+

PROPOSED RESIDENTIAL DEVELOPMENT (CHANGE OF USE)

Sunny Bank Farm, Sunny Bank, Lund Lane

Lundwood, Barnsley, S71 5PA

LOCAL PLANNING REF: (tba)

PHASE 1 POTENTIAL CONTAMINATED LAND & PRELIMINARY RISK ASSESSMENT REPORT

ref: TH/Lidster/Sunny/001 – 16th March 2019

T. M. Hyett MSc CEng MIEI, CGeol FGS, MCIOB
Chartered Engineer, Chartered Consultant Engineering Geologist
Earth-Tech Consulting Ltd
No. 5 Wentworth Terrace
Wakefield
West Yorkshire
WF1 3QW
T: 07790 581478
E: timhyett@hotmail.co.uk

(i) Terms of Reference

In March 2019, on the instructions of the Planning Consultant (Mr Tom Warren, Prism Agriculture Ltd) acting for the owner, Mr Harvey Lidster, a *Potential Contaminated Land & Preliminary Risk Assessment* (PRA) was requested on a proposed development site at Sunny Bank Farm, Sunny Bank, Lund Lane, Lundwood, Barnsley, S71 5PA.

The development proposals consist of the change of use of a variety of established agricultural buildings of mixed construction, age and condition to create: 1No. refurbishment/conversion to a residential dwelling (Building 1 - *traditional, old, stone construction in a dilapidated state*); 1No. conversion to a residential dwelling (Building 2 - *more contemporary/recent agricultural barn with portal frame and concrete infill panels*), and a further building conversion (Building 3), which is understood at this stage to be subject of a change of use from Agricultural to Flexible Business Use (Class A1) - all in accordance with a proposed **prior approval application** to be submitted to Barnsley MBC (ref: tba).

The client's Planning Consultant, Mr Warren, has advised that the Local Planning Authority can be expected to require, as a minimum, further information regarding the suitability of the site for the change of use / new dwellings: in particular, further details of the history of the site were sought - specifically in relation to potential land contamination, ground stability, mining etc. Generally, there are five recognised steps to making a preliminary assessment of this type;

- ***Desk Study*** - a brief search of available environmental information and historical maps to determine the physical characteristics of the site and to identify the likelihood of contamination, including information on the general characteristics of underlying soils and geological setting.

- ***Site Walkover & Trial Holes*** - a short survey to identify pollution leakages not obvious from the desk study and to identify what risk, if any, is present from ground instability, past coal mining and/or the presence of Radon.

- ***Conceptual Site Model (CSM)*** - to identify potential sources of contamination, the receptors that may be harmed, and possible pathways linking the two.

- ***Risk Assessment*** - to indicate what, if any, the risk of contamination is.

- ***Conclusion to the Assessment*** - to confirm to the local authority (and any other party) that the findings are satisfactory and that no further work is required (or) that there is no significant risk to human health (or) whether additional works (intrusive site investigation and risk assessment) are required to identify, quantify and confirm the presence of pollutant linkages in order to develop mitigation measures.

(ii) Mandatory Guidance

- *The Contaminated Land (England) Regulations 2000.*
- *Contaminated Land (England)(Amendment) Regulations 2012.*
- *The Environment Act 1995.*
- *The Environmental Protection Act 1990.*
- *Department for Communities and Local Government, 2012, Nat Planning Policy Framework.*
- *Department for Environment, Food and Rural Affairs, April 2012.Environmental Protection Act 1990, Contaminated Land Statutory Guidance. The Stationery Office Ltd.*

(iii) The Parties

Property	Existing barn(s) and curtilage at Sunny Bank Farm, Sunny Bank, Lund Lane, Lundwood, Barnsley, S71 5PA
Client/Owner	Mr H Lidster
Planning Consultant	Prism-Agriculture Ltd Mr Tom Warren

PART 1 SITE LOCATION, DESCRIPTION & CHARACTER

1.0 The Location

The site is located at Sunny Bank, off Lund Lane, elevated at some 50m above sea level and close to the semi-rural conurbation of Lundwood in Barnsley. *Lundwood* is a village that lies around 3 miles east of Barnsley town centre that historically was a rural farming community that takes its name from the 'Lund Wood' – the substantially wooded portion of the area of the old manor of Monk Bretton (or *Burton*). The district now falls in the Monk Bretton ward of the Metropolitan Borough of Barnsley.



Fig 1 – Location plan: existing agricultural barns, Sunny Bank Farm, Lundwood, S71 5PA

The site (and the wider area of *Lundwood*) is defined by *Character Assessment* to be within the **Lowland River Floor** landscape type C3 (see below). This is mainly defined by landform, consisting of flat valley floor, and by the presence of water in the forms of rivers, lakes, reservoirs and canals. The valley floors can be narrow or broad and are enclosed by sloping valley sides that are part of adjacent character areas, or land outside the Borough. Residential settlement on the valley floor is scarce, but frequent on the valley sides immediately outside the landscape type. Commercial or industrial development is quite common, particularly next to roads that cross the valleys, or on reclaimed land. Other characteristic features include dismantled and active railway lines, evidence of past industrial development (e.g. old

industrial stone buildings, reclaimed land, disused canals and railway lines), and trees, woodland and scrub which is often dominated by species associated with wet ground (such as willow and alder). There are four main areas of Lowland River Floor in the Barnsley District:

- C1 Elsecar Lowland River Floor
- C2 Lower Dearne Lowland River Floor
- C3 Upper Dearne Lowland River Floor
- C4 Dove Lowland River Floor

These areas are joined, as they are all part of the River Dearne system. Together they form almost continuous green corridors running from the rural landscape of the **West Barnsley Settled Wooded Farmland** (E1) to the west of the M1 motorway, weaving through and between the heavily developed character areas east of the M1, and out of the Borough and into Doncaster Metropolitan Borough in the south west. The subject area is situated in **Area C3 Upper Dearne Lowland River Floor**.



Fig 2 – Location of Lundwood in the Barnsley District

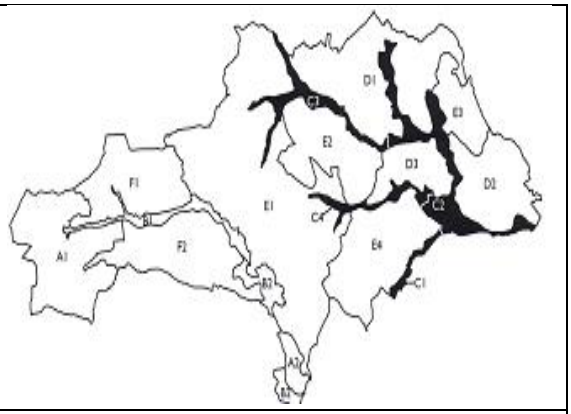


Fig 3 – Landscape Character Assessment Areas- Barnsley

2.0 Character Assessment Boundaries

Landscape character area **C3 Upper Dearne Lowland River Floor** corresponds to the flat and mostly narrow valley bottom associated with the upper reaches of the River Dearne and its tributaries. The boundaries defining its width and the western extreme occur where the ground visibly starts to slope up and becomes part of the valley sides. One of these boundaries corresponds to the M1 motorway.

The general landscape consists of a flat valley floor associated with the River Dearne and two small tributaries to the west. The valley floor is mostly narrow but it broadens where the tributaries meet each other, where they meet the River Dearne and where the disused Barnsley canal is still present. Immediately outside the character area the land slopes up to form valley sides. The underlying geology is alluvium that was deposited by the watercourses over middle coal measures. The elevation of the character area is fairly constant, dropping gradually from 100m AOD at Silkstone in the west, to 35m AOD at the eastern boundary where it meets character area *C2 Lower Dearne Lowland River Floor* in the east. The project site is towards the West extremity of Area C3, laying at circa 50m AOD.

Open water is present along the entire length of the valley floor in the form of the River Dearne, Cawthorne Dike, Silkstone Beck, a short length of the disused Barnsley Canal and small man made lakes. The River Dearne and its tributaries follow sinuous courses, excepting where some short lengths have been canalised in the 18th and 19th Centuries. The valley sides provide enclosure, and this more pronounced where the valley floor is pinched between the built-up areas of Barnsley and Monk Bretton on steeper valley sides. Vegetation in the form of hedgerows, ornamental planting, scrub and trees gives intermittent and localised enclosure. Views are generally restricted to parts of the valley sides and to short distances along the valley floor.

C3 *Upper Dearne Lowland River Floor* contains a mixture of land uses, with farmland and recreational land being most widespread. To the east of Smithy Bridge, most of the valley floor is designated for recreation as Urban Greenspace and to the west the land use is mainly farmland. Smaller pockets of land have been developed for industrial and commercial purposes.

The valley floor is crossed or followed by transportation and communication corridors. Visible remnants of past activity include Monk Bretton Priory, a short section of disused canal, and occasional industrial stone buildings. Farmland covers a large proportion of the valley floor to the west of Smithy Bridge. It consists of permanent pasture and some arable farmland. Horse grazing is evident in some riverside locations. The field pattern is irregular, and sizes vary from small to large. Fields are bounded by post and wire fences and hedgerows that often contain gaps and are unmanaged. In the west of the character area, these link to larger tracts of farmland in the adjacent character areas of E1 West Barnsley Settled Wooded Farmland and E2 Barnsley Settled Wooded Farmland.

Further east, the farmland is in smaller pockets that are isolated by built up areas. The majority of the land to the east of Smithy Bridge has been restored for recreation and is designated in the Barnsley Unitary Development Plan as both Urban Greenspace and Green Belt. It contains small lakes that are used for fishing, small woodland blocks, mown grass, mature trees and a network of footpaths. It forms a green corridor between the densely built up areas on the valley sides.

Several major and minor roads cross the valley floor. The M1 motorway crosses at the junction of Silkstone Beck and Cawthorne Dike. It is highly visible at this location as it is situated on a raised embankment. The motorway also forms part of the western boundary of the C3 and is partially screened here by trees alongside the River Dearne. The railway line from Barnsley to Wakefield runs close to the M1 along the northern part of the character area associated with the River Dearne. Several lines of pylons run along and across the central length of the valley floor. These transportation and communication routes divide up the otherwise uninterrupted, open green corridor. However, their effect on the overall character is limited, as they are narrow, and vegetation provides local screening.

Small clusters of industrial and commercial building are found on the valley floor at Darton and at Old Mill where a large gas storage tank is a dominant feature despite some screening by trees and scrub. Substantial areas of land at Old Mill are currently derelict. Residences are limited to the occasional farm building, but the valley floor is overlooked by extensive settlements in adjacent character areas on the valley sides, including Barnsley and its suburbs to the south and a broad ribbon of development between Lundwood and Kexbrough to the north. Lundwood itself, and the project site, is dominated by the Lundwood Waste Water Treatment Works (WwTW).

Lundwood WwTW is an existing Yorkshire Water (YW) Sewerage Works constructed circa 1960 in the village of Lundwood 3.2km east of Barnsley. The site is bounded by the River Dearne and fields to the east and by housing to the North and to the North East. Access to the site is gained via the existing main site entrance off Lund Lane, off the A628 Pontefract Road. The Lundwood site is approximately 32.8ha in size, and borders the subject property to the west.

3.0 The Site

The proposed development site consists of the change of use of various agricultural buildings of mixed construction to create two residential dwellings (Building 1 and Building 2) and a further building conversion (Building 3) which is understood at this stage to be subject of a proposal for change of use from Agricultural to Flexible Business Use (Class A1) - all in accordance with a proposed prior approval application to be submitted to Barnsley MBC (ref: tba).

The existing detached agricultural buildings are in various states of disrepair situated on agricultural land, plus adequate direct access by via a well-defined compacted road/track. The current land use is vacant with some small-scale agricultural storage, and there is good general curtilage. The present surfacing consists mixed grassed areas, some occasional compacted stone (deteriorated) and general hard-standing at the entrance track off Lund Lane.

The site is generally level with well-defined boundaries, and it borders Lundwood WwTW to the west, but the site is screened by dense historic woodland (known locally as Sunny Bank Wood).

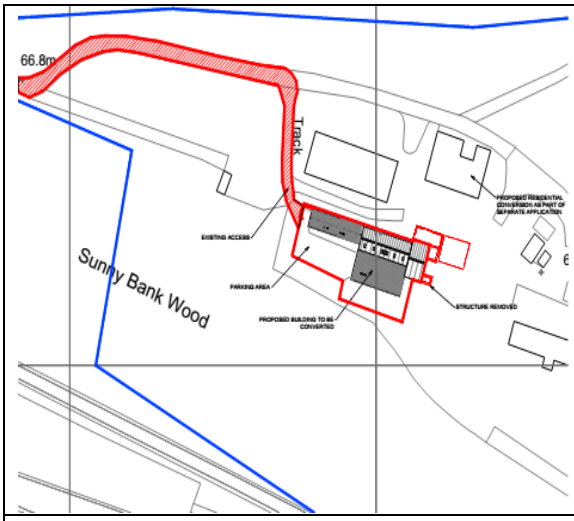


Fig 4 – Building 1 Block Plan



Fig 5 – Building 1 Photograph

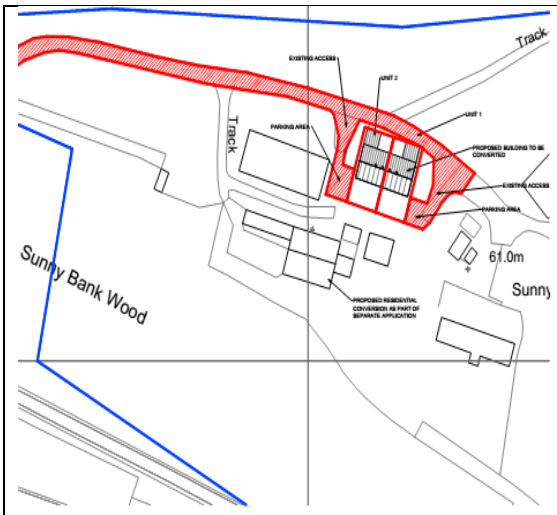


Fig 6 – Building 2 Block Plan



Fig 7 – Building 2 Photograph

There is considerable evidence that the site, and the buildings that occupy it, have been subject to previous light agricultural use, and it has been established by inquiry with the current owner that Building 1 may have been residential at some point in its history but may also have been used for occasional animal storage, but all three buildings have been used mainly for light agricultural purposes and associated machinery storage. Initial research also suggests that the farm buildings (buildings 2 & 3) are designated as allocated agricultural usage, and local knowledge suggests that this was established in the 1980's and 1990's within the permissions of the local area development plan.

There is no indication (from local knowledge, research, observations or otherwise) that suggests the site had any other previous industrial or commercial use.

PART 2 HISTORY

2.1 General

The site is adjacent *Sunny Bank Wood*, off Lund Lane, close to the semi-rural conurbation of Lundwood in Barnsley. *Lundwood* is a village that lies around 3 miles east of Barnsley town centre that historically was a rural farming community. It takes its name from the 'Lund Wood' – the substantially wooded portion of the area of the old manor of Monk Bretton (or *Burton*). The name Lund is derived from the Old-Norse *Lundr*, meaning **woodland**, sometimes of *sacred woodland*, but usually of economically important woods. The name is therefore a tautology (meaning Woodland-wood), a common feature of place-names where two languages are combined.

The development of Lundwood as it is seen today was the result of the building of the turnpike road from Barnsley to Cudworth Bridge in 1825. Reference documents tell us that the turnpike followed the old Barnsley to Pontefract road, suggesting the road was established and merely taken over by the turnpike trust. However, section 31 of the Act that gave rise to the construction refers to "*the making of this new piece of road*" and authorises the trust to stop up "*old roads and footways in the township of Monk Bretton, otherwise Burton*" because they had become unnecessary and useless.

Maps that were made just a relatively short time before, such as Thomas Jefferys (1771–72, Yorkshire), confirm that the road through Lundwood that we see today did not exist, and neither did the road through Beaver's Hole, so this "*new piece*" was evidently quite extensive. The old road ran from Barnsley across the Dearne at Old Mill Lane and then turned east on the Burton Road, passing through Monk Bretton and down to Cudworth at Cudworth Bridge. The route of this new road may well have followed existing footways but nothing large enough to have been recorded on a contemporary map, nor large enough to cope with the intended traffic.

The old 'Lund Wood' referred to above (from where *Lundwood* derives its name) was entirely within the old manor of Monk Bretton. The wood itself was still significant even in the 19th Century and covered much of the land bounding Cudworth in the east almost down to the River Dearne near Storrs Wood. The ruins of Monk Bretton Priory (which was founded in 1154 as the Priory of St Mary Magdalene of Lund by Adam FitzSwaine) lie within modern day Lundwood near Cundy Cross. The road from the Priory ran towards the village of Monk Bretton by way of the hamlet of Littleworth. Littleworth is now subsumed within Lundwood but is remembered in the old road which is named Littleworth Lane, and also in the name of the local primary school.

Monk Bretton has been a settlement since medieval times and was originally known as just 'Bretton'. It is sometimes thought to have taken its name from the twelfth-century Adam fitz Swain de Bretton, whose family owned much land in the area and who also founded Monk Bretton Priory. However, in the Domesday Book of 1086 the area is already known as *Brettone*, and the name may have originally meant 'Farmstead of the Britons', suggesting that a remnant of the old Romano-British population may have lived here into the Anglo-Saxon period.

	*The medieval village cross, today known as the 'Butter Cross', still survives, standing at the junction of High Street and Cross Street. This precious monument had the go ahead for a traffic island to protect it in 2011.*

2.2 Prehistoric and Romano-British periods (7,500 BC – AD 450)

Although human beings roamed, hunted and sought shelter over hundreds of thousands of years in this area during warm phases between periods of glaciation (the *Palaeolithic* period), the story of permanent settlement and the beginnings of the shaping of the modern landscape did not begin until several thousand years after the end of the last glaciation about 12,000-10,000 years ago.

Rising temperatures 12,000 years ago resulted in the melting and shrinking of glaciers and ice sheets which led to a rise in sea levels around neighbouring coasts and, by about 6,000 BC, the creation of Great Britain as an island separated from the continent of Europe. The rising temperatures also resulted in the thawing of frozen ground and a gradual change in vegetation culminating, by about 7,000 BC, in the development of a more or less continuous tree cover - the primaeval woods that have become known as the 'wildwood'. As the environment changed from tundra to forest, the human population gradually began to subsist on smaller prey animals (mammals, fish and birds) of forest, marsh, river and lake, and the more abundant fruits, nuts and roots. Mammals included wild cattle, red deer, wild boar, horse, bear and beaver.

The impact of these forest hunter-fishermen, the *Mesolithic* (Middle Stone Age) peoples, like that of their *Palaeolithic* predecessors, would have been negligible. Virtually all they have left behind in the Barnsley area were their tools and weapons. Finds have occurred on the moorlands in the west where they have been preserved below peat deposits. Finds have been rarer in the Coal Measure country due to early and continuous disturbance by later cultures and burying under residential and industrial developments. A very important find of artefacts was made in the south-west of the Barnsley area, on the east bank of the River Don across the river from Deepcar in 1962. The find was in what appears to have been a temporary camp beside the river where flint tools had been prepared. The excavation of the site produced 23,000 artefacts and there were signs of a shelter, possibly a windbreak, around three hearths. The artefacts included sixty-eight microliths, the most characteristic artefacts of the Mesolithic period - worked stones in the shape of very small arrowheads or barbs to be fitted into a wooden shaft to make a multi-faceted arrow, harpoon or spear.

While the *Mesolithic* peoples of the area were following their hunter-fishing-gathering lifestyle, a 'revolution' was taking place in the Middle East and Mediterranean Europe. This was the development of agriculture from about 8,000 BC. This innovation spread to Britain between 3,000-4,000 BC through colonisation and by adoption by hunter-gatherers through contact with farmers, and this marked the beginning of the *Neolithic* period. Colonists must have introduced sheep and cereals because these are not native to Britain. No *Neolithic* settlements or sacred monuments have been found in South Yorkshire, and so the presence of a *Neolithic* population in the area is known largely from chance finds of stone tools.

A series of later cultures succeeded the Neolithic in the rest of the prehistoric period and in the succeeding period of Roman rule (the term *Romano-British* is used to describe native British settlements in this period). The *Bronze Age* in South Yorkshire, which succeeded the *Neolithic*, probably began about 1,650 BC. This culture marked the beginning of the use of smelted metals. Bronze tools and ornaments from this period include daggers, axes, spearheads and decorative pins. They have been recovered from barrows on the Millstone Grit moors and as chance finds elsewhere. The Bronze Age was succeeded by the Iron Age in South Yorkshire about 700 BC. Smelted iron tools succeeded those of bronze, but this is likely to have been a slow process, as the area was distant from the main centres of technological change in the south of England. Iron Age burials are unknown, but the sites of four surviving hill or hill-slope forts have been recognised at *Langsett, Roughbirchworth, Stainborough* and *Brierley Common*.

2.3 The Anglo-Saxon and Danish Viking era (c. 400-1066)

Anglo-Saxon raiders had been attacking the east coast of Yorkshire and penetrating up the rivers Tees, Humber and Ouse from the second half of the fourth century. 'Anglo-Saxon' is an umbrella term for colonists originating in northern Jutland (the Jutes who settled largely in Kent), southern Jutland

(Angles), the coastal regions of northern Germany and Holland as far as the mouth of the Rhine (Saxons), and the North Sea coast of Germany (Frisians). South Yorkshire was settled largely by Anglians. By the middle of the fifth century permanent Anglo-Saxon settlement was beginning to take place in the English countryside already populated by the Celticspeaking native population, but Anglo-Saxon settlement did not take place in the Barnsley area until the seventh century.

It is from this time that names were given in Old English (Anglo-Saxon) and this enables some idea to be formed of the mixing of the native Celtic peoples and the new arrivals. By and large the Anglo-Saxons adopted the Celtic (or pre-Celtic) names for the major rivers: in the Barnsley area the Dearne and Dove (the black one). They also commemorated the existence of some pre-existing native settlements in names such as Bretton (as in Monk Bretton and West Bretton meaning the farm of the British), and Penistone where Pen is the Celtic penno. (hill or height). The most common Anglo-Saxon place-name elements were -ton, -worth, -ley and -field meaning farm, enclosure, woodland clearing and treeless site respectively. These have given us the modern Barnsley names of Darton and Shafton, Cudworth and Dodworth, Ardsley and Tankersley, and Darfield to name but a few.

Two hundred and fifty years later another colonisation from mainland Europe, this time from Scandinavia, added another people and another linguistic ingredient to the Barnsley area. These were the Danish Vikings who began to settle permanently in Yorkshire from 875. Their settlements are recognised by such distinctive elements as - *by* (a farm, hamlet or village) as in Barnby; and as - *thorp* (daughter settlement) as in *Goldthorpe* and *Grimethorpe*; and as - *thwaite* (woodland clearing) as in *Ouslethwaite* (blackbird clearing) and *Hornthwaite* (boar clearing).

This period of colonisation by the Anglo-Saxons and Danish Vikings, covering a period of about four hundred years in the Barnsley area, was accompanied by much clearance of primary and secondary woodland as settlements were established, and arable fields, meadow and rough pasture created and expanded. Christianity had reached South Yorkshire before the arrival of the Anglo-Saxons in the seventh century and by Domesday fifteen churches were recorded. The first churches were called minster churches and their territories were very large. In South Yorkshire it is believed that churches at Conisbrough, Ecclesfield and Silkstone fulfilled this function in the late Saxon period.

2.2 Medieval History and Tudor period (1086-1600)

By the time of the Domesday survey in 1086 most of the settlements in the Barnsley area that we know today, including Lundwood, were already in existence. However, those that were in existence by 1086 were a combination of places and territories that might have been occupied since Iron Age times or before, while others would have been virgin sites or sites long abandoned until re-occupied by Anglo Saxons and Danes.

Whether in the form of farms, hamlets or villages, these settlements were populated by groups of people who largely provided for their basic needs from their immediate locality, though having some links with neighbouring settlements. In the upland areas in the west good sites were less common than in the broad vales and minor edges of the **Middle Coal Measure** country and many settlements were - and were to remain until the present day - individual farms or small hamlets in folds in the landscape and in former wooded valleys. Throughout the medieval period there was a large amount of reclamation of land for farming from ancient woodland, scrub and heath resulting in the creation of many small walled and hedged fields, particularly in the western half of the area. These are known as *assarts* and have typical names: *ley* (woodland clearing), *storth* (wood), *royd* (clearing), *stubbing* (clearing with tree stumps) and *intake* (land reclaimed from the waste).

In the *Middle Coal Measures*, the village preceding Barnsley town was to become, and to remain, the main form of settlement surrounded by its open fields, meadows and commons. In the Dearne valley, for instance, from Darton to Bolton-upon-Dearne villages were located on dry sites on gently sloping outcrops of *Coal Measure* sandstone. Water would have been obtained from wells. In the medieval period and beyond the villages were surrounded by their open fields, again sited on the gently sloping sandstone with relatively fertile brown-earth soils. Beyond the open fields on the lowest land lay meadows where hay was cut for winter feed and riverside pastures (called by their Old Norse name of

ings). In these areas, wildfowl would also have been hunted and fish caught in the River Dearne. In the highest parts of the territory of each village lay the commons and woods providing pasture, and wood and timber for fuel and building materials.

Woodland cover had been drastically reduced by Norman times and the countryside was not covered by the boundless wildwood of people's imagination. In many areas what we in the twenty-first century think of as the typical English countryside of hedged or walled fields, winding lanes, isolated farms, hamlets and villages and scattered woods was already in existence. Oliver Rackham has calculated that the Domesday survey of England covered 27 million acres of which 4.1 million were wooded, that is 15 per cent. His figure for the West Riding of Yorkshire is 15 per cent. Recent calculations suggest woodland cover in South Yorkshire was only 13 per cent at Domesday. What this means is that in the eleventh century the country generally and the Barnsley area in particular were relatively sparsely wooded even by twenty first century standards.

All the woodlands in the area are described in the Domesday Book as *silva pastilis* or wood pasture. What this means is that they were exploited for their wood and timber while at the same time being open to grazing throughout the year. This situation was appropriate only while woods remained extensive and the population small. Documentary evidence suggests that coppice management had replaced wood pasture as the dominant type of woodland management in South Yorkshire by the end of the fifteenth century.

By 1200 most villages had a church or a chapel of ease, probably still in timber, built usually by the local lord of the manor, although some churches were 'multi-manorial', built at the expense of a number of landowners. Because the priest's living was based on a tenth (a tithe) of all the produce of the lord and his tenants, there emerged a pattern of churches with surrounding townships or parishes, the parish or township providing the tithe and the congregation. In the Barnsley area the parishes were mostly large whether on the *Millstone Grit* or the *Coal Measures* and contained subsidiary townships as in the parish of Penistone, for example, which contained the subsidiary townships of Gunthwaite, Denby, Ingbirchworth, Oxspring, Hunshelf, Langsett and Thurlstone, and the parish of Darfield with its subsidiary townships of Wombwell, Worsbrough, Billingley and Great and Little Houghton.

Monastic influence was significant in the development of the area in the medieval period. Monk Bretton Priory was established in 1154, which included the conurbation of what is now *Lundwood*. The influence of monastic establishments was felt far beyond their precincts. Monastic establishments from outside South Yorkshire were also major landowners and entrepreneurs in the Barnsley area. Nostell Priory had land in *Great Houghton* and *Thurnscoe*, and in the twelfth century, Rievaulx Abbey obtained the rights to the ironstone and the woods for making charcoal in the manor of *Stainborough*. It is also likely that *Dodworth*, which had been presented to Pontefract Priory about 1090 by the Norman lord, Robert de Lacy, was re-planned by the monks.

The town of Barnsley's development was also greatly influenced by its monastic ownership during the medieval period when it emerged as the major settlement of the area. The town had been presented by the Norman lord to the Monks of the Priory of Pontefract about 1150 and they obtained a market charter for the town in 1249. From its original site in Old Town, the town spread down Market Hill, across the Sough Dike to Cheapside and May Day Green. Coal mining was first recorded in Barnsley in 1313 and iron founding had become the staple industry of the town by 1380.

Medieval deer parks were symbols of status and wealth. They were created by kings, by the nobility, by bishops and by the heads of monastic institutions. As all the deer belonged to the Crown, from the beginning of the thirteenth century it was necessary to obtain a licence from the king to create a park. A 'grant of free warren' was given which gave a landowner a general right to hunt on his demesne (the land on his estate which was not in the hands of tenants), and this general permission was often converted into the creation of a specially enclosed area: the deer park. In the Barnsley area there were five medieval deer parks (at Wortley, Tankersley, Stainborough, Woodhall (Wombwell) and Brierley) and seventeen grants of free warren where it is not known whether or not a park was created.

2.3 The Post-Medieval period (1600-1800)

The agricultural landscape underwent considerable change in this period. The break-up of the open field system was under way in some localities before the end of the medieval period and there was considerable *enclosure* in the Tudor period throughout the country. By the middle of the eighteenth century with a rising population, rising prices for agricultural products, agricultural innovation and increasing regional specialisation there was a movement to enclose the remaining open-field land and associated meadows and commons. This last round of enclosure was achieved by thousands of private acts of parliament. This was the so-called 'parliamentary enclosure' which was accompanied by the building of new farmhouses amongst the new allotments. In some villages all the open field had already been enclosed by 1750 (as at Darfield, Wombwell and Billingley, for example) and only commons needed to be enclosed, while at Bolton-upon-Dearne, for example, three major open fields were still in existence. The new allotments, recognised by their regular shapes, were enclosed by single-species (hawthorn) hedges and stone walls – most clearly seen today in the area west of Ingbirchworth.

The seventeenth and eighteenth centuries were periods of re-building of the common people's cottages and farms (increasingly of stone with stone roofs rather than timber and thatch) and the country houses of the gentry and aristocracy.

Mid- and late seventeenth century houses of note are Bullhouse Hall near Penistone, an atmospheric building constructed of sandstone ashlar blocks with a series of steep gables and mullioned windows, and Cannon Hall, built for the Spencer family, leading members of the syndicate that almost monopolised the charcoal iron industry in South Yorkshire and North Derbyshire. Of the present Cannon Hall, the central five bays, two and a half storeys high and topped by a balustrade, are of late seventeenth century date. At a smaller scale is Houndhill, a partly timber-framed manor house. The eighteenth century saw the building of a number of country houses in local stone including most notably Wentworth Castle and Wortley Hall. These two houses, together with Cannon Hall and **Bretton Hall**, were surrounded by newly designed parks created under the influence of contemporary landscape designers as aesthetic extensions to the country house.

Industrial development in this period included small-scale but widespread **coal mining** near the outcrops of the Silkstone and Barnsley seams. **Ironstone** was also mined from bell pits. Also, of importance at water powered sites were forges and wire mills, of which *Wortley Top Forge*, dating from 1727, survives in a restored state. There is also a surviving charcoal fired blast furnace at Rockley that was erected in 1652. South Yorkshire was also noted for its leather tanning industry in the seventeenth and eighteenth centuries with the most important tanneries located in or near the villages of Cawthorne, Dodworth and Silkstone. One consequence of the growing importance of iron manufacturing and of the presence of the leather industry, was that the coppice management of surviving woodlands entered a golden age, providing, on a 20-25 cycle, cordwood for charcoal making, oak bark for leather tanning, and wood and timber for a myriad of small crafts. Many of these former coppice woods survive, most notably in a wide belt in the **Lower Coal Measures** and western part of the **Middle Coal Measures** from Wortley in the south to Cawthorne in the north. Sunny Wood, adjacent to the proposed development is an example of such.

Linen manufacturing was introduced to Barnsley in 1774 by Quakers from Cheshire and its steady growth ousted wire drawing from its position as the town's main manufacturing industry. Although the world's first steam-powered mill was established in Leeds in 1792, the weaving of the yarn into linen fabrics was still mainly a domestic industry until the second half of the nineteenth century. The first power loom in Barnsley did not begin production until the 1830s and linen weaving on power looms in mills did not become the main means of production in the town until well into the 1860s. Until then most linen was made on handlooms (worked by manual labour) set up in a loom-shop in the cottage of a domestic weaver.

The large-scale exploitation of the massive coal reserves of the *Middle Coal Measures* required easy access to markets within and beyond South Yorkshire. It was canals which began a long period of industrial development, population growth and settlement expansion. However, it was not until the

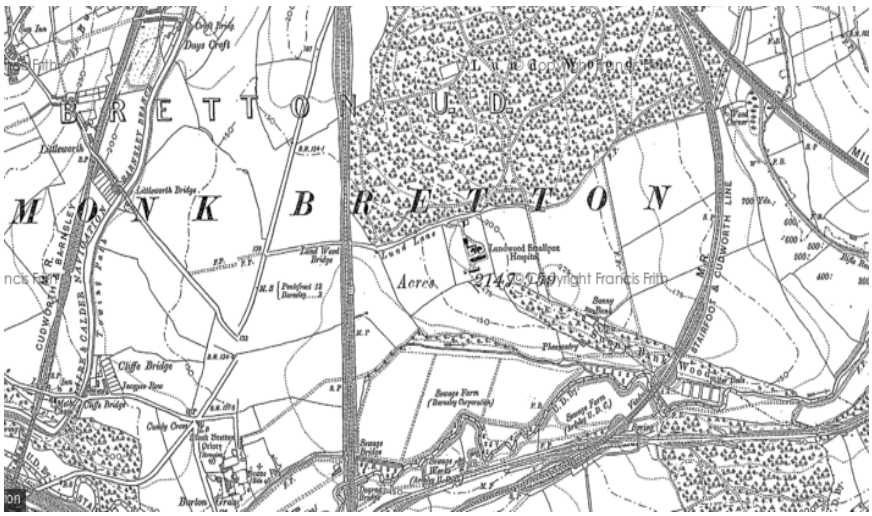
1790s, with the opening of the **Dearne & Dove Canal**, that large areas of the coalfield where the Silkstone and Barnsley seams outcropped, were opened-up on any scale.

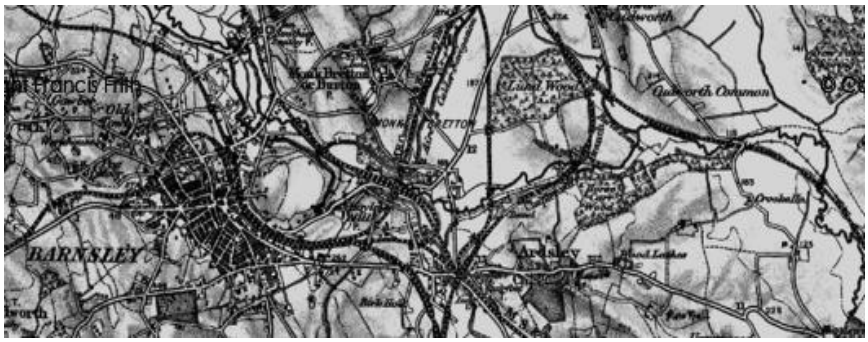
2.3 The Nineteenth Century

Despite various trading setbacks in the three decades up to 1847 Barnsley became one of the greatest centres of linen production. At the time of the 1851 census Barnsley contained the greatest concentration of domestic linen weaving in Yorkshire, with over 4,000 handlooms located in the town in nearly 800 loom-shops. Domestic linen weaving was also established in neighbouring villages such Cawthorne, Dodworth, Monk Bretton and Worsbrough Common. The linen weaving industry in the district steadily became a factory industry in the second half of the nineteenth century, with spinning mills, bleachworks and calender-works (where the cloth was rolled, smoothed and glazed). But while the industry prospered elsewhere (in Belfast, for example,) the industry in Barnsley failed to respond to new requirements and began a steady decline. By 1911 what had become a factory-based industry employed only 775 persons, mostly girls and women.

Important as the canal system was in the late eighteenth and early nineteenth centuries in opening up the coalfield and launching the area comprehensively into the Industrial Revolution, it was the coming of the railways, complemented by technological advances in shaft sinking, ventilation and underground haulage, that ensured that industrial development would continue to take place on a large scale.

The railway network, completed over a period of about seventy years, was complex. There was a flurry of development by competing companies in the 1840s and 1850s and then another major development in the 1880s. The network was completed in the early 1900s. The period from 1861 to 1881 saw the opening of seventeen deep shaft collieries in the Middle Coal Measures with the attendant growth of population and the engulfment of former agricultural villages by miners' cottages. By the end of the century in many parts of the Coal Measure country the whole landscape was dominated by the coal industry. Coal mining continued to be the major employer in the Barnsley area until the last quarter of the century, almost exclusively through continued production from collieries originally sunk in the second half of the nineteenth century. As late as 1969, there were 21 collieries in production within the boundaries of the present Metropolitan Borough employing almost 20,000 men. Today there are none. Monk Bretton Colliery (probably the nearest mine to Sunny Bank) originally opened in 1870 extracting coal from the Barnsley Seam, until its closure in 1968.

Dates	On site (salient)	Description
1851-1890	All of the site	*Agricultural Land* – featured on OS Maps of 1891 as Common fields. 

1896	All of the site	OS County Maps show the subject site as FIELDS 
1903	All of the site	OS County Maps show the subject site as FIELDS 
1924	All of the site	OS County Maps show the subject site as FIELD 
1947	All of the site	OS County Maps show the subject site as FIELD 

***[*From the above records it is clear that the development site has been predominantly agricultural fields from before c.1800 until 1947, then used solely as utility land for agricultural garaging / storage from c.1985 right up to present day*].**

Dates	Off site	Description
650BC-	In proximity	*Earliest evidence of human habitation of the area dates to the pre-historic period with flint tools and stone axes found on the moors and earthworks at Denby Common, Langsett and Roughbirchworth. Other indicators are marked on old Ordnance survey maps as 'Castle Hill' or 'Castle Dyke' and provide clues about early settlers within the area. Iron Age burials are unknown, but the sites of four surviving hill or hill-slope forts have been recognised at Langsett, Roughbirchworth, Stainborough and Brierley Common.*
1086 - 1150	In proximity	*The first reference to Barnsley occurs in 1086 in the Domesday Book, in which it is called Berneslai and has a population of around 200. The origin of the name Barnsley is subject to debate, but Barnsley Council claims that its origins lie in the Saxon word "Berne", for barn or storehouse, and "Lay", for field. The town was in the parish of Silkstone and developed little until in the 1150s when it was given to the Pontefract Priory. The monks built a town where three roads met:* *the Sheffield to Wakefield, Rotherham to Huddersfield and Cheshire to Doncaster routes.*
1154	In proximity	*The Domesday village became known as Old Barnsley, and a town grew up on the new site. Originally a monastery under the Cluniac order, Monk Bretton Priory is located in the village of Lundwood, in the borough of Barnsley, England. It was founded in 1154 as the Priory of St. Mary Magdelene of Lund by Adam Fitswane, sited on the Lund, from Old Norse. In the course of time the priory took the name of the nearby village of Bretton to be commonly known as Monk Bretton Priory.*
1249	In proximity	*The monks erected a chapel of ease dedicated to Saint Mary, which survived until 1820 and established a market. In 1249, a Royal charter was granted[4] to Barnsley permitting it to hold a weekly market on Wednesdays and annual four-day fair at Michaelmas. By the 1290s, three annual fairs were held. The town was the centre of the Staincross wapentake, but in the mid-16th century had only 600 inhabitants.* 
1350	In proximity	*John de Birthwaite was Prior of Monk Bretton in 1350. In that year Sir William de Notton, a powerful local landowner, who was later Lord Chief Justice of Ireland, and his wife Isabel, conveyed to him lands at Fishlake, Monk Bretton, Moseley and Woolley. The purpose of the grant was to build a chantry chapel at Woolley Church. Notton directed that prayers were to be said for the souls of himself, Isabel, their children, and also King Edward III, Queen Philippa of Hainault and their children. The date of the grant suggests that Notton made the grant as his way of giving thanks for England's deliverance from the first outbreak of the Black Death.* 

1850-1869	In proximity	*The first passenger station to serve Barnsley was opened by the North Midland Railway in 1840. Barnsley station (latter called Cudworth railway station) was located some 2½ miles away at Cudworth. On 1 January 1850 the Manchester and Leeds Railway opened Barnsley Exchange station, close to the town centre. On 1 May 1870 the Midland Railway opened Regent Street station, a temporary structure. A new station was opened by the MR on the Regent Street site on 23 August 1873. As it incorporated the old court house in its construction Regent Street station was renamed Barnsley Court House station.*
1850 - 1900	In proximity	*The 19th century was a period of dramatic change for the area. The Enclosures Act of 1819-1826 transformed the countryside by the division of the commons and wastes into the rectangular, stone walled fields that are now a feature of the landscape. At this time Penistone is listed as having acreage of 420 made up of commons, fields and wastes and in 1801, the population of the town was a mere 493. At the same time new textile mills along the banks of the River Don and Dearne were changing the local economy and attracting new settlements alongside them. The mid-19th century saw the development of railways and steelworks. The Manchester, Sheffield and Lincolnshire railway was completed in 1837 and the arrival led to an expansion of Penistone.*  *Penistone High Street - c. 1900*
1869-1938	In proximity	*Barnsley became a municipal borough in 1869, and a county borough in 1913. The town's boundaries were extended to absorb Ardsley and Monk Bretton in 1921 and Carlton in 1938.* *In 1845 the Woodhead Tunnel (at that time the longest in Britain) opened. Steam trains took a steady supply of coal from the South Yorkshire coalfield to Lancashire and Cheshire. So important was the line that in 1954 it became the first in the country to be electrified. Now it lies abandoned, converted in part into a long-distance walk between the Pennines. The Penistone Viaduct (NHLE 1286798) was also built at this time to carry the line across the River Don and its valley. This viaduct is a grade II listed structure but has not remained intact since its original construction. In the February of 1916, the second and third arches collapsed and a locomotive plunged into the valley below. A further railway was built, the Huddersfield and Sheffield Junction line in 1850. This allowed even more traffic to go through Penistone and businesses were soon aware of the potential of Penistone for industry.*  *Cattle market on St Mary's Street - c. 1901-1914*

1961	In proximity	*Lundwood Waste Water Treatment Works is an existing Yorkshire Water (YW)Waste Water Treatment Works constructed circa1960 in the village of Lundwood, 3.2km east of Barnsley, South Yorkshire. The site is bounded by the River Dearne and fields to the east and by housing to the North and to the North East.* 
2017 - 2019		*Yorkshire Water (using Contractor Interserve Plc) carried out a £20 million refurbishment project which made the Lundwood Sewage Treatment Works in Barnsley one of the most efficient Waste Water Treatment Works (WwTW) in the region.* *The site, which was built in 1961, serves a population of around 100,000 customers and businesses in the area.*  *The work took 2 years and involved a major overhaul and the construction of a new activated sludge treatment process and the removal and reinstatement of the existing filter beds. In addition, a new inlet was built, fitted with a new, state-of-the-art odour control unit.*

2.4 Summary of Past Usage

The proposed development site at Sunny Bank Farm,Lund Lane, Lundwood, Barnsley, S71 5PA, has been predominantly **AGRICULTURAL FIELDS** from initial settlement to the late 1950's where its agricultural usage sustained up until the 1980's / 1990's when the existing barn structures (buildings 2 & 3) were likely erected. The construction of building 1 suggests a previous residential use, but records are inconsistent, and in any event, it is highly likely that this would have been related to agriculture.

2.5 Geology (by Research)

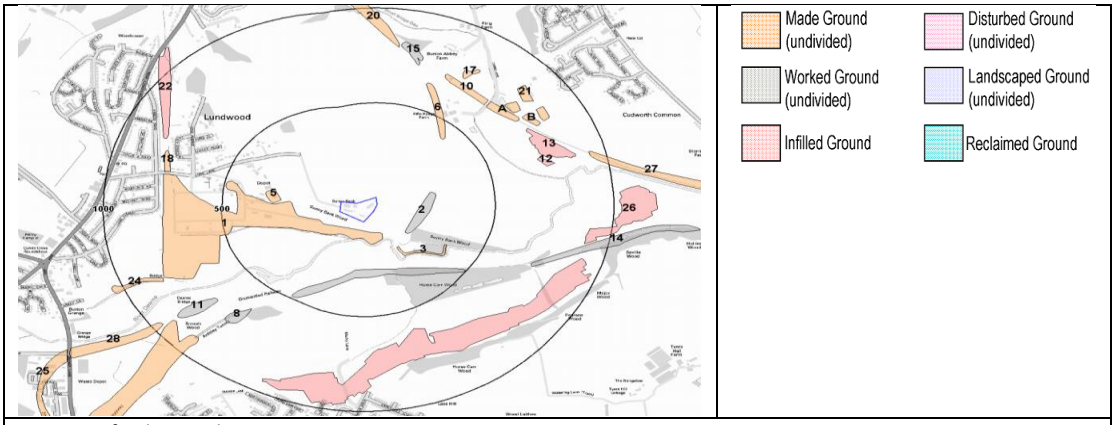


Fig 8 – Artificial Ground Map – 1:10,000 BGS Mapping

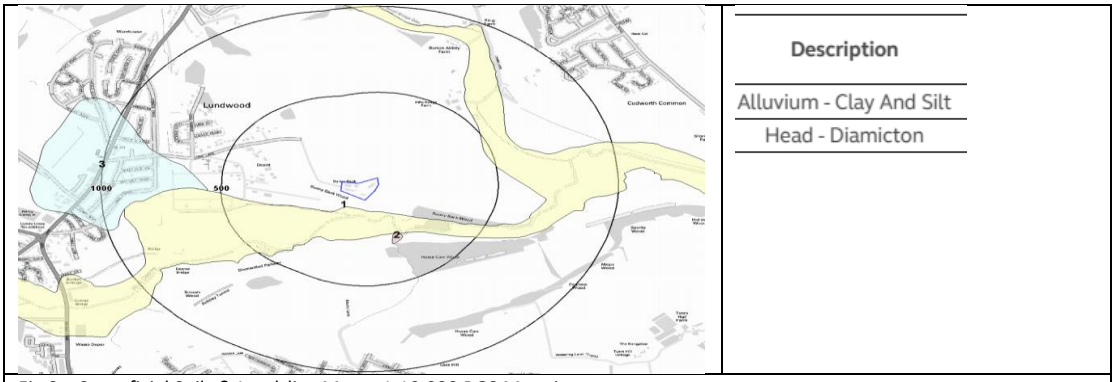


Fig 9 – Superficial Soils & Landslips Map – 1:10,000 BGS Mapping

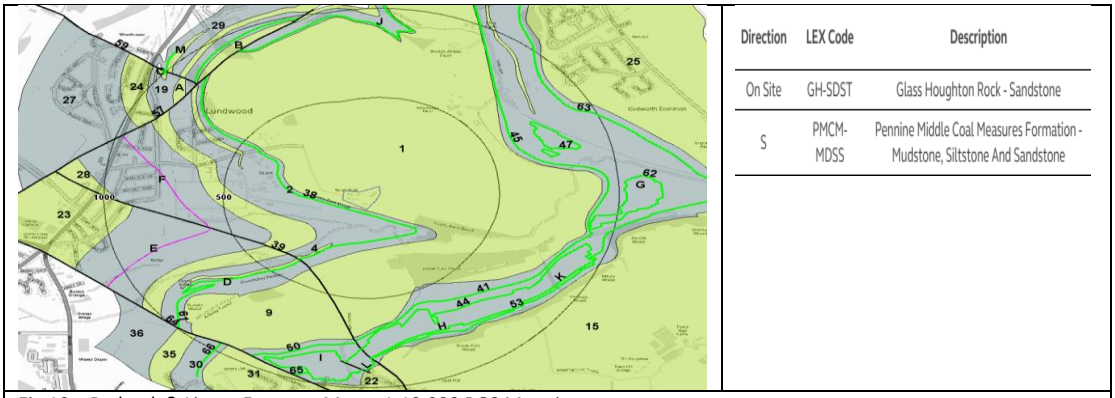


Fig 10 – Bedrock & Linear Features Map – 1:10,000 BGS Mapping

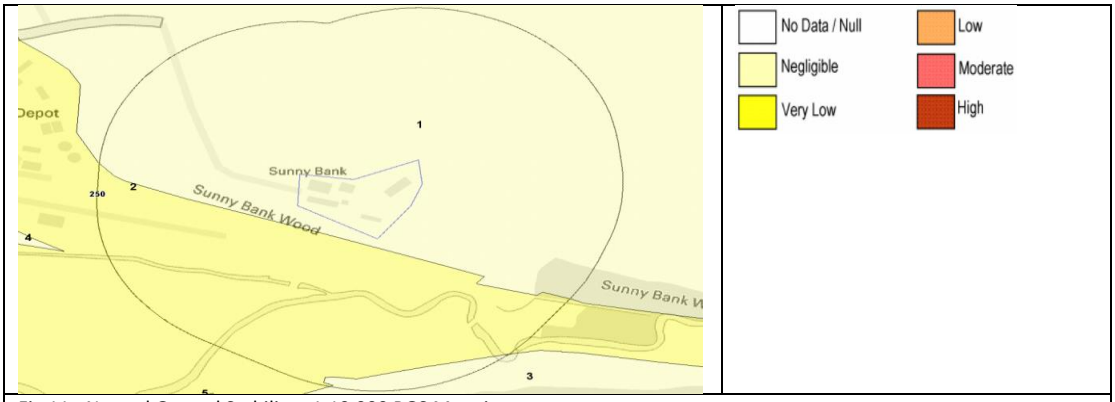


Fig 11 - Natural Ground Stability - 1:10,000 BGS Mapping

The bedrock geology is a mixture of *Glass Houghton Rock*, which is a sandstone formation, as well as the *Pennine Middle Coal Measures Formation*, which is a mixture of mudstone, siltstone and sandstone containing **coal measures** and marine fossils. The sandstone within the area may have historically been quarried in locations off-site, and the location is known to be dominated by coal mining activity.

No *Made Ground* is identified beneath the study area, however superficial soils in the study area are known to be loamy - sometimes mixed with clay or peat – and range from low to very low fertility. Centred on Barnsley is a loam/clay mix which is seasonally wet in low lying areas and acidic and suited to grass production. To the west of Barnsley, the soils become less acidic and freely draining, supporting a range of spring and autumn crops, as well as a longer grazing season.

2.6 Geology (by Walkover Survey)

The site was surveyed on Saturday 9th March 2019 by Mr T. M. Hyett MSc FGS MCIOB MIEI, a Chartered Consultant Engineering Geologist. The purpose of the walkover survey was to generally identify the undisturbed near surface geology; observe any open excavations in proximity, and comment on the potential for contaminants in the soils that could be expected, either at foundation depth (if new foundations are to be excavated) or at typical drainage depths etc., as well as providing advice to the owner on the suitability of the ground generally for the construction of the proposed development.

The topography of the site is generally flat and there is no evidence of unstable slopes, subsidence, compressible soils, swelling soils or weak soils in the immediate proximity of the proposed and/or existing building(s). From field observations, the general near surface geology can be assumed to consist:

> "TOPSOIL (and some MADE GROUND) around the existing buildings: *brown compacted sandy gravels – gravels are likely to be angular coarse sandstone, occasional brick, ceramic, clinker*." (ARTIFICIAL FILL DEPOSIT) is possible with a thin covering approximately 100mm to 150mm thick, overlying natural *"yellowish brown, firm to stiff slightly silty CLAY with sands and gravels – gravels are angular tabular fine to medium sandstone and mudstone litho-relics."* (GLACIOFLUVIAL DEPOSITS)."

There was no unusual colouration or odours to any of the soils encountered in 'open' and 'exposed' positions and/or nominal excavations during the walkover investigation and no evidence that the site had any previous heavy industrial/engineering use and no visual indicators to suggest the presence of hazardous contaminants in high (or any) concentrations, or any evidence of high (or any) concentration of *oils, lubricants, sulphates, asbestos (chrysotile, amosite, tremolite, actinolite or ferroactinolite), radon gas, methane, high concentrations of carbon monoxide, hydrogen sulphide* or *carbon dioxide*.

From consulting *Geological Map Extracts* from the BGS -*British Geological Survey* (specifically 1:10560 scale sheet 261SW and 1:50,000 scale sheet 86) the superficial deposits IDENTIFIED IN THE TRIAL HOLES overly the natural bedrock consisting "*Weathered Sandstone*" (GRENOSIDE SANDSTONE and PENISTONE FLAGS SANDSTONE) and "*Weathered, moderately strong Mudstone, Siltstone and Sandstone*" (PENNINE LOWER COAL MEASURES FORMATION). The Penistone Flags is a prominent sandstone which can be expected to have weathered to a gravelly sand or sandy gravel in the near surface.

<u>Contamination Assessment Objectives</u>.

The aim of the walkover investigation was to make a preliminarily assessment of the level of any contamination on the site in order to determine if there was any significant risk associated with contaminants in respect of both human health and the environment, including controlled waters

Investigation and some limited index testing were carried out under the full-time supervision of a Chartered Engineering Geologist (CGeol) and Fellow of the Geological Society (FGS). All the observable soils (below topsoil levels) were screened for visual or olfactory evidence of contamination incl. the presence of VOCs. No Trial Pits were carried out during this Phase I Non-Intrusive investigation.

Contamination Assessment & Approach to Considering need for Laboratory Testing.

In April 2012, Defra published new Statutory Guidance which forms a major part of their contaminated land regimes under *Part 2A of the Environment Protection Act 1990*. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

In the past there has been considerable uncertainty over how to decide when land is, and is not, contaminated land on grounds of the legal test of significant possibility of significant harm to human health or the environment – to help address this, one of the main changes set out in the new *Statutory Guidance*, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of significant possibility of significant harm to human health. Under the new four category test:

- Category 1 - describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 - cover less straightforward land where more detailed consideration is needed before the regulator can decide either:

  (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or

  (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 - describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations. The new Category 4 (C4SLs) test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime. The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

a. Land where no relevant contaminant linkage has been established.

b. Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise i.e. land with normal background concentrations in the soil.

c. Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

d. Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

For the purposes of this report, it is taken that the C4SLs are intended as 'relevant technical tools' to help local authorities and others when deciding to stop further assessment of a site, on the grounds

that it falls within Category 4 (Human Health). The Impact Assessment which accompanied the revised Statutory Guidance (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *'The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land'.*

A key distinction between the previous guidance (i.e. using *Soil Guideline Values* (SGVs)) and the C4SLs is the level of risk that they describe. The Environment Agency (EA) consider that; 'SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health'. C4SLs, therefore, should not be used as a legal trigger for the determination of land under Part 2A.

As such, the approach taken in this report follows the **2014 CL:AIRE (Contaminated Land: Application in Real Environments) guidance** published in the document '*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*' which lists the following C4SLs;

Analyte	Residential (with home grown produce) (mg/kg)	Residential (without home grown produce) (mg/kg)	Allotments (mg/kg)	Commercial (mg/kg)	PoS (mg/kg)
Arsenic	37	40	49	640	79
Benzene	0.87	3.3	0.18	98	140
Benzo(a)Pyrene	5.0	5.3	5.7	77	10
Cadmium	22	150	3.9	410	880
Chromium (vi)	21	21	170	49	21
Lead	200	310	80	2300	630

From **RESEARCH** (specifically the Geo-Insight Report GS-5867801) the **Estimated Background Soil Chemistry** within 250m of the study area boundary is acceptable, and suggestive of the following:

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
6.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
27.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg

From the **WALKOVER SURVEY**, there was **NO EVIDENCE** that the site had any previous heavy industrial/engineering use - there was an indication that very low quantities of fuel may have been stored periodically on the site (ostensibly because agricultural equipment may have been stored) but there were no visual indicators to suggest the presence of hazardous contaminants in high (or any) concentrations, or any evidence of high (or any) concentration of *oils, lubricants, sulphates, asbestos (chrysotile, amosite, tremolite, actinolite or ferroactinolite), radon gas, methane, high concentrations of carbon monoxide, hydrogen sulphide* or *carbon dioxide*.

In my professional opinion, as a qualified Chartered Engineering Geologist (CGeol FGS) there is **NO REQUIREMENT** to further investigate the soils at pre-planning stage for **Contamination**.

2.7 Hydrogeology

Groundwater was not observable in any locations surrounding the site, which sits at an elevation of c.50m above sea level. It can be reasonably assumed that ground water level is below the zone of influence of the existing foundations (which are unaffected by the proposals) and/or below any potential new drainage connection trenches. There was no evidence of soils of high leaching potential, no evidence of abstractions or springs on current mapping, and no evidence of a perched water table and/or artesian pressure within the soil at shallow depth.

Vegetation on the site is abundant but consisting mainly of shrubbery occurring as overgrowth around the perimeter of the site and around the buildings. There are no established trees or vegetation that might be affected by the proposed works, nor is the vegetation likely to adversely affect the redevelopment works as proposed.

Evidence suggests a level water table at depth with a stable, consistent soil type comprising mainly COHESIVE SOIL (Clay) overlying BEDROCK of *Sandstone* (Glass Houghton Sandstone and the *Pennine Middle Coal Measures* formation. No problems are envisaged with swelling or shrinkage of soil due to the movement of groundwater and the propagation of trees, vegetation and flora.

Groundwater, whilst not observed in any significant quantity (or at all), if found to be present at deeper elevations (if applicable) can reliably be estimated from empirical data to be in the region of between pH 5.5 – 7.0 representing a *low risk* in terms of acidic ground and potential sulphate attack on existing concrete and cement mortars.

2.8 Natural Ground Stability

A written ***Geo-Insight Report (GR-5867801)*** was commissioned to consider if there are any natural geological hazards in the vicinity of the site that could be contributing to ground instability in the area. The BGS Geo-Insight Report is attached at Appendix A. The report confirms that;

> There are no significant natural ground instability issues indicated in the vicinity of the site: namely weak or unstable rocks that could slip downhill on steep slopes (greater than c. 5 degrees) or into excavations ('Landslides (slope instability)') (LEVEL C).

However, there is one significant physical feature within 250m of the site - an abandoned historical railway tunnel some 176m to the south-east of the development. [* Note - *this is not necessarily an adverse factor, based on the development proposals, but it may be significant if further borehole drilling is concluded/recommended*].



Fig 12 – Approx. Position of abandoned railway tunnel - 1:10,000 BGS Mapping

ID	Distance (m)	Direction	NGR	Details	Date
1A	60	SW	438339 406853	Railway Sidings	1951
2A	62	SW	438341 406851	Railway Sidings	1948
4A	69	SW	438348 406846	Tramway Sidings	1931
3	88	SW	437709 406788	Railway Sidings	1966

What does this mean?

This means that the project site is situated in a location where there is no known ground instability that could cause existing or new build properties to suffer subsidence damage, however - therefore there are no special measures required, and the existing foundations should suffice for the proposed dwelling(s). There is NO IMMEDIATE requirement for any further site investigation using intrusive boreholes, and foundations (where required) should be able to be designed using observations from the foundation trenches etc. However, it should be noted that any residential dwelling house warranty provider (such as NHBC) may still require a more formal Geotechnical Investigation Report (GIR) for building warranty purposes.

There is no evidence of *running sands*, and no specific need to check for *plasticity of clay soils* (PI). It is not likely that any *collapsible* (loessic) deposits will be encountered and the buildings' foundation loads are unlikely to exceed the *safe bearing capacity* of the soil during or after construction as observed.

Of some note, the BGS Records confirm that there are 2No. existing boreholes within 250m of the site boundary, and it is recommended that these boreholes are procured from the British Geological Survey.

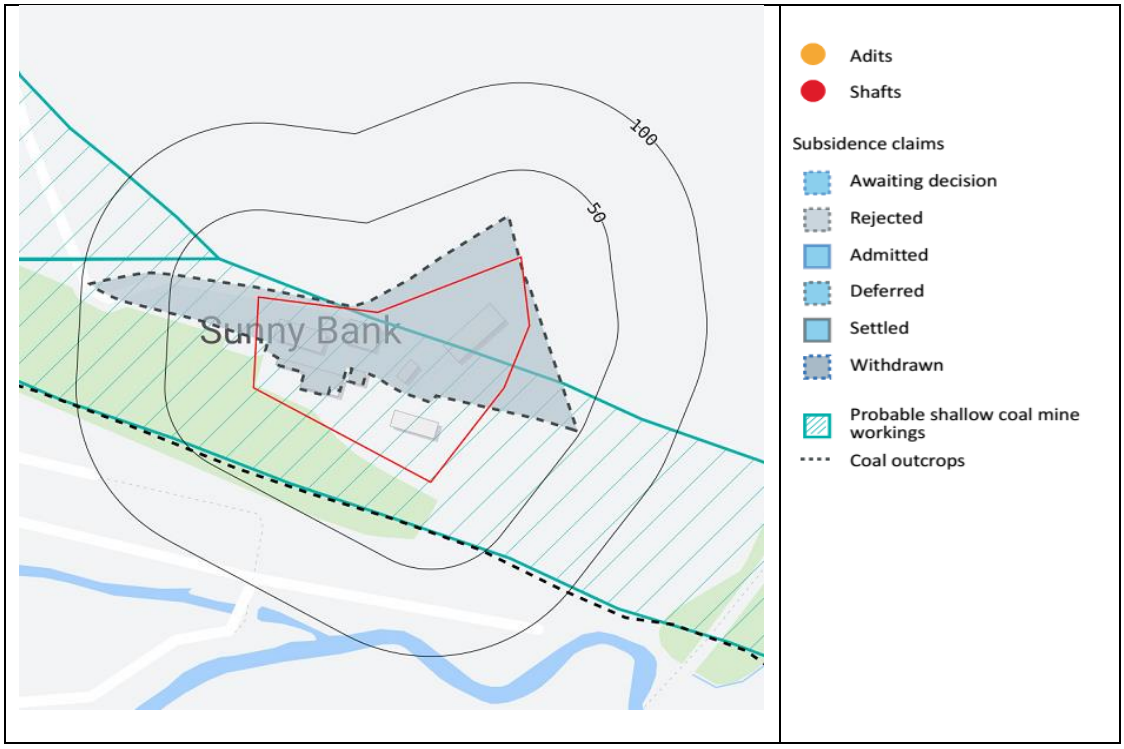
ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	230.0	SE	438711 406819	SE30NE59	503.83	SUNNY BANK
2	245.0	S	438405 406633	SE30NE48	-1.0	HUNNINGLEY 132 KV LINE SITE INVESTIGATION

[*Note – *foundation analysis should be checked using more accurate soil parameters checked during the Construction Phase (or) via Local Authority Building Control, should new structural foundations be required) - but no extensive laboratory testing is necessary to determine soil shear strength, moisture content, plastic limit, liquid limit* and *plasticity index etc., in accordance with BS1377*].

2.9 Mines

A written ***Coal Authority - Non-Residential CON29 Coal Mining Report*** was commissioned to consider if the property is within an area that is in the likely zone of influence from past mine workings. The Report confirms the site is within a **POTENTIAL RISK** area and is within a likely zone of influence from historic mine workings. The Coal Authority Report – *Non-Residential Coal Authority Mining Report* (No. 51002054591001) is enclosed in Appendix B. Specifically, the Report confirms that;

> The property lies within the potential zone of influence of recorded workings in 9 seam(s) of coal. The most recent underground working in the area was in 1991. These workings lie between 145 metres and 605 metres. Any ground movement due to this coal mining activity should have stopped.
>
> **The property is indicated to lie in an area where coal deposits have been worked at shallow depth in the past but for which no plan exists.**



In addition, The Coal Authority has evidence of a damage notice or subsidence claim for the property (or within 50m of the property) since 31st October 1994:

Distance	Type	Reference	Address	Claim date	Status	Status reason	Claim value
0	TCA	S91004-CI	SUNNY BANK FARM LUND LANE LUNDWOOD BARNSLEY S71 5PA	-	02 - Rejected	-	-

What does this mean?

This means that there is an identifiable risk of significant hazards relating to past mining on the site, and specifically the Coal Authority specifically state:

> We consider there to be a potential risk to the property from past coal mining activity. For further details refer to: Past underground coal mining, Coal mining subsidence claims.

For the purposes of Local Authority Planning Application, this means that there **is a requirement** to carry out a Coal Mini9ng Risk Assessment - primarily to assess the potential for shallow mine workings beneath the site.

Coal Mining Risk Assessment

Sources of information: Coal Authority CON29M Coal Mining Report (Ref: GS-5867802); Earth-Tech Consulting Ltd archive records; Published British Geological Survey 1:50,000 Mapping - Coal Authority Datasets available under the Open Government Licence v3.0.

Assessment of Cumulative Impact of Mining Issues:

- This risk assessment has identified the principal potential risks to the proposed development to be the possible presence of **unrecorded shallow mine workings** and **unrecorded mine entries**.

- The CA mining report does not identify any mine entries within the development area or within 20m of the site boundary. It should be noted, however, that the potential exists for unrecorded mine entries to be located within the site, and construction work should proceed cautiously, recognising that unstable entries could be present.

- The Inspection of the published geological mapping indicates that the property is indicated to lie in an area where coal deposits have been worked at shallow depth in the past but for which no plan exists. The nearby Monk Bretton Colliery accessed the Barnsley (or *Top Hards*) Seam; this was arguably the most important seam in the coal field, but between the *Barnsley* seam and the *Swallow Wood* seam there are numerous thin seams of coal to be found. These coalesce to form the *Dunsil* seam (a poor-quality coal with a high ash and sulphur content) the outcrop of which is confused by numerous faults but can be seen near Wentworth Park, for example.

- There is potential for this seam (and possibly the *Ryder* seam: a thin band which lies 15m to 30m above the main *Barnsley* seam) to be present at shallow depths and the potential for voiding to be present within the mining horizon. Mitigation measures, including investigation and stabilisation as necessary, would be recommended to facilitate secure development.

- The investigation would be expected to comprise, as a minimum, the drilling of one borehole per proposed dwelling footprint (i.e. in this case 3No. boreholes) to investigate the potential presence of any potential voiding. If coal or voiding at the mining horizon/coal seam is discovered, then a stabilisation programme by drilling and pressure grouting would likely be required to cover the proposed built development footprint.

Prior to carrying out any works which may intersect, disturb or enter any coal seams, coal mine workings or mine entries (within the ownership of the Coal Authority), the written permission of the Coal Authority shall be obtained (www.coal.gov.uk/services/permissions/index.cfm).

2.10 Radon

A written ***British Geological Survey (BGS) Geo-Report - Radon Report: England and Wales*** was commissioned to consider the general ground conditions in the vicinity of the site and check whether the site is in a radon effected area, and whether Radon protective measures (basic or otherwise) are required for the proposed new building.

The Report confirms that;

Question: Is the property in an area where radon protection measures are required for new properties or extensions to existing ones as described in either publications BR211 (England and Wales) or BR376 (Scotland) by the Building Research Establishment?
Answer: **No radon protective measures are necessary**.

But,

Question: Is the property in a Radon Affected Area as defined by Public Health England (PHE) and if so what percentage of homes are above the Action Level?
Answer: **The property is not in a Radon Affected Area**, as less than 1% of properties are above the Action Level.

What does this mean?

This means that the project site is situated in a location where there is no possibility that Radon gas above actionable level will be encountered. No protective measures (such as conventional *Radon barriers* etc.) are required in strict accordance with *CON29 Standard Enquiry of Local Authority 3.13 Radon Gas: Location of the Property in a radon Affected Area* but it may be prudent for the owners to give some consideration to basic, inexpensive measures during any new-build construction, although I acknowledge that the proposed development is not a new build: The BGS Geo-Report: *Radon Report: England and Wales* (Report No. GS-5867800) is attached at Appendix C.

PART 3 CONCEPTUAL MODEL

3.0 Sources, Pathways & Receptors

Sources	• No hydrocarbons presently stored on site • Very low to extremely low probability of hydrocarbons previously stored on site in past 100yrs • No probability of hydrocarbons migrating from off site in the past 50yrs • Low probability of chemicals stored on site in the past 50yrs • Low probability of metals stored on site in the past 50yrs
Pathways	• Ingestion of contaminated soils • Inhalation of contaminated soil dusts • Inhalation of vapours • Dermal contact with contaminated soils • Leaching/migration of controlled water
Receptors	• Site workers • Site visitors • Groundwater/wider environment

3.1 Risk Assessment Summary

An **EXTREMELY LOW** risk of vapour inhalation by site workers is possible (as is the case with all sites where former mechanical equipment may have been stored). There is always a *very minor* risk of possible contamination of groundwater by hydrocarbons (*extremely low* in this case) due the possible historic presence of fuels and combustibles in very small quantities (i.e. for agricultural vehicles etc.). However, these risks would only manifest if physical evidence of hydrocarbon contamination in the underlying soil was detected/observed during construction. In the ***highly unlikely*** event that this occurs, it should be checked in the laboratory using chemical analysis testing of soil samples, but in my opinion, it is highly unlikely that hydrocarbons will be present in significant or high concentrations.

During the course of the walkover survey, and from field observations, there was **NO EVIDENCE** that the near surface soils contained any quantities of medium or high risk contaminants - in particular there were no visual indicators of the presence of high concentrations of *oils, lubricants, sulphates, asbestos (chrysotile, amosite, tremolite, actinolite or ferroactinolite), radon gas, methane, high concentrations of carbon monoxide, hydrogen sulphide* or *carbon dioxide*. In my professional opinion there is no requirement to further investigate or test the soils for contamination in the laboratory.

PART 4 CONCLUSIONS & RECOMMENDATIONS

4.0 Conclusions – Potential Land Contamination.

Regarding **Potential Land Contamination**, the site is assessed to present an ***extremely low*** risk of contamination from evidence of its historic use. Records (and observations) indicate the site was predominantly fields and agricultural land dating back at least as far as 1800 and there is ***no evidence*** that the site had any association with any industrial usage. The site remained field until the 1980's / 1990'2 when the more recent agricultural barns were constructed. As such, in my opinion, there is ***no risk*** of contamination from any previous or current use:

a. An ***extremely low*** possibility exists that hydrocarbon contamination (if later found) could have an mild adverse impact on site workers during construction, and it is recommended that this extremely low risk nonetheless be mitigated by the usual adoption of basic safe working procedures and the use of appropriate PPE, as can be expected of any reputable builder in his normal construction method statements and risks assessments etc.

b. It is ***not likely*** that hydrocarbons (if later found) would adversely impact controlled waters due to the unlikely presence in high concentrations from domestic garaging, and due to the nature and general lack of continuity of groundwater beneath the site.

c. Based on the information collected, and from observations, soil description and classification can be performed sufficiently adequately in accordance with BS5930 during the construction phase of the development by way of Building Regulations inspection, and there are no immediate concerns regarding *moisture content, plastic limit, liquid limit* and *plasticity index* of soils for foundation design.

d. For the purposes of the planning conditions, it is not necessary in my opinion to fully characterise the geological conditions any further, and there is no requirement to include chemical analysis on soil samples, and from my observations there is no immediate need to carry out *TPH analysis, PAH analysis* and/or *Loss on Drying*. [*Note- *this should be reviewed in the highly unlikely event that contaminants, or any indicators of contaminants, are observed during the course of any future excavation work associated with the development*].

4.1 Conclusions – Mining Risk Assessment.

Regarding **Coal Mining Risk**, the site is assessed to present a ***high risk*** that the proposed development is underlain by **unrecorded shallow mine workings** and unrecorded mine entries:

a. An **intrusive investigation** would mitigate this risk, and would be expected to comprise, as a minimum, the drilling of **one borehole per proposed dwelling footprint** (i.e. in this case 3No. boreholes) to investigate the potential presence of any potential voiding. If coal or voiding at the mining horizon/coal seam is discovered, then a stabilisation programme by drilling and pressure grouting would likely be required to cover the proposed built development footprint.

4.1 Basis of Assessment

This assessment is a *Preliminary Phase 1 Investigation* intended to give an indication as to the need for further assessment of the site. This report may be submitted in support of either a planning application (or) for the purposes of due diligence on the part of the owner. I can confirm to Barnsley District Planning Authority (and any other third party) that, insofar as the potential for **Land Contamination**, the geological conditions on the site are generally adequate for carrying out the development as proposed under Planning Application No. (tba).

However, regarding **Coal Mining** risk, it will be necessary to drill 3No. boreholes at each of the 3 proposed properties to a depth not less than 30m. Until this has been done, it is not possible to know whether any *Site Remediation* is required. In my professional view this should be a **post-planning condition** giving effect to the following;

> ***Prior to the commencement of any works on site the developer shall undertake a scheme of intrusive site investigations, designed by a competent person and adequate to properly assess the ground conditions on the site and establish the risks posed to the development by past coal mining activity. A report of findings from the intrusive site investigations and any remedial works and/or mitigation measures considered necessary shall be submitted for approval in writing with the planning authority together with a plan/time frame for the implementation of the remedial works and/or mitigation measures.***
> ***Reason: A pre-commencement condition is required in order to establish the exact situation regarding coal mining legacy issues on the site.***

4.2 Testimony of Independence

I am a professionally qualified Chartered Civil Engineer (CEng), Chartered Consultant Engineering Geologist (CGeol), and Chartered Construction Manager (CMan). I am a Fellow of *The Geological Society* (FGS), Member of the *Institute of Engineers Ireland* (MIEI) and Member of the *Chartered Institute of Building* (MCIOB). I hold a post-graduate law degree (LLM), a post-graduate MSc degree in *Engineering Geology;* a degree in *Mathematics and Physics* and under-graduate qualifications in *Civil Engineering*, and I have more than 30 years of experience working in construction specialising in the fields of underground space, mining and foundation engineering.

I confirm that under para. 2.E.2 of Appendix 2E of *Planning Policy Guidance Note 14 (PPG14) – Development on Unstable Land, DoE, 1990* I am suitably qualified to make these statements, and I understand that my overriding duty is to present independent and impartial expert analysis, and I believe I have complied with that duty. The facts I have stated in this report are true and the opinions I have expressed are correct and they are entirely my own, based upon the evidence I have been shown and my own observations.

Signed



.....
Tim Hyett LLM MSc CEng MIEI CGeol FGS MCIOB
Chartered Consultant Engineering Geologist
Earth-Tech Consulting Ltd
16th March 2019

REFERENCES

- *Ambler, L., 1913. Old Hall and Manor Houses of Yorkshire Brownhill, R. N., 1987.*
- *Brownhill, R. N., 1987. The Penistone Scene*
- *Cumberpatch, C., 2004. An Archaeological Desk Top Assessment of a site at 'Sunnymede', Huddersfield Road, Penistone, South Yorkshire*
- *Dransfield, J. D., 1906. History of Penistone Parts 1 & 2*
- *Elliot, B., (Ed) 1993. Aspects of Barnsley*
- *Elliot, B., (Ed) 1996. Aspects of Barnsley 4*
- *Ekwall, E., 1960. The Concise Oxford Dictionary of English Place-names 4th Ed.*
- *Hambleton, D. & Young, M., 1995. Penistone*
- *Hey, D., 2016. A History of Penistone and District*
- *Hunter, Rev. J., 1820. History of the Deanery of Doncaster and South Yorkshire*
- *Penistone Local History Group., 1990. Times Remembered*
- *Penistone Urban District Council., 1969. Centenary 1869-1969*
- *Victoria County History of Yorkshire Vol. II 1925.*
- *Victoria County History of Yorkshire Vol. III 1925.*