed development is unlikely to increase the area currently available for infiltration of rainwater and subsequent leaching.
4. direct run-off of contaminants to surface water	Low likelihood	Mild	Low: The site sits within an area that has been quarried for at least a century and therefore the historic operations on site and any residual contaminants are likely to have minimal impact on ground and surface water quality when compared within the potential impact from surrounding operations. The proposed development is unlikely to increase the area currently available for direct run-off of contaminants.
5. permeation of plastic water supply pipes	Unlikely	Mild	Very low: Significant contamination is not anticipated within the made ground on site. There was no evidence of mobile hydrocarbon contamination from point sources on site (tanks)

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 Very Low to Moderate.

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

- Linkage 2 - Migration and accumulation of ground gas in properties potentially resulting in asphyxiation or explosion.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Geo-environmental

To further investigate this linkage we would recommend a preliminary intrusive ground investigation, specifically tailored to collect information on these risks. This should include:

- Investigation of the shallow soils below the site to determine the nature and composition of the fill material within the former quarry area and gas generation potential.
- Contamination testing of soil samples from any made ground present (to include heavy metals, PAH, TPH, to better understand any risks to human health which will also address those linkages with moderate/low risk estimations. The risk assessment will need to be reviewed once the development proposals, including any areas of retained or new soft landscaping, are available.
- Installation of gas monitoring wells within the made ground and completion of ground gas monitoring.
- Contamination assessment in relation to human health and other receptors as appropriate.
- Update of the conceptual site model and risk assessment, including recommendations for further work or remediation as necessary.

Investigation by window sampling is likely to prove the most cost effective at this stage, although access down to bungalow level will not be possible unless hand-held window sampling equipment is used. Should the quarry be backfilled with rock spoil, then progress may also be hampered and trial pitting with a mechanical excavator or alternative drilling techniques may be required. Should significant contamination be encountered it will also be necessary to investigate any risk to groundwater in the Principal Aquifer and the downgradient stream.

It is recommended that a basic radon protection measures be installed as a minimum, given the potential radon risk to the site, with consideration given to full protection.

6.2 Geotechnical

Although a full geotechnical desk study is outside the remit of this preliminary contamination risk assessment, in addition to the contamination risks to the site, consideration should also be given to the geotechnical setting.

The site is located within an area of potential regrading and/or fill and made ground of unknown thickness is anticipated below the site, over the limestone bedrock. The fill may comprise quarry waste/rock spoil, or it may have been imported and is therefore of unknown variable composition and compaction. It should be assumed at this stage that the made ground may be aggressive to buried structures, such as concrete.

The cut face of the quarry in the south of the site is largely obscured by vegetation and inaccessible and therefore it was not possible to gain an idea on stability, although that visible did appear to include historic small rock falls/hummocky ground, suggesting some limited instability, although the Carboniferous limestone dips south into the slope and is therefore likely to be generally stable. Consideration should be given to de-vegetating the slope to survey the quarry face for stability depending on proximity to the proposed location of the offices and any associated parking areas. Some stabilisation or protection works may be recommended, such as the use of netting.

Additionally, the northern half of the site slopes down to road level, is uneven in places, and appears to be retained for a short section below the access road where the slope is steep, which may suggest localised historic instability. However, this access road is used by HGVs accessing the bagging plant and beyond, and therefore vehicles travelling to the proposed offices are not anticipated to additionally load the road/slope below. Consideration of slope stability downslope of the development may need to be considered, particularly if any cut and fill works are to be carried out which may load the crest of the slope. The presence of a historic spring may also influence the stability of the northern-eastern slope if still present; shallow groundwater should be expected close to Tape Lane.

There are manholes and pipework evident within the slope and in the area surrounding the bungalows and therefore buried services and potentially historic structures may be present.

7 SUMMARY

- 7.1** It is proposed to demolish the existing residential and outbuildings on site for redevelopment for a commercial end use (modular style offices)
- 7.2** The site is located on the southern side of Tape Lane, Gurney Slade, Somerset, approximately 0.5 km east from the A37 at Gurney Slade (see desk study mapping in Appendix B). The British National Grid Reference of the site is ST628493.
- 7.3** The site is irregularly shaped, slopes down to the south and is approximately 145 m by 55 m in size at its widest points. In the north-east it comprises two adjacent residential bungalows and front gardens, part of an overgrown grassed area in the south-east, a row of former residential garages and workshops/storage sheds along the central southern boundary and a former shed/stable in the central area. The remainder of the site is parking/access and primarily concrete and gravel surfaced. Access into the site is via a sloping access road up from Tape Lane to the central area of the site.
- 7.4** The site is located within a former quarry cutting on the northern facing side of Tape Hill. Tape Lane runs along the base of the hillside, with land beyond rising to the north as Cock and Shore's Hills. The resulting valley is called Gurneyslade Bottom and to the east of the site carries a small stream in addition to the lane.
- 7.5** There were no existing significant sources of contamination noted on site or in the immediate vicinity during the site walkover. Two heating oil tanks associated with the bungalows were present, but with no signs of staining, odour or historic leaks.
- 7.6** The surrounding area includes residential and farmland to the east and south, and limestone crushing and quarrying operations to the west and north. Immediately adjoining the site to the west is a limestone bagging plant.
- 7.7** The site was originally part of a small quarrying operation to the east. By 1930s the quarry had expanded to include the southern half of the site. By the 1960s the bungalows currently present are shown along with an access road/track up from Tape Lane. It is likely that some regrading or infilling activities have been undertaken to level the site, although the cut face of the quarry is still mapped in the south. By the late 1980s the site footprint is as shown today, along with the adjacent bagging plant building.
- 7.8** The Oxwich Head Limestone (Principal Aquifer) is shown to be dipping at approximately 30 degrees south in the area of the site. Immediately south of the site younger Conglomerate of the Mercia Mudstone Group (Marginal Facies) is shown outcropping which overlies the inclined Carboniferous rocks in the area. As indicated by the historical mapping, the site is likely to be underlain at least in part by made ground, which may comprise quarry waste or alternative infill materials.
- 7.9** The site is in a higher probability radon area and therefore basic radon protection measures should be installed as a minimum in any new development.

- 7.10** 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.
- 7.11** Potential sources of contamination are considered to include a historic limekiln on site and made ground from the quarry infill activities. Heavy metals, PAH, asbestos and ground gas were identified as potential contaminants of concern. Following the risk estimation, the risk of migration and accumulation of ground gas was noted as Moderate therefore requiring further investigation.
- 7.12** Further works are recommended to allow an assessment of the gas risk, determine the nature and composition of the fill material, and allow testing of soil samples to better understand any risks to human health.
- 7.13** Depending on the location of the office building/s and associated car parking it may be prudent to undertake vegetation clearance and a survey of the quarry face for localised instability. Consideration should also be given to slope stability downslope of the proposed office location.

8 REFERENCES

- 8.1 BS 5930:2015 *Code of practice for ground investigations*
- 8.2 BGS map (sheet 280, scale 1:50,000, published 1984)
- 8.3 British Geological Survey Lexicon of Named Rock Units, www.bgs.ac.uk/lexicon
- 8.4 Environment Agency website, www.environment-agency.gov.uk
- 8.5 British Geological Survey website, www.bgs.ac.uk
- 8.6 Defra website, www.magic.defra.gov.uk
- 8.7 Environment Agency (2020) *Land contamination risk management (LCRM)*

APPENDIX A - PLANS AND DRAWINGS

- (i) Red Line Planning Boundary Plan & Annotated Plan
- (ii) Site Photographs (index below)

Photograph no.	Description
1.	Grassed area in SW to rear of bungalows, looking SW. Cut face of quarry visible.
2.	Grassed area in SW to rear of bungalows, looking S
3.	Grassed area to SW to rear of bungalows, looking W.
4.	Elevation change from rear of site (S) stepping down to level of bungalows, looking SW.
5.	Rear of 'Alwyn' (bungalow on E side) indicating location of heating oil tank, looking E.
6.	Alwyn heating oil tank.
7.	Rear of bungalows 'Alwyn' (foreground, E side) and 'Myrtledene' (W side), looking NW.
8.	Retaining wall to rear of bungalows and Myrtledene heating oil tank. Looking W.
9.	Myrtledene heating oil tank.
10.	Front of Myrtledene, looking S.
11.	Myrtledene front garden sloping down to N
12.	Myrtledene front garden sloping down to N
13.	Alwyn front garden sloping down to N, looking SE towards adjoining property
14.	Alwyn front garden sloping down to N, looking NE
15.	Front of Alwyn, looking SE.
16.	Fence towards NE site boundary, preventing access to the bungalows from Tape Lane.
17.	Shed/stable in central area of site, looking NW.
18.	Shed/stable in central area of site, looking W.
19.	Adjacent to shed, looking W.
20.	Slope down to road level beyond fence visible in previous photo, looking NW.
21.	SE area of site.
22.	Row of workshops and residential garages along S boundary, looking E.
23.	Workshops on S boundary, looking SE. Cut face of quarry to rear.

24.	Inside workshops, looking S.
25.	Inside workshops, looking S.
26.	Lubricating oil drums inside workshop. Minimal staining and hydrocarbon odour inside workshop, concrete slab floor appears intact.
27.	Inside workshops, looking S.
28.	Inside workshops, looking S.
29.	Garages, looking S.
30.	Garages, looking S.
31.	Central & E half of site, looking E.
32.	Central area of site, breeze block building is shed/stable, looking NE.
33.	Looking W towards site access road (sloping away down to W).
34.	Site access road, sloping down to W. LKAB Minerals Ltd limestone/marble crushing plant visible (off-site). Looking NW.
35.	Site access road, sloping up to E, looking E.
36.	Site access road and short section of retaining wall, looking SE.
37.	Slope below access road and bagging plant (visible in distance), felling works evident. Looking S.
38.	Slope below access road & bagging plant, at limit of bagging plant building. Slope steps in below central shed/stable. Looking S.
39.	Slope below bungalows, looking SE.
40.	N limit of site, looking E along Tape Lane.
41.	Stream near N site boundary, just beyond point where emerges from culvert, flowing E. Looking N.
42.	Settlement pit beyond N site boundary to W of culvert outlet. Looking NE.
43.	Looking W towards bagging plant (off-site) from bungalow level.
44.	Looking E towards bagging plant. Limestone silo evident.
45.	Inside bagging building.
46.	Bagging plant silos and storage area. Looking SE.
47.	Further storage areas, including AdBlue filling point. Garages/stores contain bagging material (plastic/paper). Dumpy bags contain limestone. Looking SW.
48.	Concrete apron at top of site access road. Dust suppression system evident. Looking NE.
49.	Fuel tank to rear (SE corner) of bagging plant. Abandoned metal tank visible beyond, before cut face of quarry.
50.	Looking W along Tape Lane beyond NE limit of site adjacent to LKAB Minerals Ltd office.

Revisions:

KEY:

- Site boundary
- Other land owned by the applicant



ALL DIMENSIONS TO BE CHECKED ON SITE



Party Wall Etc Act 1996
 The works indicated on these drawings may be within the provisions of the Act. It is the building owner's responsibility to serve the requisite notice(s) to adjoining owners and otherwise comply with the Act.

Responsibility is not accepted for errors made by others scaling from this drawing. All discrepancies should be reported to Western Building Consultants.

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Drawing:
 Site Location Plan

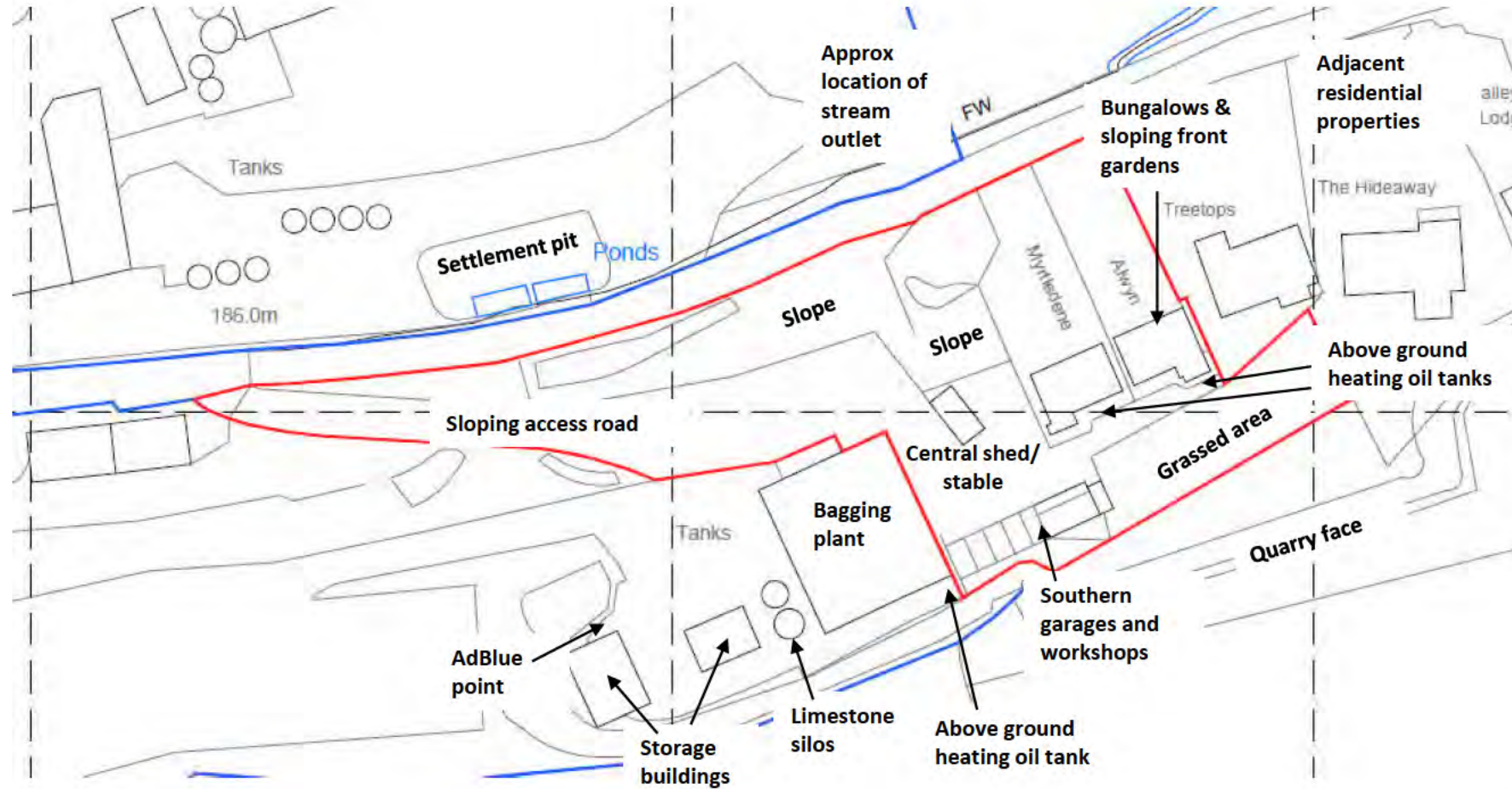
Project:
 The Mill
 Gurney Slade
 BA3 4TE

Drawing No : (2)001 Revision :-
 Scale: 1:1250 @ A3 Job No : WE521/168
 Drawn By: IM Date : 30/06/2021



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Annotated site plan



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736000-1 (00)



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2. Grassed area in SW to rear of bungalows, looking S



3. Grassed area to SW to rear of bungalows, looking W.



4. Elevation change from rear of site (S) stepping down to level of bungalows, looking SW.



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6. Heating oil tank.



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13. Alwyn front garden sloping down to N, looking SE towards adjoining property



14. Alwyn front garden sloping down to N, looking NE



LKAB Minerals Ltd

Desk Study & Preliminary Risk Assessment – Land Adjacent to The Mill, Gurney Slade, Radstock

736000-1 (00)

15. Front of Alwyn, looking SE.



16. Fence towards NE site boundary, preventing access to the bungalows from Tape Lane.



17. Shed/stable in central area of site, looking NW.



18. Shed/stable in central area of site, looking W.



19. Adjacent to shed, looking E.



20. Slope down to road level beyond fence visible in previous photo, looking NW.



21. SE area of site.



22. Row of workshops and residential garages along S boundary, looking E.



23. Workshops on S boundary, looking SE. Cut face of quarry to rear.



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25. Inside workshops, looking S.



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27. Inside workshops, looking S.



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29. Garages, looking S.



30. Garages, looking S.



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34. Site access road, sloping down to W. LKAB Minerals Ltd limestone/marble crushing plant visible (off-site). Looking NW.



35. Site access road, sloping up to E, looking E.



36. Site access road and short section of retaining wall, looking SE.



37. Slope below access road and bagging plant (visible in distance), felling works evident. Looking S.



38. Slope below access road & bagging plant, at limit of bagging plant building. Slope steps in below central shed/stable. Looking S.



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41. Stream near N site boundary, just beyond point where emerges from culvert, flowing E. Looking N.



42. Settlement pit beyond N site boundary to W of culvert outlet. Looking NE.



43. Looking W towards bagging plant (off-site) from bungalow level.



44. Looking E towards bagging plant. Limestone silo evident.



45. Inside bagging building.



46. Bagging plant silos and storage area. Looking SE.



47. Further storage areas, including AdBlue filling point. Garages/stores contain bagging material (plastic/paper). Dumpy bags contain limestone. Looking SW.



48. Concrete apron at top of site access road. Dust suppression system evident. Looking NE.



49. Fuel tank to rear (SE corner) of bagging plant. Abandoned metal tank visible beyond, before cut face of quarry.



50. Looking W along Tape Lane beyond NE limit of site adjacent to LKAB Minerals Ltd office.

