GEOTECHNICAL RISK ASSESSMENT

AT

170 PENISTONE ROAD
SHELLEY
HD8 8HZ

FOR

MR & MRS I SOWERBY

REPORT REF: IS 3619

Engineering Geologists and Environmental Scientists



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SEPTEMBER 2025

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Project	Geotechnical Risk Assessment for Land Adjacent 170 Penistone Road, Shelley, HD8 8HZ		
Client	Mr and Mrs I Sowerby		
Date	September 2025		
Version	Issue 1		
Reference	IS 3619		
Prepared by	Frances A Bennett	BSc (Hons), CGeol, FGS, FIMMM, C.WEM, MCIWEM, MIEnvSci	Director Ashton Bennett Ltd

1. INTRODUCTION

This Report generally follows the recommendations of the Design Manual for Roads and Bridges, CD 622 Revision 1, Managing geotechnical risk, March 2020 in compiling a Geotechnical Risk Assessment for the construction of a residential property at land adjacent to 170 Penistone Road, Shelley, HD8 8HZ and any potential for the construction to detrimentally affect the adjacent A629 road.

The report is required due to the proposed excavation to facilitate the construction of the new building, and to confirm that these excavations will not undermine the stability of the A629 Penistone Road. This requirement forms Condition 9 of Planning permission 2023/62/91272/E.

This Report follows the Geotechnical reporting requirements of Section 4, CD622, providing a:

1 Introduction
2 Statement of Intent (SoI)
3 Preliminary Sources Study Report (PSSR)
4 Ground Investigation Scope Report (GISR)
5 Ground Investigation Report (GIR)
6 Geotechnical Design Report (GDR)
7 Special Geotechnical Measures Form (SGMF)

Additional reports to clarify information are provided as Appendices.

2. STATEMENT OF INTENT

2.1 Project IS 3619

It is proposed to construct a residential property in the existing garden of No 170 Penistone Road, Shelley, HD8 8HZ.

The site is currently occupied by a garden to 170 Penistone Road, Shelley.

The site lies around National Grid Reference 419970E 410857N, covering 0.1ha. The Penistone Road lies at a height of 161.8m above Ordnance Datum to the immediate north of the site. The site reduces from 160m aOD in height towards the south by circa 8m to 152.2m aOD.

A site visit confirmed the site to be occupied by a grassed slope with a garden shed and further lawned area at the base and Shepley Dike to the south at a height of 145m aOD.

The site is bounded to the north by a stone wall and the A629 Penistone Road with residential housing beyond. The site is bounded to the east by the house and garden of 170 and 172 Penistone Road and to the west by woodland. The site is bounded to the south by a slope with Shepley Dyke and a mill pond at a lower ground level.

The site lies entirely outside any current Kirklees Highway asset, although works required for construction may affect the asset of the A629 roadway.

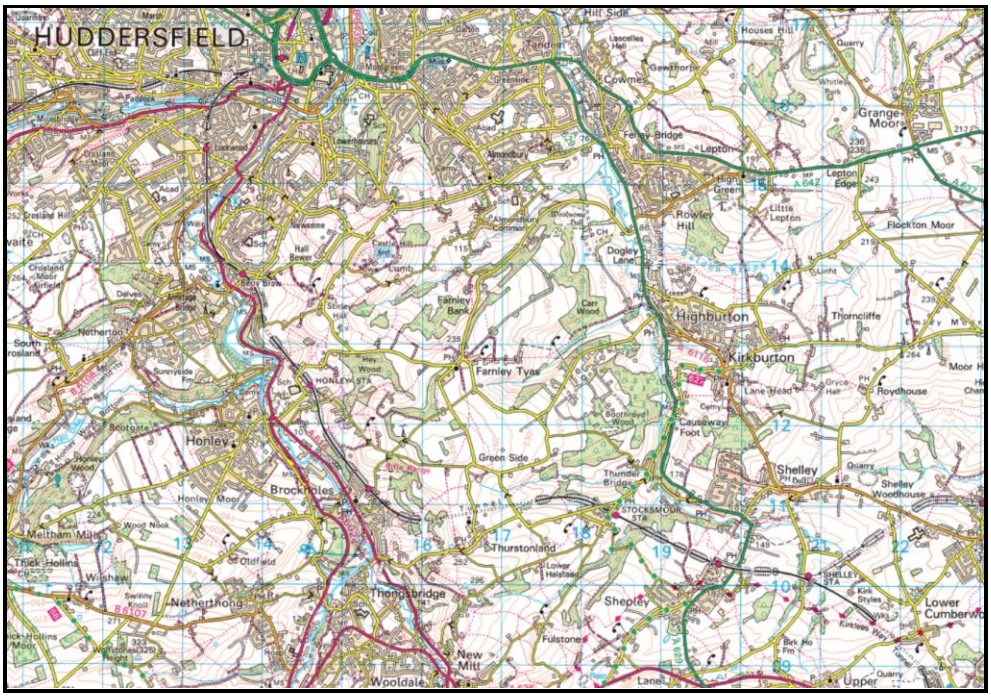

Figure 1 Site Location Map

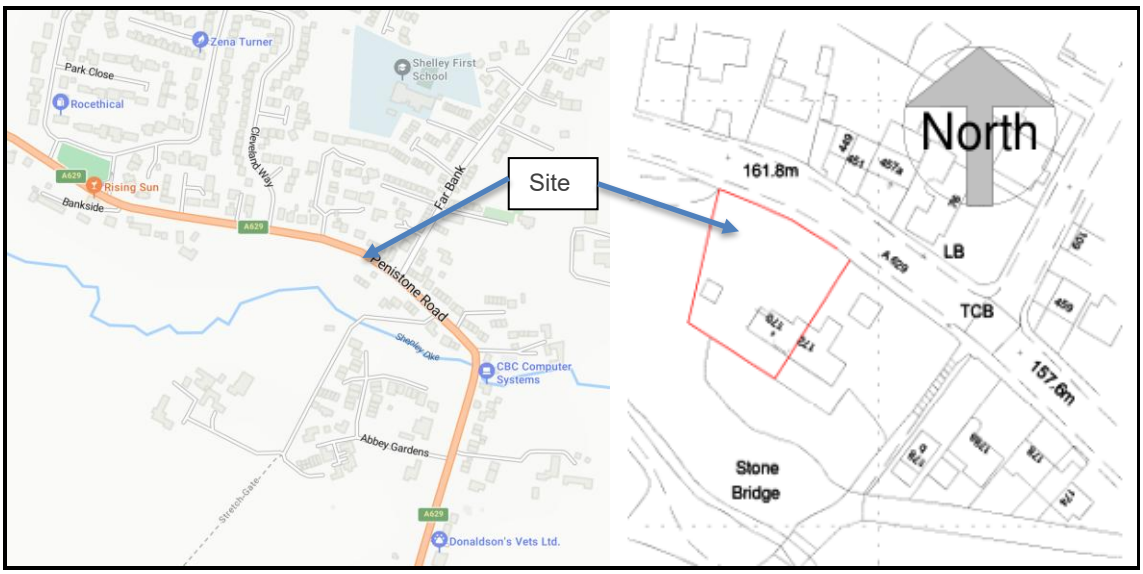

Figure 2 Site Location Detail

2.2 Objectives

The objectives of the Risk Assessment are to collect all readily available data for the site, including those recommended in Appendix D of CD622, collate all information to enable a preliminary engineering assessment, design any further information or ground investigations required to enable the risk assessment and to enable design of any special geotechnical measures required.

2.3 Summary of Existing Information

- A Phase I Desk Study was undertaken in November 2024 and reported to the client as Report IS 3604.

The purpose of this Phase 1 Study was to collate and assess information on the site including geological, hydrogeological and mining information, archival maps and historical review to determine past use, a database review, environmental data on water and soil, and to undertake a site reconnaissance to enable a desk top assessment of pathways of migration and potentially sensitive receptors, and to determine solutions to any geotechnical, environmental and mining concerns to the development of the site.

- A Phase II Ground Investigation Report comprising trial pits and rotary cored boreholes was undertaken on the site in March 2025. The purpose of the Phase II Ground Investigation was to assess the ground and groundwater conditions and the nature and engineering properties of the strata beneath the site in order to assist in design of the foundations for the proposed development of a residential house.

  Borehole Logs and rock core photographs are presented in Appendix C.

- Plans, Elevations and Views for Land Adjacent 170 Penistone Road by DB Architects Drg No 2204-01 Rev D.

- Garden Gabion Wall Details, Foundation Sections and Structural Proposals on Drawings P4541-AVE-XX-FN-D-S-0011, 0012 and 0013, Avie Consulting Ltd, 2025.

- Approval in principle for design of wall adjacent to south side of A 629 at 170 Penistone Road, Shelley, for Kirklees Council, Avie Consulting Ltd, 09/07/2025.

2.4 Preliminary Geotechnical Risk Register

Table 1 below lists the potential geotechnical risks to the site which may detrimentally affect the site or adjacent road.

TABLE 1
Preliminary Geotechnical Risk Register

			Risk before Control		
	Hazard	Consequence	Likely = L 1 to 5	Severity= S 1 to 5	Risk = R L x S
	Surface Flow and Flooding				
1	The site is in a Flood Risk Area	Flooding of the site	1	2	2
2	Drainage allows surface water to flow over the site	Flooding of the site	3	4	12
3	Watercourses cross or flow immediately adjacent to the site	Flooding of the site	1	1	2
4	The site lies below any surface water feature	Flooding of the site	2	2	4
	Subterranean (groundwater) Flow				
5	The site lies above an aquifer	Flooding	4	4	16
6	The site extends below the surface of the water table	Flooded site Unstable ground	1	4	4
7	The site lies within 50m of a watercourse, well or a potential spring line	Flooded Site Unstable ground	2	2	4
8	The development will result in a change in the proportion of hard surfaced / paved areas	Flooding	4	4	16
9	As part of the site drainage, more surface water, rainfall and run-off than at present will be discharged to the ground (via soakaways and/or SUDS)?	Flooded ground Destabilizing of ground Inflow into excavations	4	4	16

			Risk before Control		
	Hazard	Consequence	Likely = L 1 to 5	Severity= S 1 to 5	Risk = R L x S
10	The lowest point of the proposed site is close to, or lower than, the mean water level in any local pond or spring line	Flooding	1	1	2
11	Groundwater Rise	Flooding Slope instability	2	2	4
12	Water Chemistry	Chemical damage to underground concrete	1	1	2
	Ground Nature and Stability				
13	The ground has insufficient bearing capacity for proposed build	Ground subsidence and structural damage	2	5	10
14	The site lies on soft or compressible ground	Ground subsidence and structural damage	2	2	4
15	The site lies on running sands	Ground subsidence and structural damage	2	2	4
16	The site lies over a backfilled quarry	Ground subsidence	2	2	4
17	The site overlies solution cavities	Ground settlement and structural damage	2	2	4
18	The soil has a potential for a landslide	Ground collapse and structural damage	3	5	15
19	The bedrock has a potential for a landslide	Ground collapse and structural damage	3	5	15
20	Slopes, natural or manmade in the vicinity of the site	Slippage of ground and damage to site and adjacent road	3	5	15
21	The proposed re-profiling of landscaping changes slope stability	Slippage of material to damage site and road	5	5	25
22	Neighbouring land includes railway cuttings or other slopes/cuttings	Slippage of soil and damage to site	1	1	2
23	Works proposed within areas where trees have been removed	Possible ground heave due to readjustment of moisture levels in the soil	2	2	4
24	The clay strata has a history of seasonal shrink-swell subsidence in the local area	Ground subsidence or heave due to varying moisture levels in the ground	3	3	9
25	The site is overlying an area of previously worked ground?	Settlement of fill and damage to site and adjacent road	2	2	4
26	The site lies over (or within the exclusion of) tunnels, e.g. railway lines?	Collapse of tunnel and damage to site and adjacent road	1	1	2
	Mining Stability				
27	The site is undermined at a depth >30m bgl for coal or other mineral	Site instability	1	1	2
28	The site is mined for coal or other mineral at depths of <30m bgl?	Potential ground subsidence damage to site and adjacent road	5	5	25
29	There is evidence of a mine shaft on site	Collapse of Mine Shaft and damage to site and adjacent road	3	3	9
30	Coal or other mineral is available to be mined in the future beneath the site	Possible ground subsidence to site if shallow mining is undertaken	3	3	9
31	The site lies on a backfilled opencast site	Ground subsidence	1	1	2
	Toxic Gases				
32	There is putrescible material beneath the site such as landfill that could give off toxic gases?	Entry into drainage and causing explosion if sparked and damage to site. Pollution of site	1	1	2
	Contamination				

			Risk before Control		
	Hazard	Consequence	Likely = L 1 to 5	Severity= S 1 to 5	Risk = R L x S
33	Contamination has been detected beneath the site	Damage to human health	2	2	4
34	Imported material contains contamination?	Damage to human health	1	1	2
35	Contamination was detected that could detrimentally affect the site	Damage to human health	3	3	9
	House Construction				
36	The house is constructed on made ground	Subsidence of site and damage to adjacent road	3	3	9
37	The site strata have insufficient bearing capacity	Subsidence of site and possible damage to house and adjacent road	4	4	16
38	The house is constructed on unsuitably compacted fill	Ground subsidence and damage to house and adjacent road	2	2	4
39	Difficult construction due to buried old services and foundations	Severing services Settlement over old services	2	2	4
40	Aggressive ground conditions	Corrosion of PE/PVC pipework beneath site Sulphate attack on buried concrete pipework	2	2	4
41	Unusable excavated soil	Costly disposal off site	2	2	2
42	Instability caused by excavation for foundations and services	Ground subsidence	4	4	16
	A629 Road				
43	Construction of house destabilises the road	Costly repairs to road	2	4	8

The preliminary risk register indicates that the risks of shallow mining, insufficient bearing capacity, slope reprofiling and of slope instability are the main geotechnical risks to the site and in turn the stability of the adjacent roadway.

Results of the Phase I Desk Study and Phase II Ground Investigation may reduce the risks highlighted. Where risks still remain, then additional control measures may be required to mitigate the risks or reduce them to an acceptable or tolerable level.

2.5 Proposed Studies and Investigations

A Phase I Desk Study and Phase 2 Ground Investigation were proposed to assess the geotechnical risks to development.

2.6 Programme

The studies and investigations were undertaken in November 2024 and March 2025. Construction of the house is proposed for October 2025.

3. PRELIMINARY SOURCES STUDY REPORT

3.1 Project

The project is the construction of a house and garden on land adjacent to 170 Penistone Road, Shelley, HD8 8HZ. The report reference number is IS3619 version 1, dated September 2025.

This report was prepared by Frances A Bennett an engineering geologist who has a degree in Geology, a postgraduate qualification in Soil Mechanics and is a Chartered Geologist CGeol, and Chartered Water and Environmental Manager C.WEM and FIMMM and MIEnvSci, with 48 years of experience in the fields of geology, geotechnical engineering, hydrogeology, contamination, mining, slope stability and waste disposal.

A Curriculum Vitae for Frances Bennett is presented in Appendix A.

3.2 Introduction

There are no changes to the project since compilation of the SoI.
There are no recorded previous geotechnical studies having been undertaken on the site.

3.3 Sources of Information, desk study, site reconnaissance, site description and review of findings.

Enquiries made for information and information received included:

1. Geological mapping at 1:50,000 by British Geological Survey, Sheet 77.
2. Geological mapping at 1:10,000 by British Geological Survey, Sheet SE11SE.
3. BGS Memoir for Sheet 77 Huddersfield.
4. BGS archival boreholes in National Grid Data Centre.
5. Hydrogeological data from the Environment Agency.
6. Hydrology data from the Environment Agency.
7. Flood Risk from surface water, rivers and seas and groundwater, the Environment Agency.
8. Environmental data from Groundsure, Report CM-1194429-4873-141124, Nov 2024.
9. Archival maps from Groundsure Report CM-1194429-4873-141124, November 2024.
10. The Coal Mining Report No. 51003466545.
11. The Mining Remediation Authority interactive website.
12. Subsidence Engineers' Handbook, National Coal Board Mining Department, 1 Jan 1973.
13. Construction Over Abandoned Mine Workings, PR Healey and J M Head, CIRIA, 1984.
14. CIRIA C758, Abandoned Mine Workings Manual, 2019.
15. Kirklees Planning Applications in the local area.
16. Ordnance Survey maps.
17. Service drawings from utilities.

3.4 Site Reconnaissance

A site reconnaissance was undertaken on Wednesday November 13th 2024.

The site lies to the immediate south of the A629 Penistone Road. The site level at the centre of the road north of the site is 161.8m aOD. The north part of the site lies at 160.0m aOD reducing to 152.00m aOD at the southern end of the site.

The ground falls from 160m aOD to 158m aOD beneath the proposed house and falls further to 152m aOD in the rear garden. The slope measures as 15 to 20 degrees to the horizontal from the road to the rear of the site.

Figure 3 Site Plan

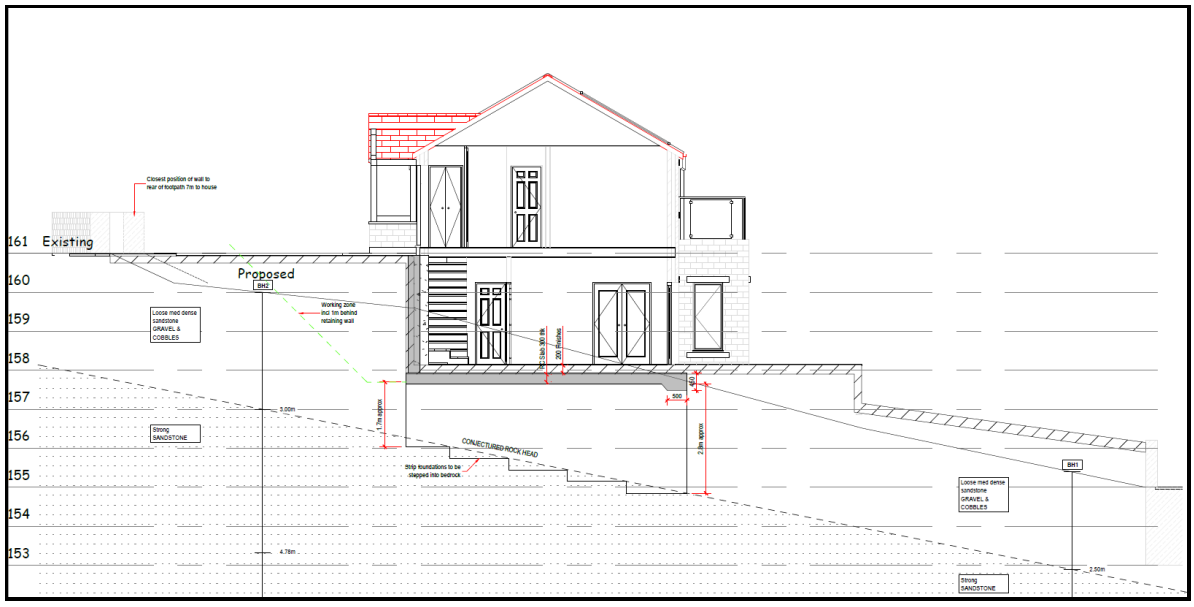

Figure 4 Site Section

The site lies as a grassed lawn forming the garden to 170 Penistone Road. The site is bounded to the north by a stone wall and the A629 Penistone Road with residential housing beyond. The site is bounded to the east by the house and garden of 170 Penistone Road and to the

west by woodland. The site is bounded to the south by sloping ground down to Shepley Dyke and a mill pond at a lower ground level.

There was no evidence of any potentially contaminating materials on the site. There were no mature trees on the site.

3.5 Ground Conditions
3.5.1. Historical Maps

The following maps and plans were inspected to assess the history of the site and its past environments. The archival Ordnance Survey maps are presented in Appendix B. The site marked on the maps in Appendix B is the area of the planning application. The new build property will occupy the western half of this area which is described below.

TABLE 2
Historical Maps Inspected

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
1854	1:10.560	The site is shown as open ground south of Penistone Road.	A property is shown east of the site and Shepley Dike flowing east to west to the south. The area is annotated as Shelley Far Bank.
1892 1893	1:10,560 1:2,500	The site is shown as open ground with woodland annotated immediately south of the Penistone Road.	A property is shown to the east of the site and residential houses to the north of Penistone Road. To the south of the site a mill pond is shown south of Shepley Dike and a mill named New Mills is shown to the south east of the site. The map of 1893 annotates an old quarry to the immediate east of the site to the rear of the house east of the site.
1904 1906 1913	1:10,560 1:2,500 1:2,500	The site is shown as open ground with woodland adjacent to the Penistone Road.	The property east of the site has extended to the west. Additional housing has developed in the area and the mill is renamed Shelley New Mill which has extended in size. A quarry is annotated to the west, west of Sand Hollow house. The 1904 map indicates a cliff south of the Penistone Road and east of the site to the rear of No 172 Penistone Road.
1932 1948 1951-1955	1:10,560	The site is shown as open ground with trees adjacent to the Penistone Road.	The surrounding area has developed a few additional houses.
1959-1960 1967-1970	1:2,500 & 1;10,560	The site is now shown as open ground with no trees.	The house to the east of the site has been extended at the rear. The cliff is annotated to the rear of 172 Penistone Road. The mill has reduced in size and additional housing is shown in the village.
1976 1975-1976 1977-1980	1:2,500 1:2,500 1:10,000	The site is shown as open ground with no trees.	The surrounding area remains generally unchanged.
1987-1992 1990-1993 1992-1994 1994-1995	1:2,500 & 1:10,000 1:2,500 1:2,500	The site remains unchanged during this time.	By 1987 the mill building is no longer shown. Large areas of housing are shown to have been developed north of Penistone Road.
2001 2003 2010	1:10,000 1:1,250 1:10,000	The site area remains unchanged during this time.	The surrounding area is further built up with houses. The quarry face is shown to the north of the house east of the site, number 172 Penistone Road.

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
2024	1:10,000		

In summary, the area is shown on the OS maps to have been open land and a residential garden since 1854. The immediate surrounding area has been open land and residential housing.

3.5.2. Historic Industrial Land Use

The site area has not been occupied by any previous historic industrial activity.

In the surrounding area within 250m there has been historical industrial land use of a woollen mill 39m to the south east and a gas works 177m to the south east. There are no historical tanks within 150m of site. An electricity station is present 122m north east. There are no historic petrol stations or garages within 300m of the site. There is an unspecified quarry 208m to the west. There has been no historical military land within 500m surrounding the site area.

The local historic industrial land uses are unlikely to have detrimentally affected the nature of the site.

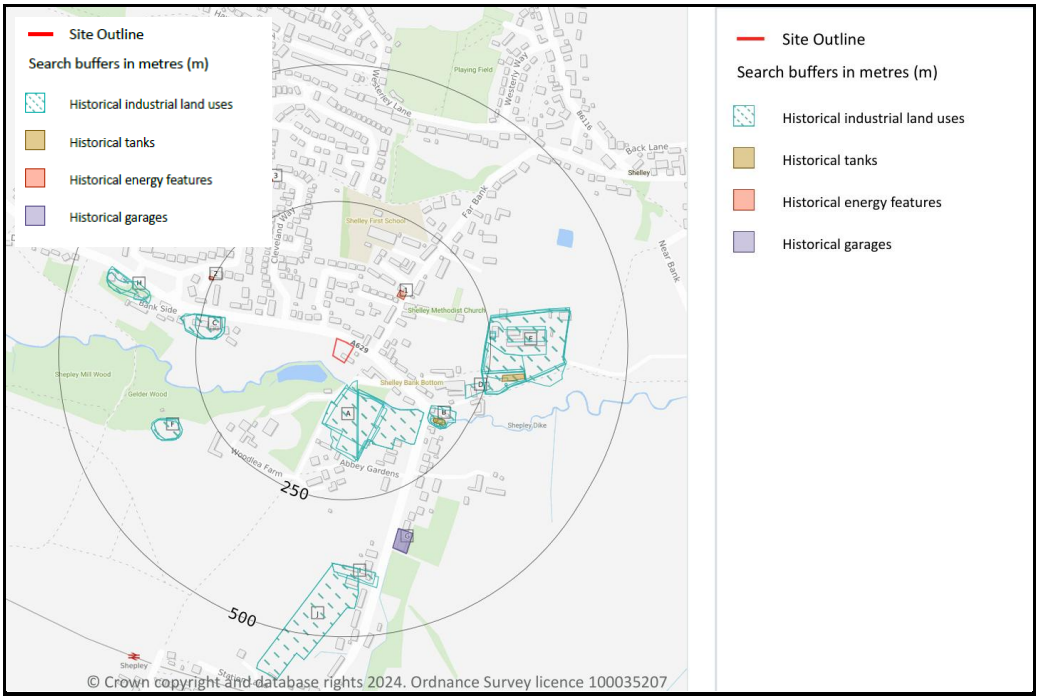

Figure 5 Historic Industrial Land Use

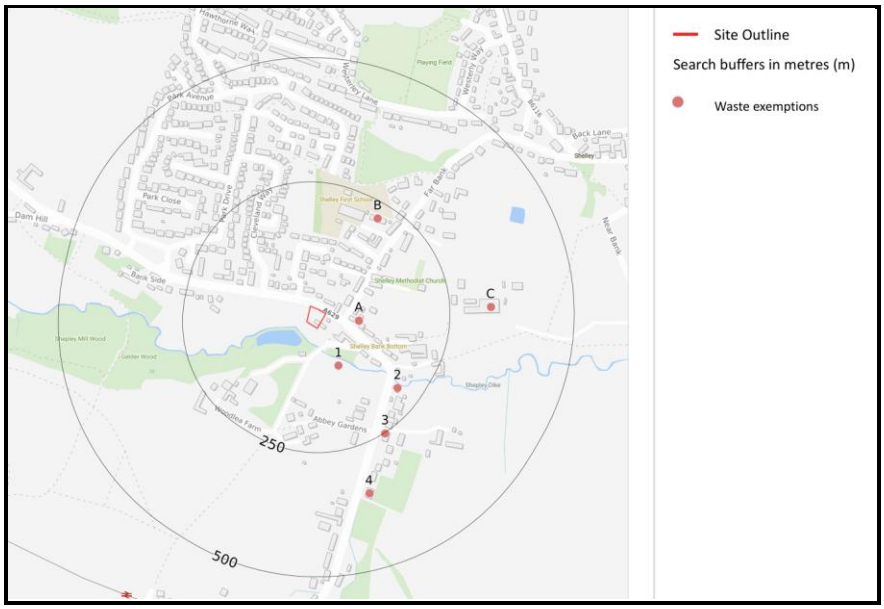

Figure 6 Waste and Landfill Sites

3.5.3. Landfill and Waste Sites

There are zero active or recent landfill sites or recently closed landfill sites recorded within 500m of the site. The BGS records and LA/mapping records indicate no historical landfill within 500m of site. There were zero historical local authority (LA), Environment Agency (EA), or Natural Resources Wales (NRW) landfills within 500m of site.

The site is unlikely to be detrimentally affected by toxic gases from landfill due to distance of >250m.

3.5.4. Current Industrial Land Use

The site area is currently occupied by open ground forming a residential garden. There are no sites determined as Contaminated Land within 500m of the site.

Potentially contaminating industrial land use within 250m of the site are noted as an electricity sub station 59m to the south, electrical equipment repair and servicing at 79m east, electrical features 124m north east, unspecified works or factories 197m east, waste storage 232m south east and a pumping station 235m south east.

Current industrial land uses beyond 100m are unlikely to detrimentally affect the site. There are no local current petrol or fuel stations within 500m of the site. There are no sites determined as contaminated land, National Grid High Voltage underground electricity transmission cables or high pressure gas transmission pipelines on, or within 500m of the site.

The local current industrial land uses are unlikely to have detrimentally affected the nature of the site.

Figure 7 Made, Reworked and Infilled Ground

Figure 8 Current Industrial Land Use

3.5.5. Geology

The published British Geological Survey Map (BGS) at a scale of 1:10,000 shows the site to be underlain by sandstones, mudstones and siltstones of the Pennine Lower Coal Measures Formation of the Carboniferous Geological Age. The site is immediately underlain by the Grenoside Sandstone.

Superficial drift deposits are shown not to overlie the solid strata in the site area. Alluvial deposits associated with the Shepley Dike are present to the south of the site at a lower ground level and will not affect the land on the site. The site geology is presented in Figures 9 and 10.

The Grenoside Sandstone is exposed as a thickly bedded massive sandstone to the rear of houses 170 and 172 Penistone Road. Measurement of the dip and strike indicated the sandstone to dip at a shallow angle of 10 to 15 degrees to the north, ie 'into' the site and beneath the roadway. This reduces the risk of a bedrock landslide 'out' of the slope. Photographs are presented in Appendix E.

The BGS maps do not indicate the presence of any geological faults crossing the site. The maps show the presence of a fault to the east of the site. It is possible that smaller faults sub parallel to this may exist in the strata causing fissuring and fracturing to the rock. Due to the cessation of tectonic activity in the area, faulting is unlikely to detrimentally affect the stability of the site.

Made ground may be present on the site and is unsuitable founding strata. The strata of the Lower Coal Measures Formation Grenoside Sandstone provides good bearing strata where unweathered and unfaulted for carrying the bearing pressures imposed by low rise development without undue settlement.

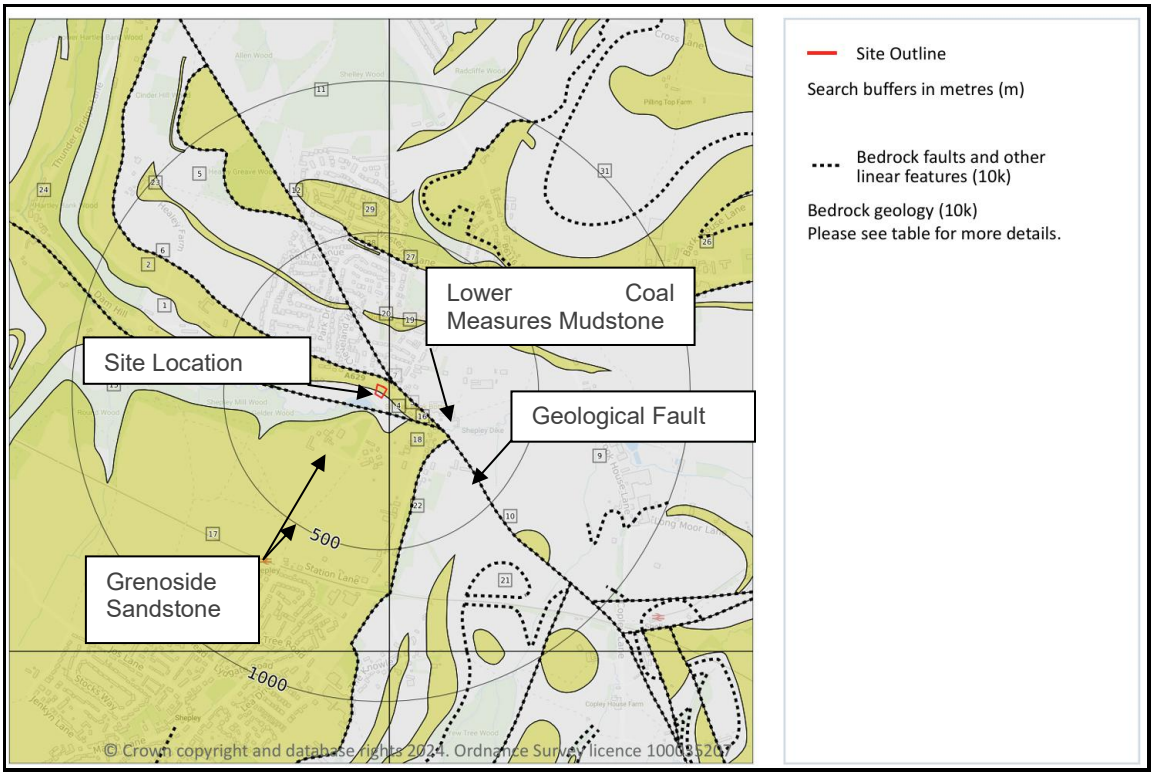

Figure 9 Geological Fault and Bedrock Geology

Figure 10 Superficial Geology Plan

According to the British Geological Survey there is a very low risk of landslides and collapsible deposits. There is a negligible to very low risk of shrink and swell hazard from clays, negligible risk of running sands, ground dissolution of soluble rocks and compressible deposits. There is a very low to moderate risk of a landslide. This is based on the geology and excludes made ground.

Archival boreholes held by the British Geological Survey (BGS) in the vicinity are shown in Figure 11.

Borehole SE11SE43 to the west of the site encountered 2.20m of made ground overlying 1.80m of sand with sandstone encountered at 4.0m bgl. Boreholes SE11SE76 and SE21SW146 encountered circa 2.0m of made ground overlying clay. Borehole SE21SW46 encountered 3.50m of made ground with natural ground not encountered. A borehole to the south east of the site for Firth Carpets, SE11SE3 encountered sandstone, mudstone and shale to a depth of 68.58m bgl with rest water level at 12.19m bgl.

In terms of ground stability, it is essential to determine the nature of the slope in terms of depth of soil, weathered rock and competent rock and to determine the dip and strike of the rock to assess its potential for slope instability.

Figure 11 BGS Archival Boreholes

3.5.6. Hydrology

The rainfall over the area of the site will drain downhill into the closest surface water of the Shepley Dike 24m to the south west and 7m below the site. The Dike is not influenced by tidal action.

The site is shown by the Environment Agency to not lie within a fluvial Flood Zone, flooding is unlikely to occur. There are no historical flood events on or within 250 of the site area. There are no areas benefitting from flood storage within 250m of the site. There is no risk according to RoFRaS of flooding from rivers and seas.

3.5.7. Flooding

The site is not at risk of flooding from rivers or seas as detailed in Figure 12 and 13. There are no records of historical flood events.

The site is not at risk of surface water flooding as detailed in Figure 14.

The site is at negligible risk of groundwater flooding as detailed in Figure 15.

Flooding is unlikely to detrimentally affect the stability of the site and adjacent road.

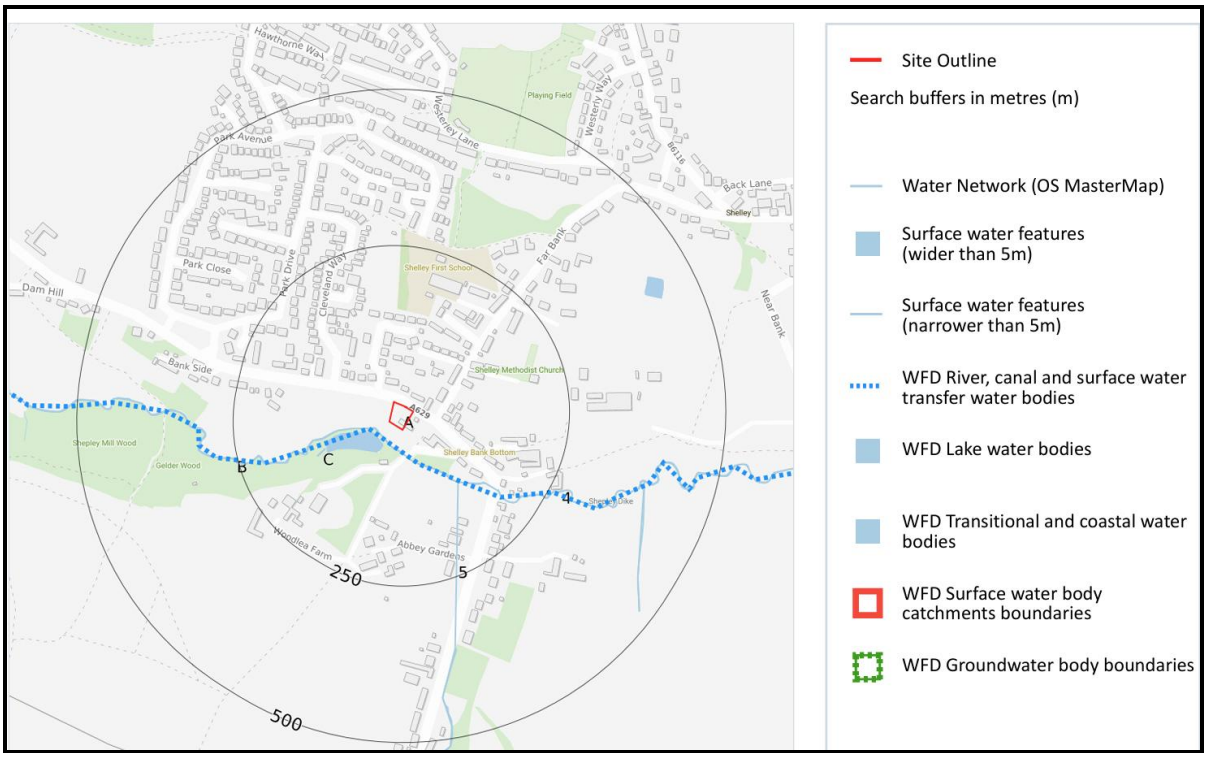

Figure 12 Hydrology

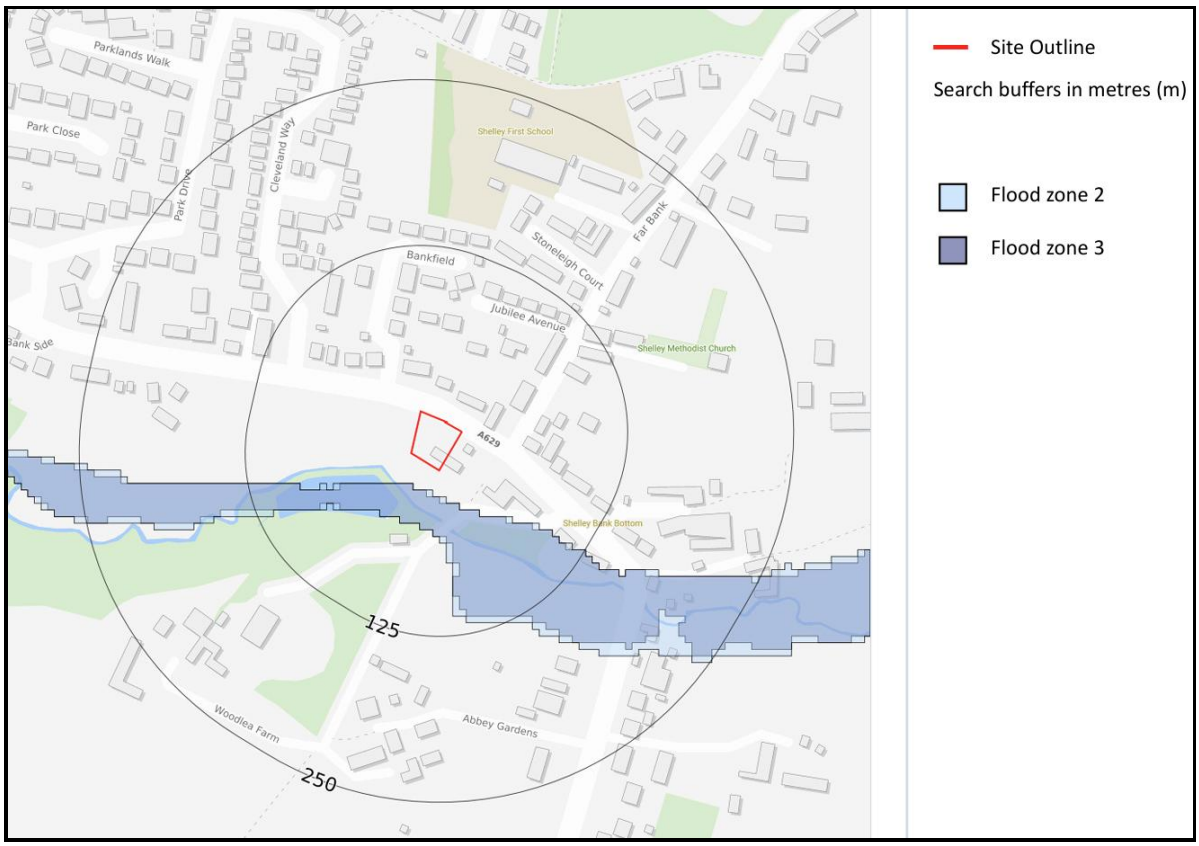

Figure 13 Flood Zones

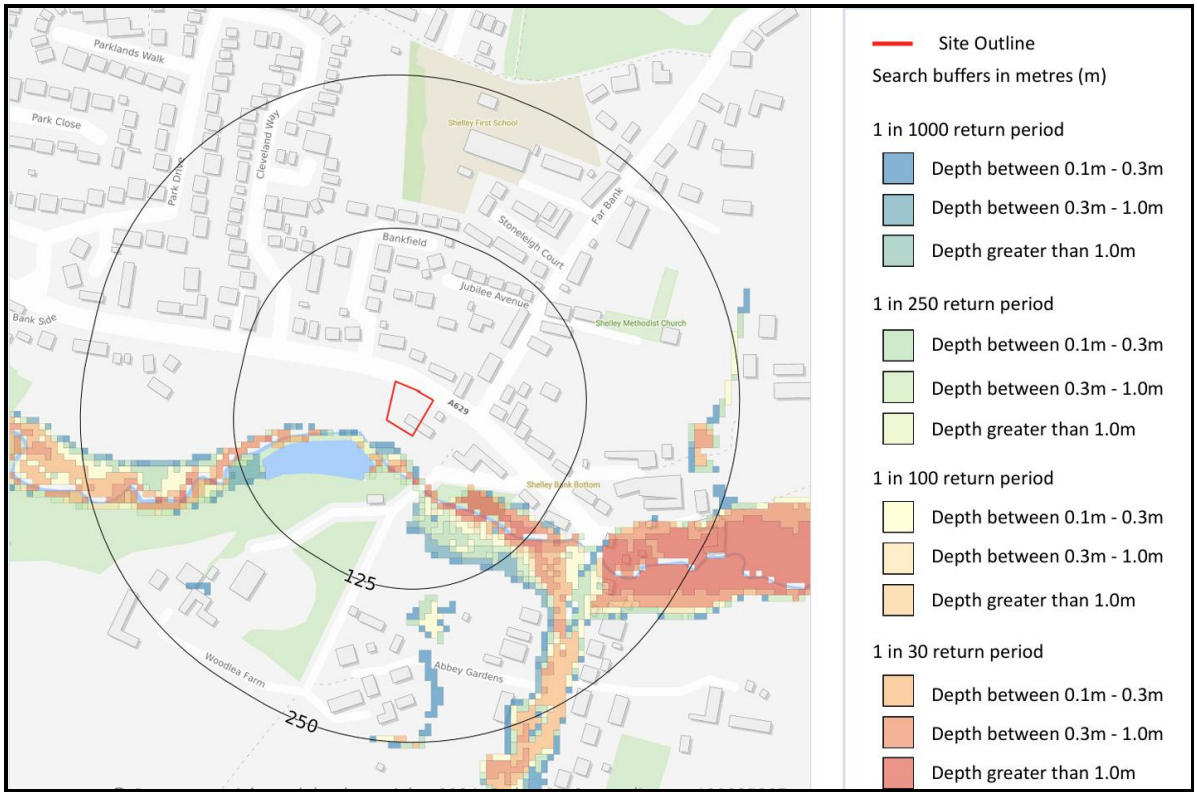

Figure 14 Surface Water Flooding

Figure 15 Groundwater Flooding

3.5.8. Hydrogeology

The geological maps produced by the BGS indicate the site to be underlain by the Grenoside Sandstone of the Lower Coal Measures strata which is a Secondary A Aquifer. This is predominantly permeability layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

There are no superficial deposits on the site

The ground vulnerability beneath the site area is classified as having a high vulnerability within the bedrock. This implies the site is able to easily transmit pollution to groundwater.

There is a negligible risk of groundwater flooding.

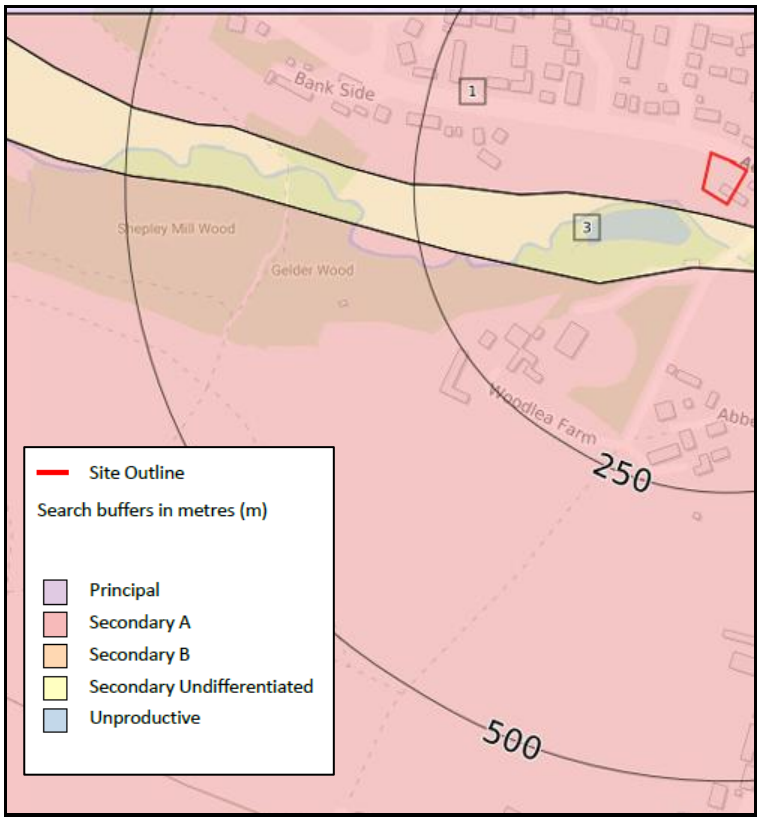

Figure 16 Hydrogeology of Bedrock

3.5.9. Quarrying

The site immediately adjacent to the east is annotated as an old quarry. The quarry face can be seen to the rear of 170 and 172 Penistone Road and is 6m to 7m in height. The houses are constructed on the quarry floor and there is no backfill to the quarry. Photographs are presented in Appendix E.

3.5.10. Coal Mining

The property is not within a surface area that could be affected by any past recorded underground coal mining. The property is not within a surface area that could be affected by present underground coal mining.

The property is not in an area where the Mining Remediation Authority has received an application for, and is currently considering, whether to grant a licence to remove or work coal by underground methods. The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area likely to be affected from any planned future underground coal mining.

There are no recorded mine entries known to the Mining Remediation Authority within, or within 20m of the boundary of the property.

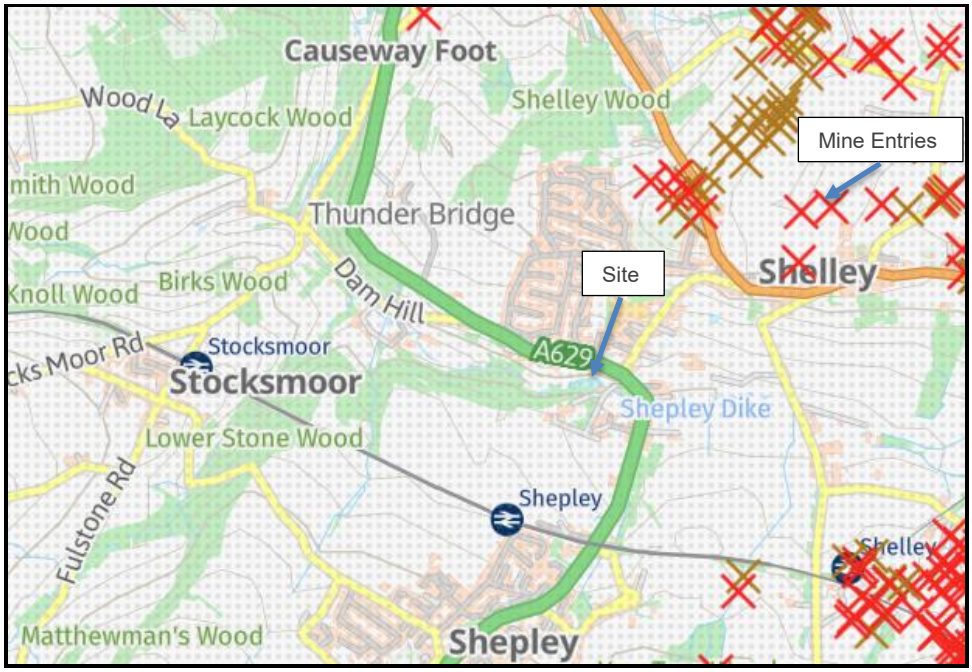

Figure 17 Mine Entry Plan

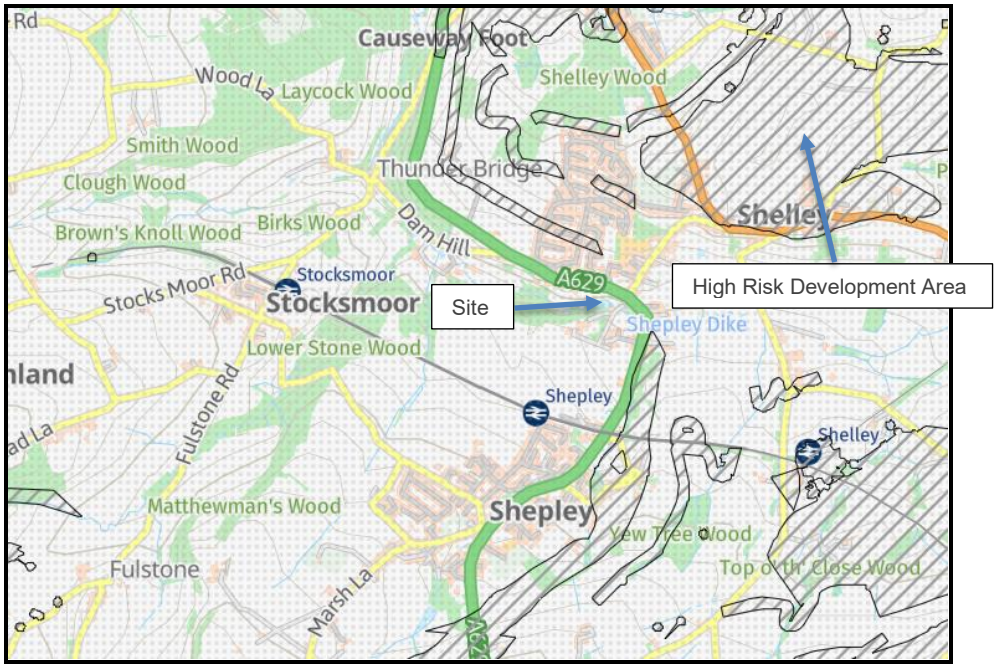

Figure 18 High Risk Development Areas

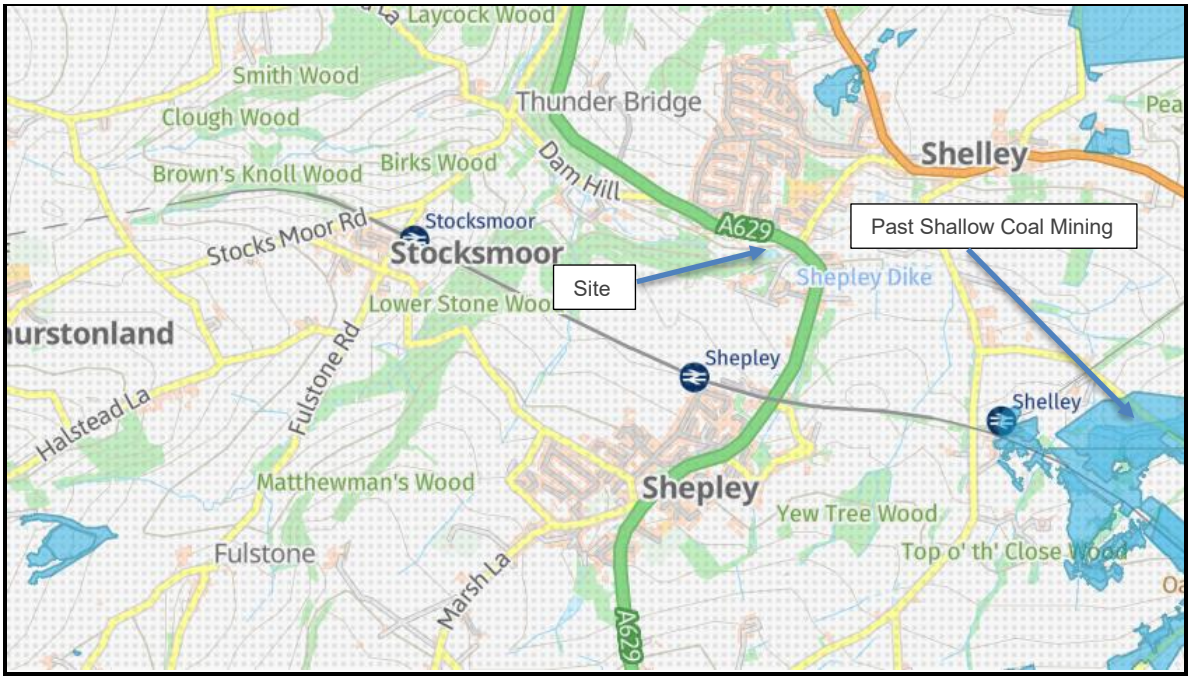

Figure 19 Past Shallow Coal Mining

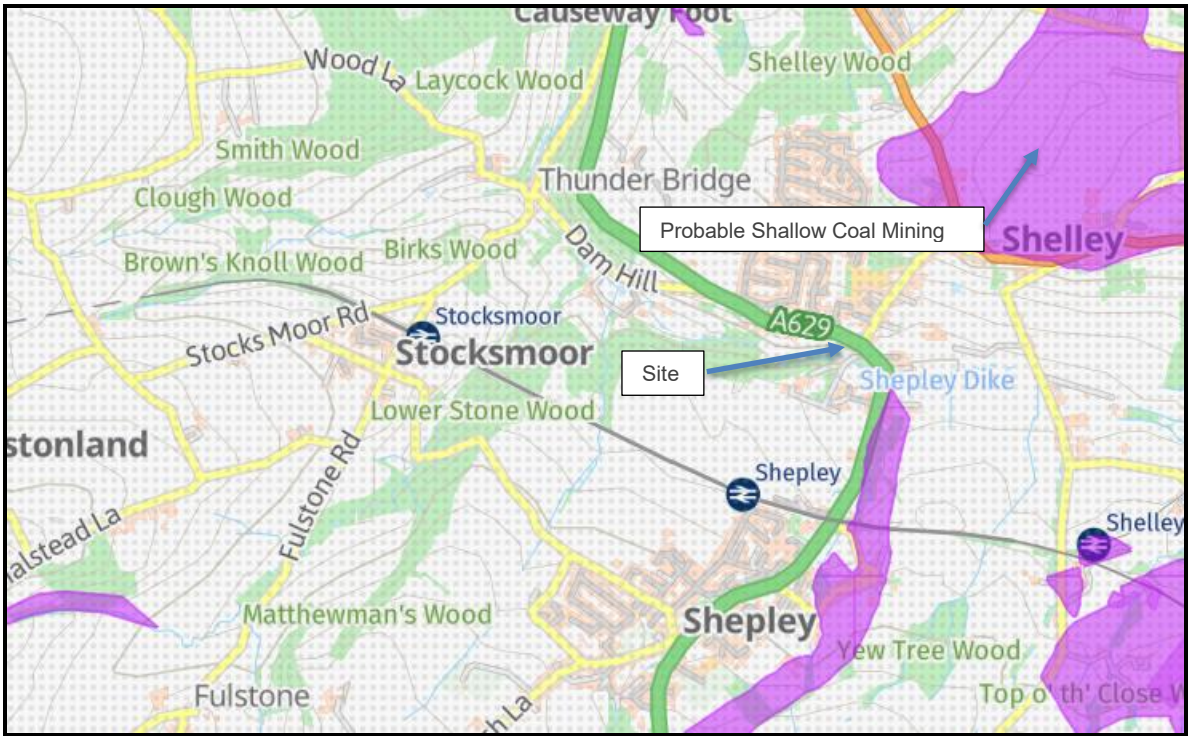

Figure 20 Probable Shallow Coal Mining

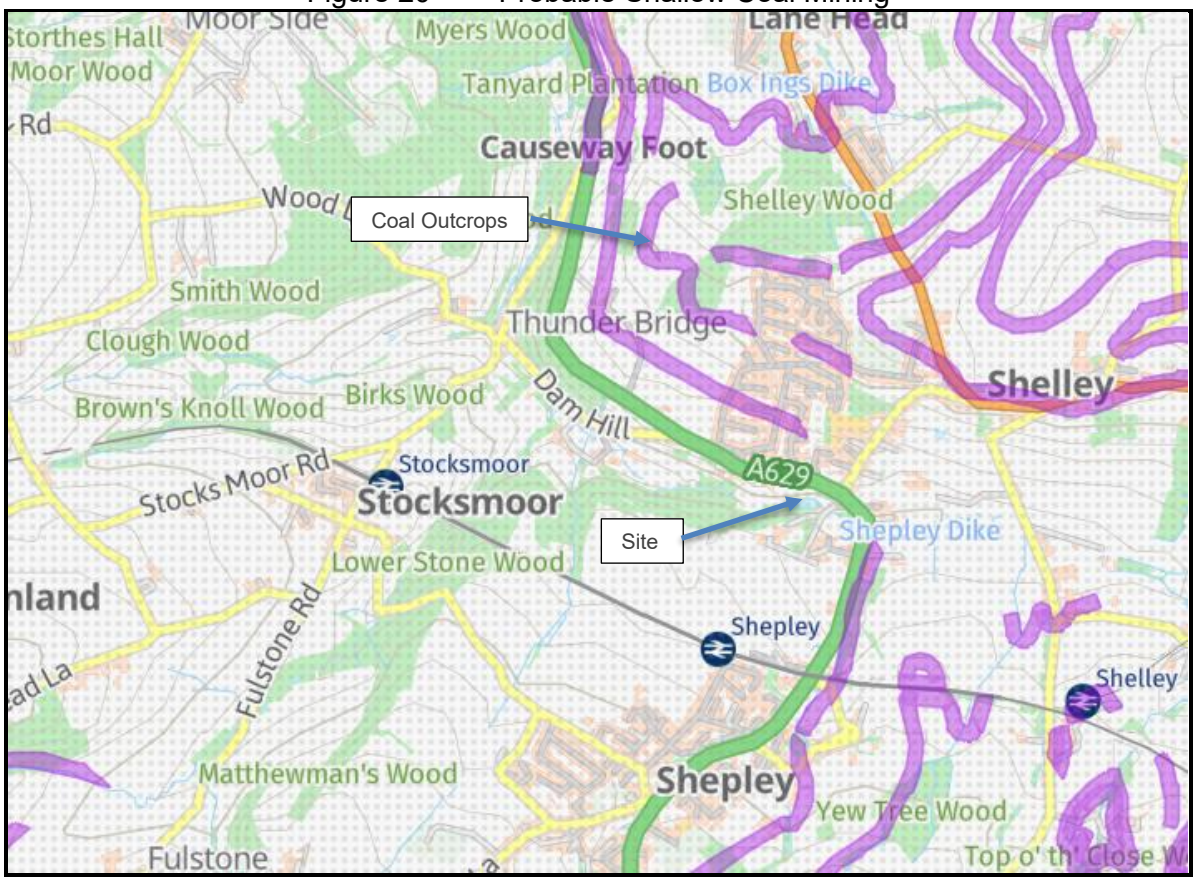

Figure 21 Coal Outcrops

The Mining Remediation Authority records indicate that the site does not have any mine shafts on site or in close vicinity of 20m. The records indicate the site does not lie in an area of high

risk development, it is improbable that it is underlain by shallow coal mining and it is not underlain by any recorded shallow mining, as detailed in Figures 17 to 21.

The Mining Remediation Authority mining report is presented in Appendix D and should be read in full.

3.5.11. Contaminated Land

The historical maps have indicated that the site has, since 1894, formed a residential garden. It is not therefore anticipated that the site will be contaminated. Visual inspection of ground during trial pitting and drilling will establish any requirement to test the soil for potentially contaminating substances.

There are no landfills within 250m of the site which could cause migration of toxic gases to detrimentally affect the site.

3.6 Preliminary Engineering Assessment

The main engineering assessments required for the project are to assess the suitable bearing strata to support the residential property and to assess the stability of the slope to retain the house and to provide stability to retain the adjacent road, the A629.

The preliminary risk register indicates that the risks of shallow mining and of slope instability are the main concerns to the development of the site and in turn the stability of the adjacent roadway. Section 2.5.10 has eliminated the risk of shallow or deep mining being present beneath the site and eliminated the risk of mining subsidence occurring to the site.

There are no cuttings, embankment or roadways proposed for the construction.

Foundations for the proposed house could be designed as strip footings or piled foundations set into the rock. Excavations for services and the like may require support in the short and long term.

There is no perceived risk to the site from surface or river water, flooding, rising groundwater, swelling and shrinkage of clay of high plasticity, contamination or toxic gases from landfill. There are no previous foundations or man made obstructions that may affect the development of the site.

There is a perceived risk of slope instability which requires investigation by a ground investigation.

3.7 Comparison of project options and risks

These have been discussed. The geotechnical risks register is updated following the results of the ground investigation.

3.8 Drawings and Photographs

Drawings are presented throughout the text and in Appendix F, and photographs are presented in Appendix E.

4. GROUND INVESTIGATION SCOPE

4.1 The objectives of the ground investigation are to assess the nature and strength of the weathered bedrock and to collect rock cores for strength assessment for design of foundations and to assess slope stability in the light of the proposed construction and the support to the adjacent roadway. The dip and strike of the bedrock should also be identified.

4.2 Proposed Investigation

The ground investigation was completed in March 2025 and comprised:

1. Assessment of bedrock dip from adjacent quarry wall
2. Excavation of three trial pits.
3. Drilling of two boreholes by rotary drilling rig including coring of bedrock.
4. Installation of one standpipe for monitoring groundwater.
5. Laboratory testing of rock strength by unconfined compressive strength and point load tests.

4.3 Site and working restrictions

The site lies as sloping ground 15 to 20 degrees to the horizontal and will require benching for safe working.

4.4 Reporting

The factual data from the ground Investigation is supplied in Appendix C.

5. GROUND INVESTIGATION REPORT

5.1 Field and Laboratory Results

5.1.1. Fieldwork

Three trial pits were excavated by JCB 3CX in November 2024 to assess the shallow ground conditions.

A further ground investigation was undertaken between Tuesday January 28th and Friday January 30th 2025 and comprised the drilling of two boreholes by Geotron Ltd with a Comachio GEO 205 drill rig (BH01 and BH02),with the collection of core samples, laboratory testing and installation of one groundwater monitoring point.

The purpose of the soil sampling was to enable laboratory testing of soils to determine the geotechnical properties, and one standpipe was installed in BH01 to enable monitoring for the presence of groundwater levels over time. Geotechnical tests were undertaken in February 2025 to confirm the engineering properties of the strata.

All exploratory points were marked out on site by reference to existing physical features on the site. The trial pit and borehole positions are detailed on Figure 22.

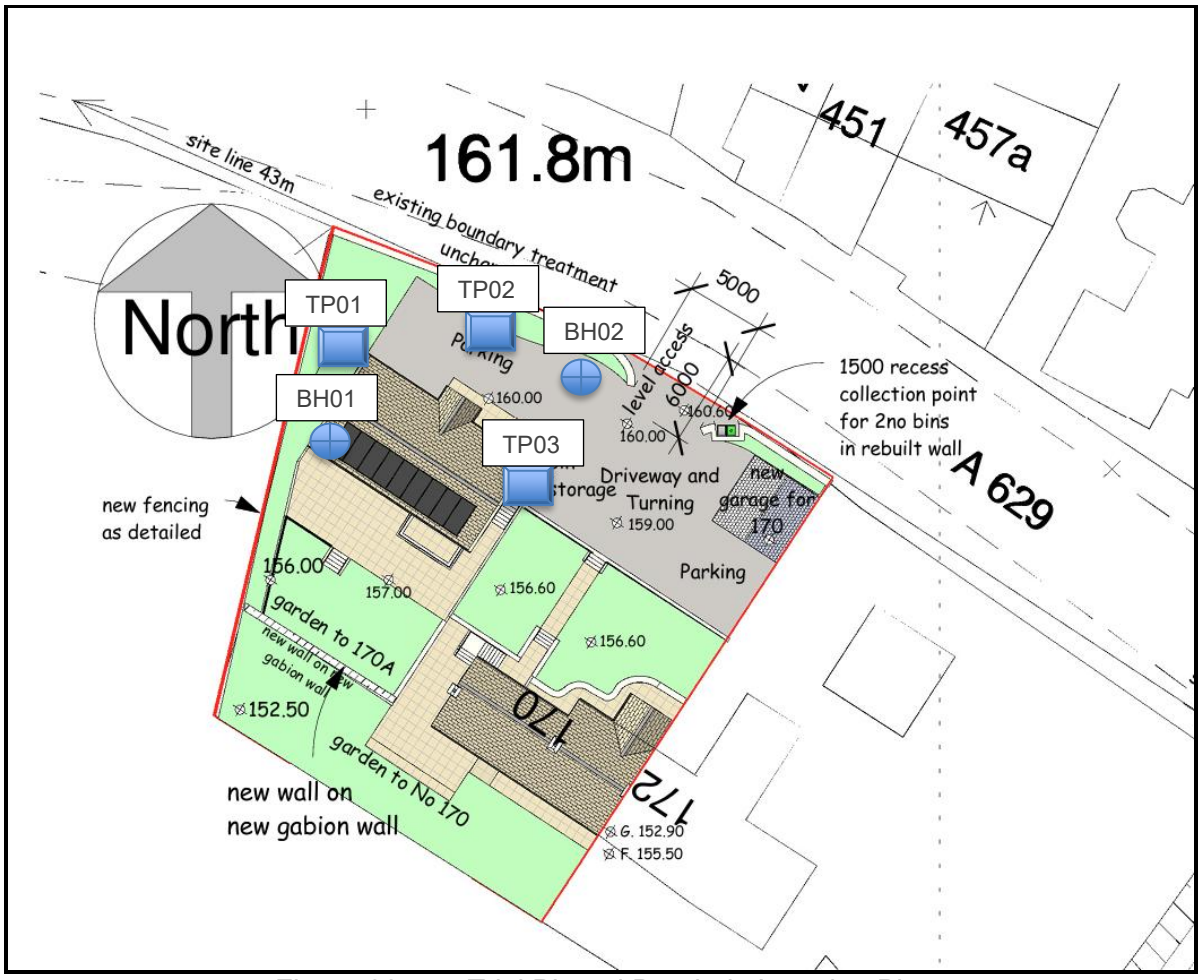

Figure 22 Trial Pit and Borehole Location Plan

5.1.2. Ground Conditions

The topography of the site is shown in Figure 22. The site lies at 160m aOD at its junction with the roadway, falling to 152.50m aOD at the south west corner of the rear garden. The ground continues to drop away to 145m aOD at the bottom of the Shepley Dike valley.

The ground investigation was undertaken to assess the nature of the weathered bedrock and strength of both this material and the sandstone bedrock.

The site was everywhere underlain by topsoil, and weathered sandstone resting on strong sandstone.

The trial pits encountered 0.40m to 0.50m of topsoil underlain by loose to medium dense gravel and cobbles of sandstone to a depth of 2.50m bgl. The trial pits were terminated due to trench side collapse. Water was not encountered.

TABLE 3
Ground Conditions Encountered in Boreholes

Borehole	Topsoil In mbgl	Weathered Sandstone In mbgl	Medium Strong Sandstone In mbgl	Strong Sandstone In mbgl	Very Strong Sandstone In mbgl	Extremely Strong Sandstone In mbgl
BH01	GL-0.50	0.50-2.50		2.50-4.78	4.78-5.33	5.33-11.50
BH02	GL-0.50	0.50-3.00	3.00-6.67	6.67-7.90		7.90-10.50

The topsoil extended to a depth of 0.50m bgl. The topsoil was everywhere underlain by loose to medium dense yellow brown sandstone gravel and cobbles in a fine matrix representing weathered sandstone.

This was underlain by medium strong to strong, thinly to thickly laminated light grey coloured coarse grained sandstone with rare micaceous laminations to between 4.78m in BH01 and 7.90m in BH02. In BH01 very strong sandstone was encountered between 4.78m to 5.33m, being thinly to thickly laminated with a light grey orange brown colour and medium grained.

Extremely strong sandstone was encountered at 5.33m in BH01 and at 7.90m in BH02.

Borehole locations are shown on Figure 22. Borehole Logs and photographs of the rock cores are presented in Appendix C.

The cores were logged by Ashton Bennett and also by Structural Soils Ltd who undertook the laboratory testing. Total core recovery (TCR) varied 47% to 93% in BH01 and 100% in BH02. Solid core recovery (SCR) varied 47% to 87% in BH01 and 13% to 84% in BH02. The 13% being between 3.00m to 4.00m bgl in BH02.

The Rock Quality Designation (RQD) determines the % of core that is recovered as sound lengths which are 100mm or more in length.

In BH01 the RQD varied from 0% at 2.50m to 4.00m, 23% at 4.00m to 5.50m, 46% at 5.50m to 7.00m, 67% at 7.00m to 8.50m, 81% at 8.50m to 10.00m and reducing to 8% at 10.00m to 11.50m bgl.

In BH02 the RQD varied from 0% at 3.00m to 4.50m, 37% at 4.50m to 6.00m, 35% at 6.00m to 7.50m, 48% at 7.50m to 9.00m and 55% from 9.00m to 10.50m bgl.

5.1.3. Standard Penetration Test (SPT) Results

The Standard Penetration Test (SPT) test uses a thick-walled sample tube, with an outside diameter of 50.8 mm and an inside diameter of 35 mm, and a length of around 650 mm. The blow count provides an indication of the density of the ground.

Standard Penetration Tests (SPT) were undertaken in the boreholes until bedrock was encountered. The results are detailed below and are presented in full on the borehole logs in Appendix C.

TABLE 4
Standard Penetration N Values Recorded

Borehole	Topsoil In mbgl	Weathered Sandstone In mbgl	Medium Strong Sandstone In mbgl
1.00-2.00m		19, 22	
2.00-3.00m		24, 24	50+
3.00-4.00m			50+

The SPT N values within the weathered sandstone indicate a medium dense state of compaction. SPT N values on accounting the sandstone classify as medium strong or above.

5.1.4. Groundwater Conditions

Groundwater was not encountered during the drilling of the boreholes. Groundwater levels measured in BH01 in September 2025 were 3.50m below ground level of 156.60m aOD.

5.1.5. Laboratory Test Results

Point Load Tests were undertaken on 10 sandstone samples in BH01 and 10 sandstone samples in BH02.

TABLE 5
Point Load Test Results

BH No	Depth in mbgl	Point Load Test In Is(50) MN/m2	C Factor	UCS in MPa	Classification BS5930
1	3.84	2.37	23	54.51	strong
1	5.24	3.10	23	71.3	strong
1	5.42	2.30	23	52.9	strong
1	5.61	2.88	23	66.24	strong
1	5.73	3.15	23	72.45	strong
1	5.88	3.42	23	78.66	strong
1	6.17	3.11	23	71.53	strong
1	6.27	3.53	23	81.19	strong
1	6.42	3.30	23	75.90	strong
1	6.52	3.88	23	89.24	strong
2	4.91	2.01	23	46.23	moderately strong
2	6.07	2.17	23	49.91	moderately strong
2	6.34	2.97	23	68.31	strong
2	7.58	0.14	23	3.22	weak
2	7.90	0.12	23	2.76	weak
2	8.04	2.55	23	58.65	strong
2	8.24	3.35	23	77.05	strong
2	8.91	3.02	23	69.46	strong
2	9.00	2.89	23	66.47	strong
2	9.44	4.46	23	102.58	very strong

The results indicated the sandstone to be generally strong with weak sandstone encountered in BH02 at 7.58m and 7.90m bgl.

Unconfined compression tests were undertaken on three soil samples of sandstone to assess rock strength, and the results are presented in Table 6.

TABLE 6
Unconfined Compression Test Results

WS No	Depth in m bgl	Moisture Content %	Load at failure In kN	Peak Stress In MPa	Axial strain at failure %	Bulk Density Mg/m³	Dry Density Mg/m³
BH01	7.43	4.3	389.3	67.5	0.81	2.45	2.35
BH01	8.01	3.7	355.8	62.1	0.76	2.47	2.38
BH02	5.04	4.6	202.1	35.3	0.63	2.42	2.32

The results indicate the sandstone tested to be moderately strong to strong. The point load test results conform generally with the UCS results for the sandstone strength.

5.2. Ground Summary

A ground Investigation was undertaken in order to assess the ground conditions for development of a new build house on sloping ground off Penistone Road.

BH01 was drilled from a ground level of circa 156.5m aOD and BH02 was drilled from a ground level of circa 160m aOD.

The site is underlain by topsoil which extends to a depth of 0.50m bgl. The topsoil is everywhere underlain by loose to medium dense yellow brown sandstone gravel and cobbles in a fine matrix representing weathered sandstone.

At 2.50m to 3.00m depth the weathered sandstone is underlain by moderately strong to strong thinly to thickly laminated light grey coloured coarse grained sandstone with rare micaceous laminations to between 4.78m (150.72maOD) in BH01 and 7.90m (152.1maOD) in BH02. In BH01 very strong sandstone was encountered between 4.78m to 5.33m, being thinly to thickly laminated with a light grey orange brown colour and medium grained.

Extremely strong sandstone was encountered below 5.33m (150.2maOD) in BH01 and below 7.90m (152.1maOD) in BH02.

The strong sandstone has a sufficient bearing capacity to support the loads imposed by the proposed residential house.

Groundwater was not encountered during drilling of the boreholes. Sump pumping may be required in any excavations following heavy rainfall. If during construction rainfall softens the founding horizon and service trenches, any softened material should be scraped away before pouring of concrete to ensure good bonding with the soil/rock.

The site is not suitable for soakaways. Although the weathered sandstone may absorb storm water, this may promote creep in the weathered strata, and all storm water should be directed to main drainage.

The topsoil or any made ground detected are unsuitable material on which to place foundations for the proposed new build house due to their vertical and lateral variation in composition and their low strength.

The underlying weathered sandstone is in a loose to medium dense state of compaction and has a suitable bearing capacity for light weight buildings placed on reinforced raft foundations on level ground.

The site for development is sloping and the bases of trees on adjacent quarried land indicate creep of the weathered material downslope. It is recommended therefore that the weight of the building is transferred to the underlying strong sandstone.

This could be achieved by the construction of deep strip footings or piled foundations.

The strip or piled foundations should support a reinforced raft of 300mm in thickness beneath the house footprint. The weight of the house will be supported entirely by the strong sandstone.

As the site is sloping, the possibility of creep in the weathered sandstone needs to be addressed. As foundations will be set into the sandstone bedrock, there will be no added weight to the loose material from the development of the house, thus creep is unlikely to be increased by the development.

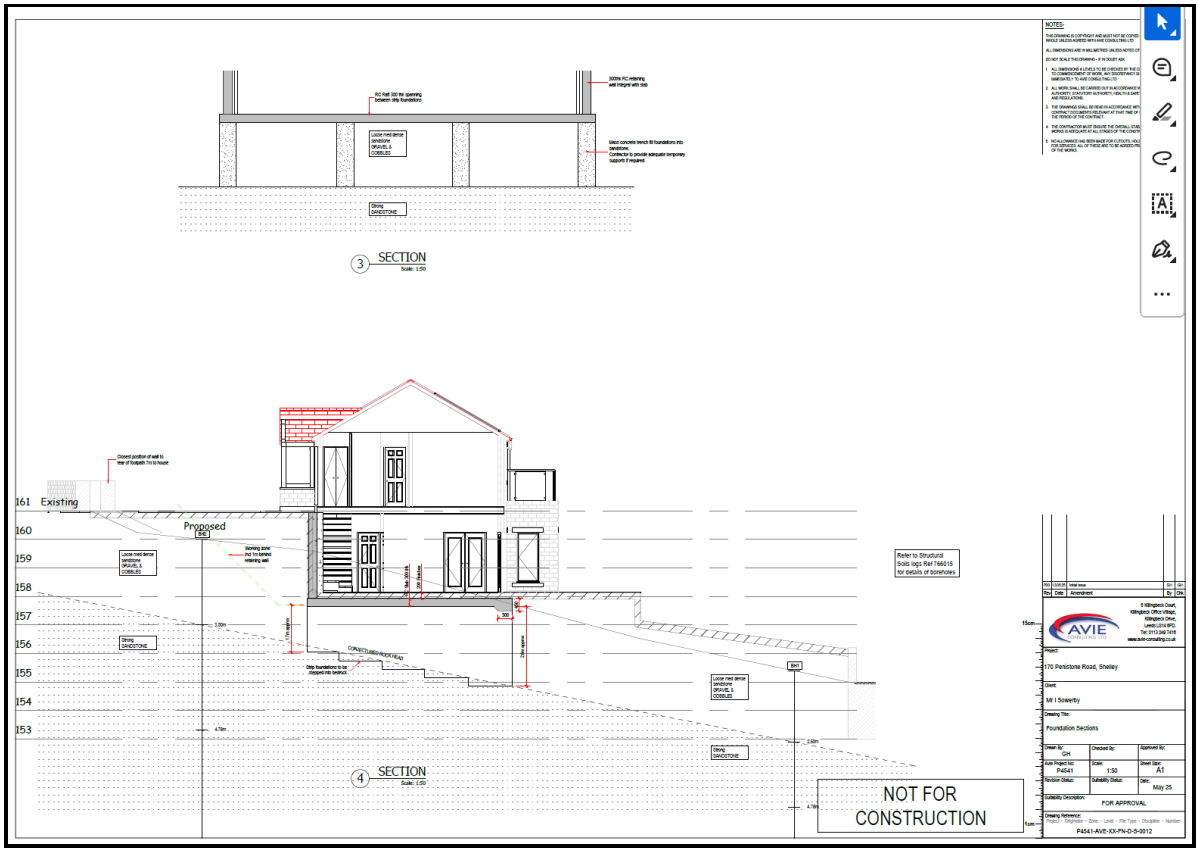

Figure 23

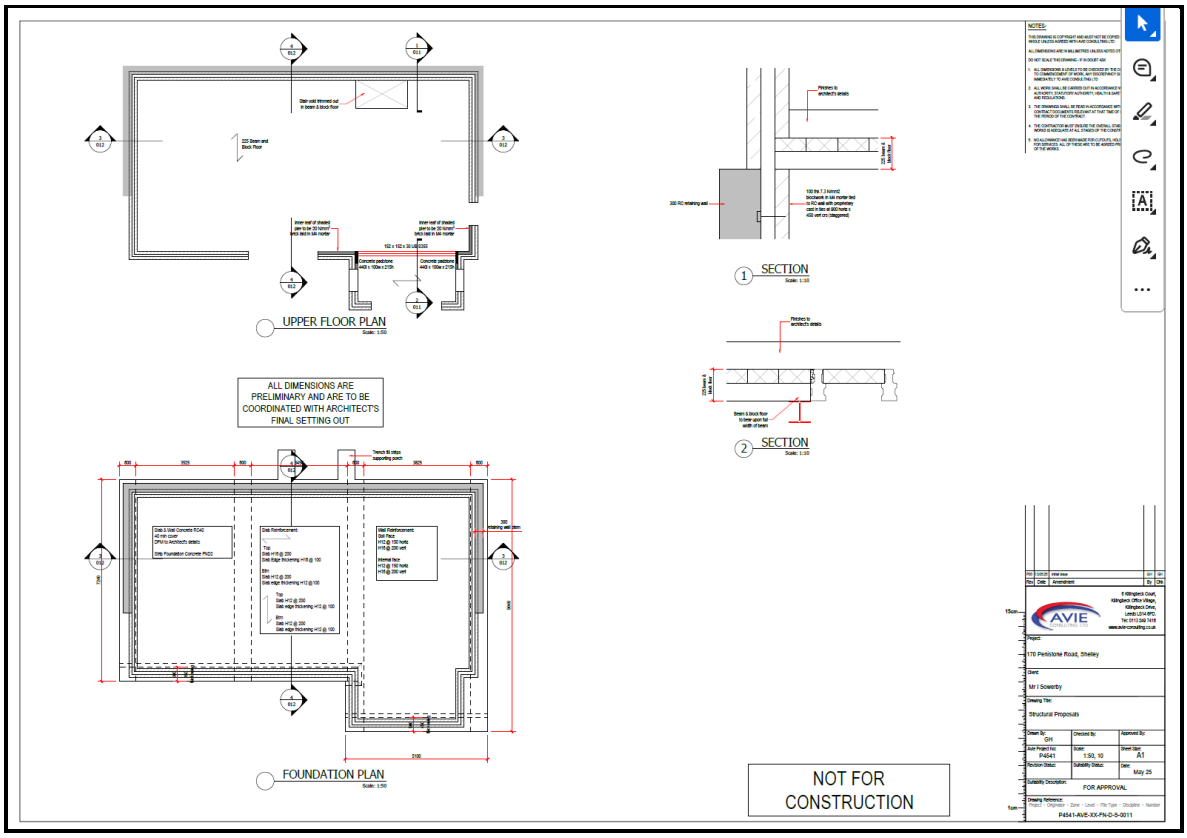

Figure 24

6. UPDATED GEOTECHNICAL RISK REGISTER

TABLE 7
Updated Geotechnical Risk Register

			Risk before Control				Risk after Mitigation		
	Hazard	Consequence	Likely L	Severity S	Risk = L*S	Mitigation	Likely	Severity	Residual Risk
	Surface Flow and Flooding								
1	The road is in a Flood Risk Area	Flooding of the site	1	1	2	Site is not in a Flood Risk Zone	1	1	2
2	Drainage allows surface water to flow over the site	Flooding of the site	3	4	12	Road and site drainage installed will reduce flood risk	1	1	2
3	Watercourses cross or flow immediately adjacent to the site	Flooding of the site	1	1	2	The nearest water course Shepley Dike lies at 7m below the lowest level of the site	1	1	2
4	The road lies below any surface water feature	Flooding of the site	2	2	4	The site lies 7m above Shepley Dike	1	1	2
	Subterranean (groundwater) Flow								
5	The site lies above an aquifer	Flooding	4	4	16	Groundwater levels in the aquifer lie at >3.5m below the site	1	1	2
6	The site extends below the surface of the water table	Flooded site Unstable ground	1	4	4	The water table is >3.5m bgl	1	1	2

			Risk before Control				Risk after Mitigation		
	Hazard	Consequence	Likely L	Severity S	Risk = L*S	Mitigation	Likely	Severity	Residual Risk
7	The site lies within 50m of a watercourse, well or a potential spring line	Flooded site	2	2	4	Only watercourse lies7m below site and 13m below the road	1	1	2
8	The development results in a change in the proportion of hard surfaced / paved areas	Flooding	4	4	16	Drainage will be installed and drain excess water to town drains	1	1	2
9	As part of the site drainage, more surface water, rainfall and run-off, than at present will be discharged to the ground (e.g. soakaways / SUDS)	Flooded ground Destabilising of ground Inflow into excavations	4	4	16	Surface water will be attenuated before discharge to watercourse No soakaways	1	1	2
10	The lowest point of the site is close to, or lower than, the mean water level in any local pond or spring line	Flooding	1	1	2	The site is above any water line in local ponds/springs	1	1	2
11	Groundwater Rise	Flooding	2	2	4	Unlikely to rise 6m	1	1	2
12	Water chemistry	Chemical damage to under ground concrete	1	1	2	No soluble sulphate in ground to cause aggressive damage to u/g concrete	1	1	2
	Ground Nature and Stability								
13	The ground has insufficient bearing capacity for proposed build	Ground subsidence and structural damage	2	5	10	The sandstone has sufficient bearing capacity for the proposed house at 2m to 3m bgl	1	1	2
14	The site lies on soft or compressible ground	Ground subsidence and structural damage	2	2	4	The site not underlain by compressible material	1	1	2
15	The site lies on running sands	Ground subsidence and structural damage	2	2	4	The site does not lie on running sands	1	1	2
16	The site lies over a backfilled quarry	Ground subsidence and structural damage	2	2	4	The site does not lie over a backfilled quarry	1	1	2
17	The site overlies solution cavities	Ground subsidence and structural damage	2	2	4	The site does not lie over any solution cavities based on the geology	1	1	2
18	The soil has a potential for a landslip	Ground collapse	3	4	15	Soil may creep overtime and mitigation required	4	4	16
19	The bedrock has a potential for a landslide	Ground collapse	3	4	15	The bedrock dips at 10 to 15 degrees to the horizontal into the site, ie north	1	1	2
20	Slopes, natural or manmade in the vicinity of the site	Slippage of ground and damage to site and adjacent road	3	4	15	Adjacent slopes / rock faces unlikely to affect site	1	1	2
21	The proposed re-profiling of the site changes slope stability	Slippage of material to damage site and road	5	5	25	Reprofiling will not alter or create steeper slopes adjacent to the road	1	1	2

			Risk before Control				Risk after Mitigation		
	Hazard	Consequence	Likely L	Severity S	Risk = L*S	Mitigation	Likely	Severity	Residual Risk
22	Neighbouring land includes railway cuttings or embankments	Slippage of soil and damage to site	1	1	2	No adjacent railway cuttings or embankments	1	1	2
23	Works proposed within areas where trees have been removed	Possible ground heave due to readjustment of moisture levels in the soil	2	2	4	No trees felled within area of proposed house construction.	1	1	2
24	The clay strata has a history of seasonal shrink-swell subsidence in the local area	Ground subsidence or heave due to varying moisture levels in the clay ground	3	3	9	No evidence of such movement as site is not underlain by clay with a high plasticity	1	1	2
25	The site is overlying an area of previously worked ground?	Settlement of fill and damage to site and adjacent road	2	2	4	A quarry lies off site, there was no quarrying beneath the site or on the wider site area.	1	1	2
26	The site lies over (or within the exclusion of) tunnels, e.g. railway lines?	Collapse of tunnel and damage to road	1	1	2	Site is not located over any recorded infrastructure	1	1	2
	Mining Stability								
27	The site is undermined at a depth >30m bgl for coal or other mineral	Site instability	1	1	2	Unlikely to cause detriment to site stability due to substantial cover of competent strata, >10 times any coal thickness	1	1	2
28	The site is mined for coal at depths of <30m bgl?	Potential ground subsidence and damage to site and road	5	5	25	Mining investigation did not record any mining at <30m beneath the site	1	1	2
29	There is evidence of a mine shaft on site	Collapse of Mine Shaft and damage to site and roadway	3	3	9	No evidence of any circular features and no shafts recorded by the Mining Remediation Authority	1	1	2
30	Coal is available to be mined in the future beneath the site	Possible ground subsidence to site if mining undertaken	3	3	9	There is no risk of workable coal being mined at a depth < 30m bgl in the future	1	1	2
31	The site lies on a backfilled opencast site	Ground subsidence	1	1	2	The site does not lie on an opencast site according to Mining Remediation Authority and archival maps	1	1	2
	Toxic Gases								
32	There is putrescible material beneath the road such as landfill that could give off toxic gases?	Entry into drainage and causing explosion if sparked and damage to site	1	1	2	No landfill or putrescible material detected in TPs and BHs. No landfill within 250m of site	1	1	2
	Contamination								
33	Contamination has been detected beneath the site	Damage to human health	2	2	4	Site investigations did not detect any contamination	1	1	2

			Risk before Control				Risk after Mitigation		
	Hazard	Consequence	Likely L	Severity S	Risk = L*S	Mitigation	Likely	Severity	Residual Risk
34	Imported material contains contamination?	Damage to human health	1	1	2	No imported material	1	1	2
35	Contamination was detected that could detrimentally affect the site	Contamination of site and risk to human health	3	3	9	Site investigations did not detect any contamination that could affect human health	1	1	2
	House Construction								
36	The house is constructed on made ground	Subsidence of site and damage to house and road surface	3	3	9	The site lies on bedrock, no made ground detected in GI	1	1	2
37	The site strata have insufficient bearing capacity	Subsidence of the site and damage to site and road surface	4	4	16	The bedrock is sandstone which has substantial bearing capacity in excess of 250kN/m2.	1	1	2
38	The house is constructed on unsuitably compacted fill	Ground subsidence and damage to house and adjacent road	2	2	4	No engineered fill detected on site	1	1	2
39	Difficult construction due to buried old services and foundations	Severing services Settlement over old services	2	2	4	No buried services encountered during GI, site formerly a garden	1	1	2
40	Aggressive ground conditions	Corrosion of PE/PVC pipework beneath site Sulphate attack on buried concrete pipework	2	2	4	Utilities installed with clean inert pipe bedding material No recorded high sulphate levels in soil tests beneath site	1	1	2
41	Unusable excavated soil	Costly disposal off site	2	2	4	All excavated soil will be suitable for reuse on site	1	1	2
42	Instability caused by excavation for foundations and services	Ground subsidence	4	4	16	Requires mitigation measures of temporary support for excavations	1	1	2
	A629 Road								
43	Construction of house destabilises road	Costly repairs to road	3	4	12	Road is constructed on thickly bedded strong sandstone dipping to the north	1	1	2

7. GEOTECHNICAL DESIGN and GEOTECHNICAL MEASURES

The geotechnical risks that remain after consideration of the primary sources (Desk Study) and ground investigation (GIR) are that;

1 The soil may creep downslope
2 Instability of the site may be caused by excavation for foundations and services

These scenarios may detrimentally affect the stability of the house and adjacent road and mitigating measures are required in geotechnical design.

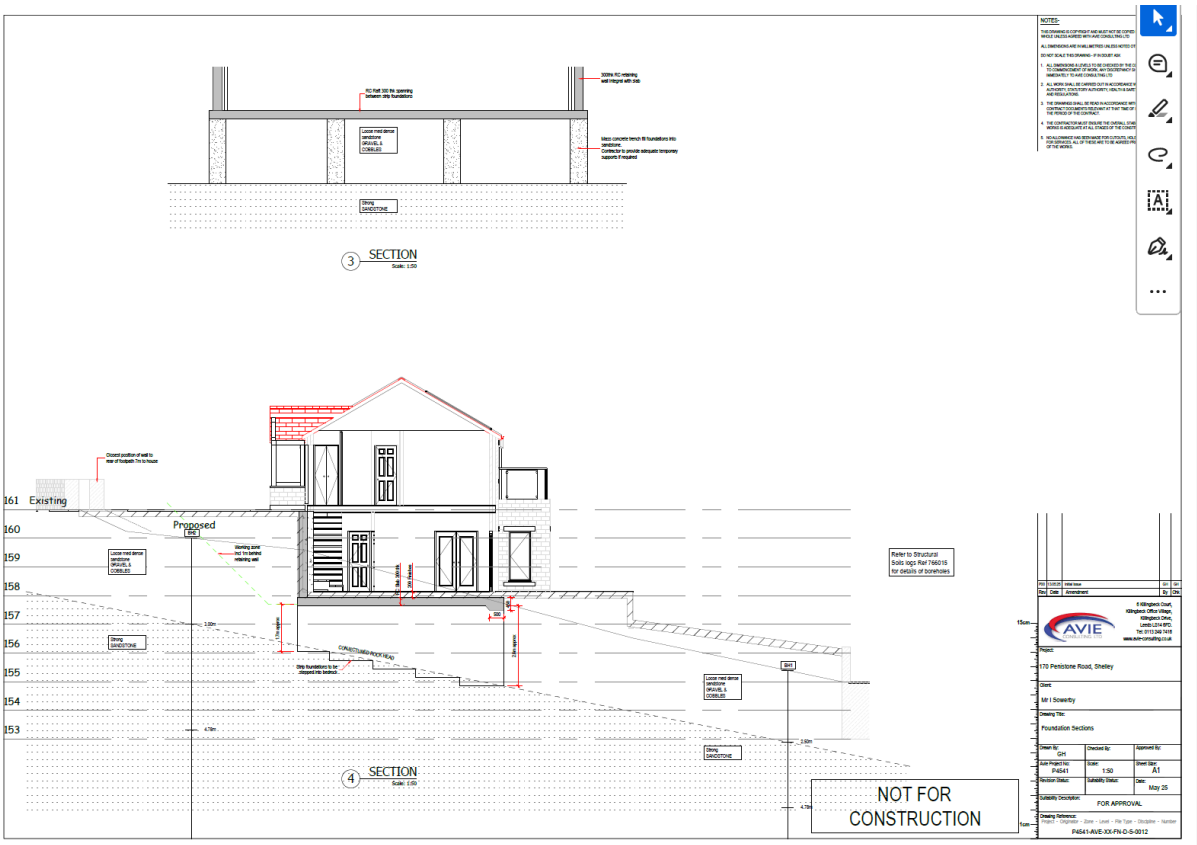

Figure 25 Foundation Sections

The house will be two storeys high with the upper floor the same level as the road and the lower level in basement, open to the rear garden. The basement will be constructed as a reinforced concrete raft with retaining walls to three sides. The raft will be supported on mass concrete strip foundations perpendicular to the slope of the hillside to transmit the loads through a layer of loose medium to dense sandstone gravel and cobbles, to found on the underlying strong sandstone.

The design for foundations are to construct strip footings founded on the sandstone bedrock at circa 1.7m to 2.00m bgl as shown in Figure 25 above.

Adjacent to the road, the retaining wall for the north wall of the house will prevent any soil creep. In the rear garden a gabion wall will be constructed to prevent soil creep occurring.To prevent any soil movement during construction, all excavations should be supported, both in the short and long term.

Figure 25 shows sections through the proposed building and shows that the basement and a 1.0m wide working zone is sufficiently far away from the adjacent road as to not affect the highway.

The structural design has been undertaken by Avie Consulting Ltd, using assumptions of a wall stem of 300mm thick concrete a raft slab of 300mm thick concrete, raft edge thickenings of 450mm thick concrete and trench fill foundations of 600mm thick concrete.

With proposed range of soil parameters to be used in the design of earth retaining elements to be:
Y =17kN/m3, Ko=0.50, Kp=4.98, ϕ=30 degrees and δ=15 degrees.

Groundwater level is measured as below the depth of foundations and should not be a concern during construction. If during and after heavy rainfall the founding layer for foundations, walls or services is softened, then this material should be removed before pouring concrete.

The geotechnical risk register indicates that the site is not at risk of flooding, mining instability, solution cavities, toxic gases, contamination, infilled ground and unsuitable bearing strata, bedrock landslide, clay shrinkage or aggressive ground to affect underground concrete all as detailed in Table 7.

Based on the geotechnical risk assessment, it is concluded that during and following construction of a new house on the garden of 170 Penistone Road, this will not detrimentally affect the ground stability. This is provided good construction practice is followed and all excavations have temporary support.

The borehole BH02 sunk adjacent to the road, and the inspection of the quarry face to the rear of 172 Penistone Road, indicates that the A629 road is constructed on high strength massively bedded sandstone bedrock. Although the quarry face is close to the road footpath, inspection revealed no damage to the footpath or adjacent road. The sandstone dips to the north beneath the road presenting stable ground. It is unlikely that the development will detrimentally affect the A629 road.

8. GENERAL REMARKS

This report truly reflects the conditions found during the desk study and ground investigation. Whilst the work was undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research, the results portrayed only pertain to the information attained, and it is possible that other undetected information and undetected ground and gas conditions, undetected mining conditions and undetected contamination may exist. The ground investigation was only undertaken within the site boundaries and should not be used for interpretation purposes elsewhere. These conclusions are only a brief summary of the report, and it is recommended that the report is read in full to ensure that all recommendations have been understood.

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Appendix **A**

FRANCES A BENNETT

BSc CGeol FGS FIMMM C.WEM MCIWEM CEnv MIEnvSci

QUALIFICATIONS

Academic	BSc in Geology with Honours, London University	1973
	HNC Soil Mechanics, Commendation	1976
Professional		
	Chartered Geologist	1991
	Geological Society of London - Fellow	1974
	Institute of Materials, Minerals and Mining - Fellow	1993
	Chartered Environmentalist	1992
	Midland Geotechnical Society - Member	1978 to 1985
	Institute of Environmental Science - Member	1991
	Chartered Water & Environmental Manager	1993
	Institute of Environmental Assessment – Associate Member	2000 to 2015

EXPERTISE 48 years of experience in geotechnical, mining, waste, water and environmental fields.

- Established two companies to advise on geotechnical, mining, hydrogeology and environmental issues and design and install ground source heating from groundwater sources.
- Acquire clients and liaise on all aspects of land acquisition and solutions to development.
- Manage team of geotechnical, mining and environmental engineers.
- Expert witness/Public Inquiries for geotechnical/water /mining/environmental concerns.

Geotechnical

- Design ground investigations and report on suitable foundations for development.
- Ground investigation & foundation design for residential/commercial/wind farms.
- Soil and rock slope stability assessment and design of slope stabilisation works.
- Design of soil nailing/rock anchors for slope stabilisation.
- Design of special foundations on difficult ground.

Environmental

- Pre purchase environmental audits of residential and industrial premises.
- Waste Disposal Licence Application/Surrender, Landfill Design and monitoring.
- Environmental assessments for waste disposal, industrial, mines & roads.
- Environmental investigations and solutions to soil and water contamination.
- Design and supervision of environmental remediation and site Validation.

Hydrogeological

- Water Resource Assessments for industry and private estates.
- Water well design, drilling, pump testing and commissioning.
- Design of water sources for geothermal heating.
- Hydrogeology and Hydrology Reports for wind turbines
- Fire Water Risk Assessments for industry

Mining and Quarrying

- Calculation of mining subsidence, negotiation with British Coal/The Coal Authority.
- Design and supervision of coal and stone mine and mine shaft stabilisation.
- Mining and Geotechnical investigation of former colliery sites.
- Estimation of mine/quarry reserves, design of excavation and restoration.
- Geotechnical Assessments of Quarries for Health and Safety.
- Assessment of gypsum reserves in Armenia for ERDB funding.

EXPERIENCE

1991-To Date **Principal of Ashton Bennett, Consulting Engineering Geologists and Environmental Scientists, Bridge Mills, Huddersfield Road, Holmfirth, HD9 3TW.** *www.ashton-bennett.com*

Initiated and established a consultancy to undertake geotechnical, mining and environmental projects, and to expand by winning a larger share of the market at home and abroad, by achieving a broad client base for the practice. Established sustained business relationships with blue chip companies to undertake substantial projects throughout the UK and Eastern Europe.

Presented seminars on aspects of geotechnical and mining problems and environmental concerns. Representation as Expert witness at Public Enquiries in all aspects of ground and groundwater.

Principal of Earthtest Energy, Designers and Installers of Ground Source Heat from groundwater. Bridge Mills, Huddersfield Road, Holmfirth, HD9 3TW. *www.earthtestenergy.com*

Initiated and established a company to design and install ground source heat using groundwater and employ geologists, hydrogeologists and mechanical engineers to ensure compliance with regulations and a complete design and commissioning package to ensure system is compliant and efficient whilst ensuring groundwater is returned to the aquifer for sustainability of resources.

Presented workshops and lectures on ground source heating systems to MPs and local groups.

Installation of ground source heating systems using groundwater, for domestic and commercial properties in England and Scotland. Installation of commercial ventilation and heat recovery.

Water and Environmental Projects:-

Environmental audits and statements for industrial premises including environmental investigation for multi-national Canadian Company on purchase of industrial land, including sampling and testing to USEPA standards. Design of remedial work, supervision, monitoring and validation of remediation.

Environmental investigations including liability assessments of land contaminated by mine waste and old gas works waste on sites throughout the UK, including design and supervision of remediation and validation for planning approval.

Environmental audits of commercial and industrial property for blue chip clients including General Electric USA, local authorities and Canadian industries.

Hydrogeology and Hydrology reports for planning for construction of wind turbines. Hydrogeology and Hydrology Reports for Basement Impact Assessments in London.

Design of waste disposal sites, licence granting and completion reports.

Fire water risk assessments for chemical industries, design of water attenuation tanks, liaising with Environment Agency, Network Rail and Fire Brigade to ensure compliance.

Environmental impact assessments for landfill projects, quarries, mines and major developments.

Expert witness representation on asbestos, waste disposal, water pollution and environmental concerns.

Investigation of mine water and recommendations for remediation.

Design and construction of water wells for industry, ground source heating, domestic and farms and for fire water for industry.

Presentation to Yorkshire Water of a feasibility study to use compensation water from Yorkshire water reservoirs to run a hydropower system to create electricity for community benefit.

Presentation to Yorkshire Water of the feasibility of constructing a water treatment plant underground at Brownhill in Holmfirth to protect the local environment and which was taken up by Yorkshire Water.

Geotechnical and Mining Projects:-

Assessment of mineral reserves for the government, for ERDB in Armenia and for large estates.

Expert Advice for European Regional Development Bank for funding a proposed gypsum quarry in Armenia, including site inspection, assessment of ground investigation reports and quarry design.

Mining and geotechnical ground investigations for design of foundations for wind farms.

Submission of applications and management of Government Grants for sites undermined by stone mines and coal mines and/or affected by contamination and landfill gas. Design of site investigations and remedial work to enable development.

Mining investigations to assess ground stability, design and supervision of ground stabilisation, and mine shaft stability, design of foundations for redevelopment. Assessment of potential contamination from underground fuel tanks, removal of tanks, remediation and validation for planning.

Design, supervision, assessment and reporting on all aspects of geotechnical studies for development of housing, offices, factories, rail yards, roads, canals, wind farms, geothermal heating and heavy industry sites.

Foundation design including settlement calculations, bearing capacity and pile design for housing, industrial and commercial clients throughout the UK. Geotechnical site investigations including design and supervision of special foundations for development on difficult ground for commercial and industrial clients and County Councils.

Slope stability assessments using SLOPE for embankments/cuttings and construction works. Rock stability analyses, design and supervision of soil nailing, rock bolting and rock anchoring. Geotechnical investigation of mine tip stability, design and supervision of ground stabilisation, design of foundations and regrading of slopes to enable redevelopment to proceed.

Assessment of slope failures in Devon and Scotland for Crown Estate, design and implementation of remedial stabilisation work. Representation for Knipe Point Owners on slope stability at Knipe Point, reporting and design of remedial works. Assessment of major landslip in Penicuik, Edinburgh, liaise with SEPA and design of composting of landslip material to reduce further risk.

Mining, Geotechnical and Environmental investigation and assessment of former coal mines and gas works in the UK for local authorities.

Reporting for and expert witness for Public Inquiries for geotechnical and mining disputes including proposed landfill on former mine next to the River Calder in Wakefield.

Undertaking Basement Impact assessments for proposed development of basements in London, Essex and Oxford with impact assessment and design of foundations and mitigating measures to ensure safe design and construction.

Expert Witness representation for slope stability where 5 houses were demolished in Whitby and for JLR for a car showroom suffering substantial subsidence and structural damage.

1988-1992 **Associate Geotechnical Engineer, Wakefield**.

Joined a small practice established for four years to increase its turnover by winning large infrastructure projects and broadening its geographical base. Designed a brochure, chaired seminars and presentations to lift the profile and broaden the client base for the practice.

Geotechnical Investigations for urban renewal projects in Birmingham for design of pile and pile caps for bridge to carry 80 T trucks, and for safety audits on canal slopes for British Waterways.

Ground and methane investigations for nationwide housing and industrial developers including supervision of piling and vibrocompaction contracts, underpinning and slope stability. House subsidence investigations.

Design of ground investigations to determine extent of shallow mining, design and supervision of remediation of mines and design of special foundations.

Investigation of water pollution from mines and recommendations for remediation in consultation with Environment Agency.

Advice to legal profession and evidence in environmental issues and in disputes including ground and foundation behaviour. Expert witness representation on slope stability, mining and waste disposal and water pollution disputes.

1978-1988 **Associate Engineering Geologist, A B Malkin, Consulting Geologists of Hanley, Stoke-on-Trent.**

Gained valuable experience in geotechnical design, mineral assessment, mining, environmental assessments and earthworks. Responsible for all aspects of projects from liaison with clients, supervision of investigation and remedial works to liaison with NHBC and councils.

Geotechnical and mining experience included estimation of gravel reserves for RMC, design of working programmes and site restoration, site investigation to locate old mine workings and mine shafts, and supervision of grouting works and foundation recommendations, calculation of mining subsidence past, present and future for clients such as Jaguar Cars Ltd., inspection of and remedial work to buildings damaged by subsidence.

Mining assessment for British Coal's proposed Park Mine near Stafford, and analysing effects of subsidence on the River Trent floodplain, GEC's Factory, Stafford sewage works and farmland.

Earthworks restoration of a 24 hectare disused sand and gravel quarry, comprising design and supervision to produce suitably compacted fill to develop 300 houses, and to stabilise 30m slope.

Environmental assessments of waste disposal sites in old marl and sandstone pits. Rock slope assessment and stabilisation and installation of rock anchors.

Assessment of pollution to large trout ponds from mine water, design of remediation.

Mar'78-Jul'78 **Engineering Geologist, Cooper MacDonald & Partners, Consult Civil Engineers, Epsom.**

Responsible to Head of Department for all aspects of designing, tendering, site supervision and reporting of site investigations, including settlement analyses of projects in Birmingham and Saudi.

1977-1978 **Engineering Geologist, Engineering Geology Unit, British Geological Survey, Edinburgh.**

Responsible for all site investigations in Scotland, including site supervision, setting up a mobile laboratory, surveying, geomorphological studies and geotechnical reports.

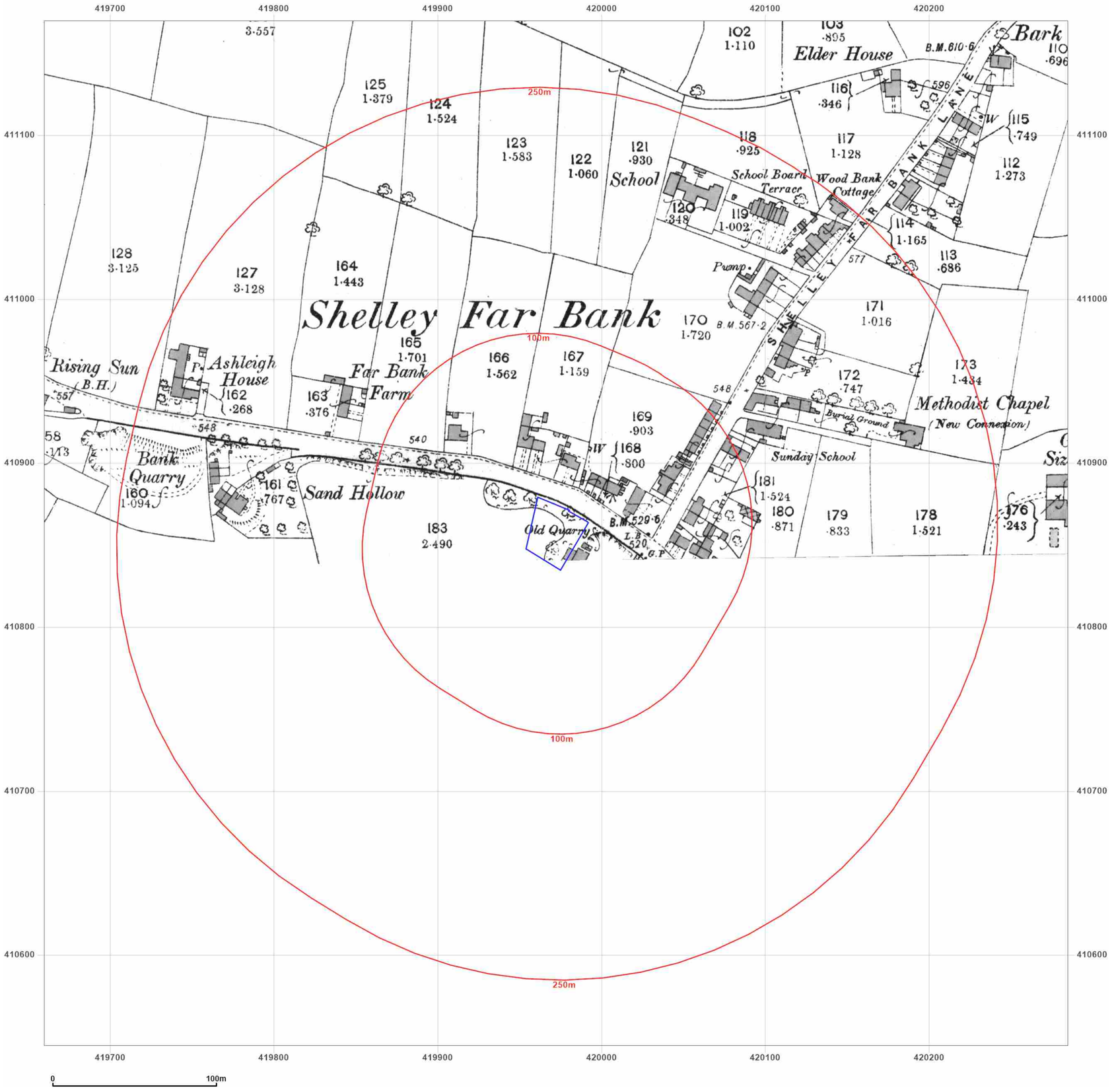
Responsible for equipping an engineering geological laboratory, and for establishing a data bank for geological information from the North Sea, and assessing feasibility of similar projects.

1973-1977 **Engineering Geologist, Howard Humphreys Ltd, (now Kellogg Brown and Root) Consulting Civil Engineers, Leatherhead.**

Training in soil mechanics and foundation engineering. Engaged on reviews of geological literature, maps and aerial photographs, geological, geomorphological and hydrogeological field mapping. Soil and rock slope stability analyses for M4 motorway cuttings. Logging tunnel in Coal Measures strata and providing detailed mining and geotechnical maps for County Council.

Collation of geological information for 300 boreholes sunk in Libya, producing geological maps and interpretative reports for development for water attenuation and sewage treatment works for Benghazi and Tripoli Main Drainage.

Appendix **B**



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Huddersfield, HD8 8HZ

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Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: County Series
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Scale: 1:2,500
Printed at: 1:2,500

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Revised 1893
Edition N/A
Copyright N/A
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Map Name: County Series

Map date: **1906**

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Surveyed 1906
Revised 1906
Edition N/A
Copyright N/A
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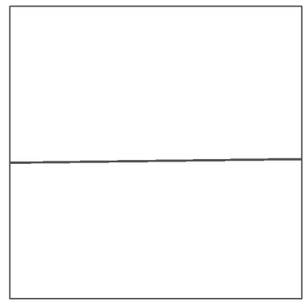

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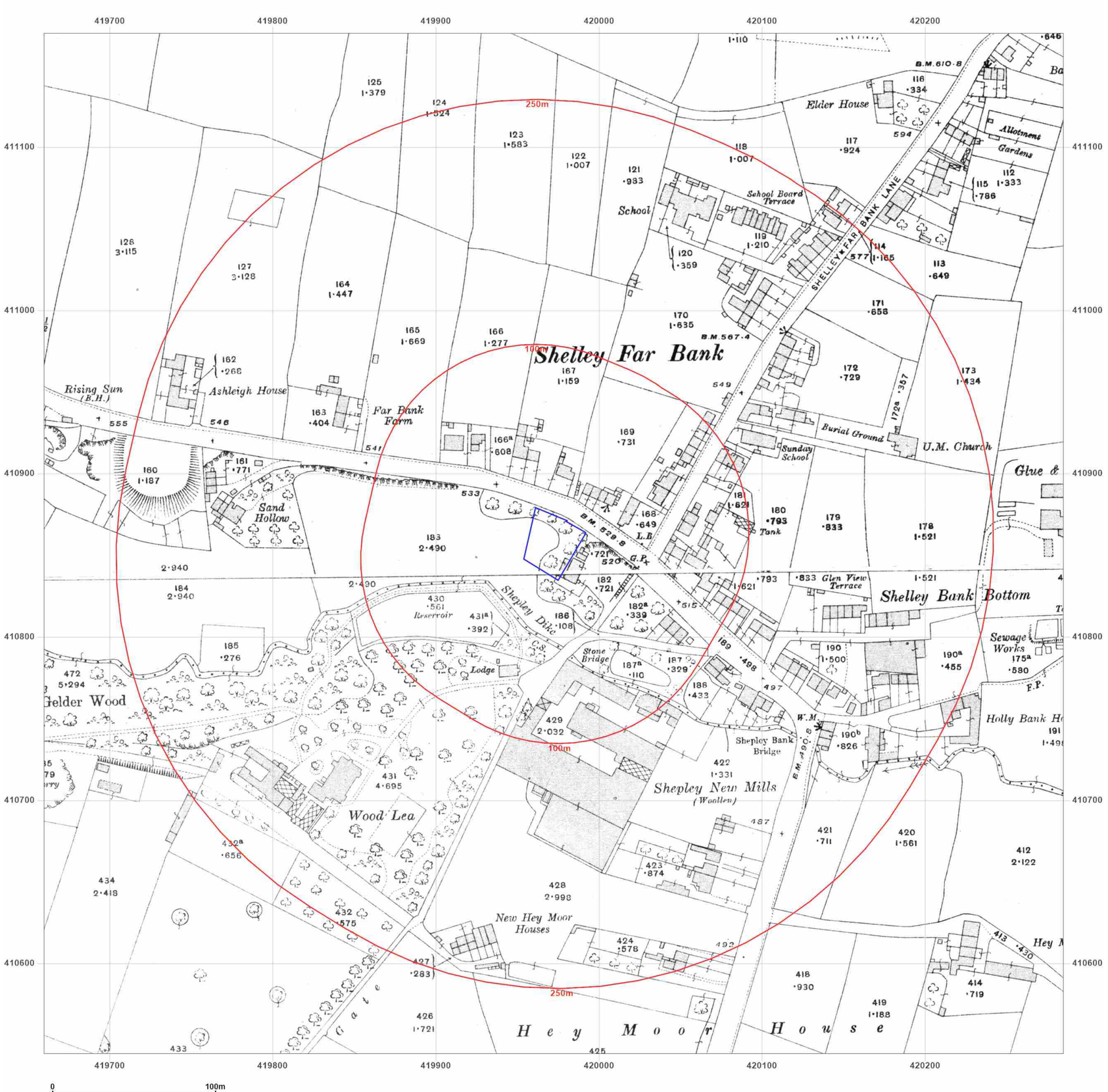

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Grid Ref: 419972, 410857

Map Name: County Series

Map date: **1913**

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Surveyed 1913
Revised 1913
Edition N/A
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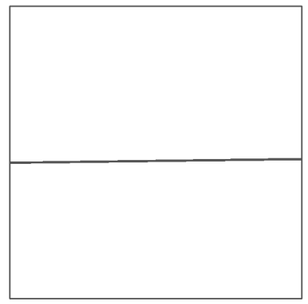

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Map date: **1959-1960**

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Copyright 1959
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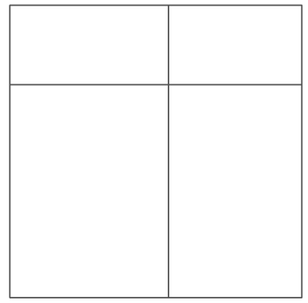
Revised 1959
Edition N/A
Copyright 1960
Levelled 1930



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Map Name: National Grid

Map date: **1959-1960**

Scale: 1:2,500

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Revised N/A
Edition N/A
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Revised 1959
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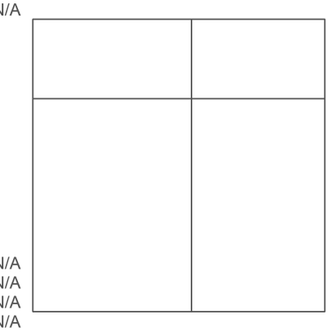

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Report Ref: CMAPS-CM-1194429-4873-141124HIS
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Map date: **1976**

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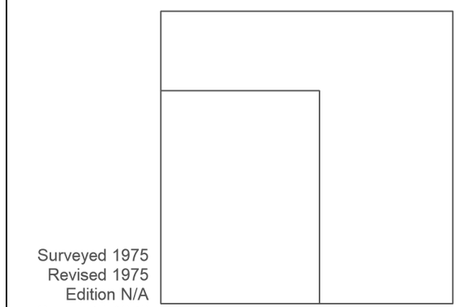

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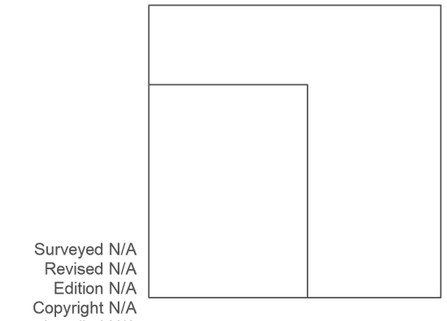

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Map Name: National Grid

Map date: **1975-1978**

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Printed at: 1:2,500

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Edition N/A
Copyright 1978
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Surveyed 1976
Revised 1976
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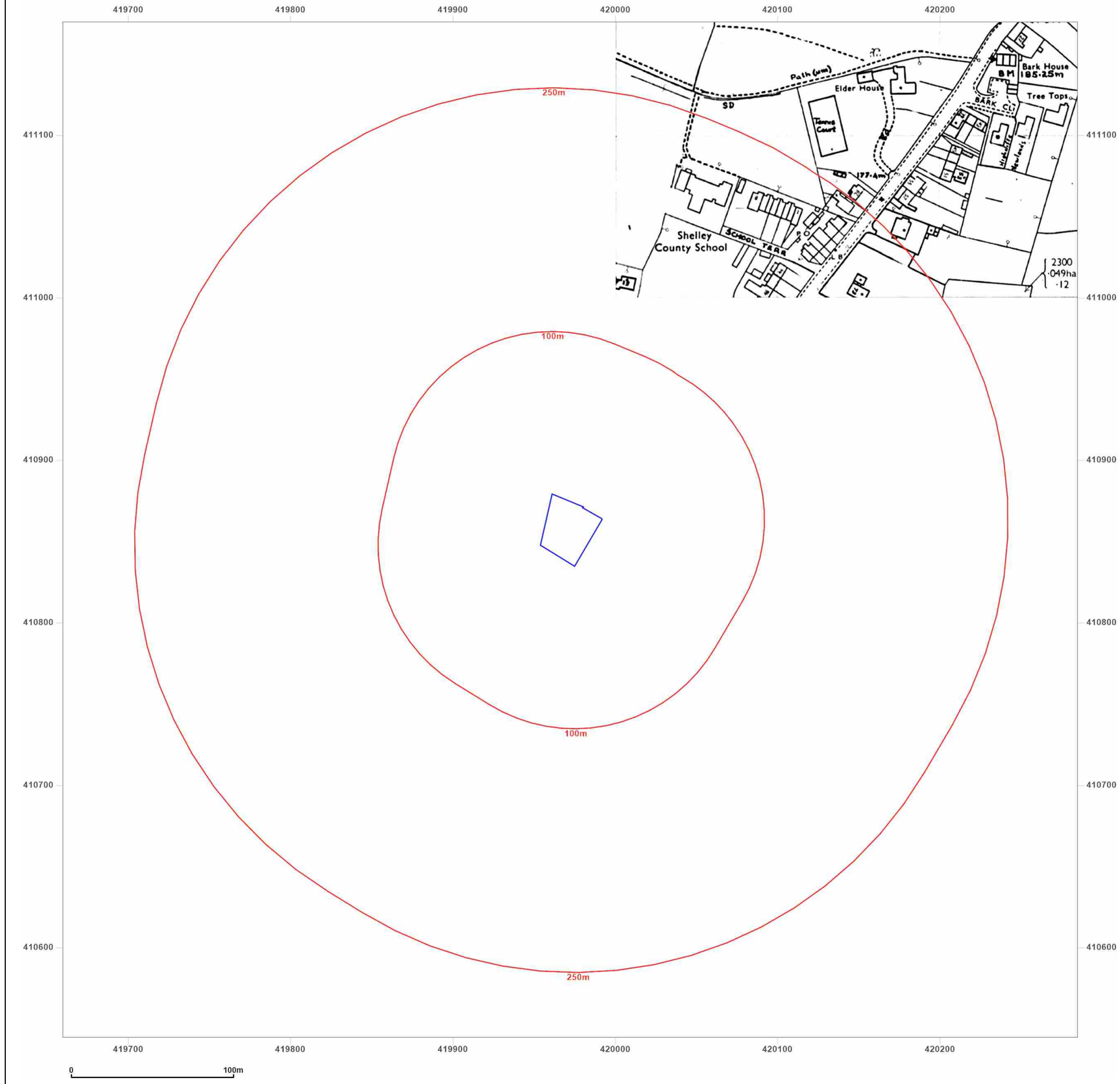

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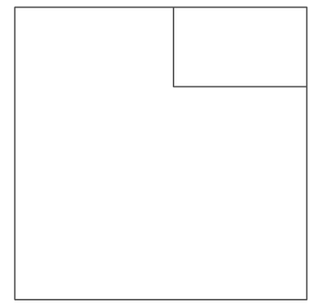

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Map Name: National Grid

Map date: **1987-1992**

Scale: 1:2,500

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Revised N/A
Edition N/A
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Report Ref: CMAPS-CM-1194429-4873-141124HIS
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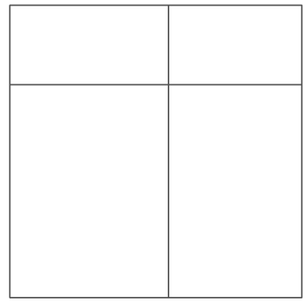

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Client Ref: CMAPS-CM-1194429-4873-141124
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Printed at: 1:2,500

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Revised N/A
Edition N/A
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Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

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Copyright 1994
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Production date: 14 November 2024

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CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid

Map date: **1994-1995**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1995
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
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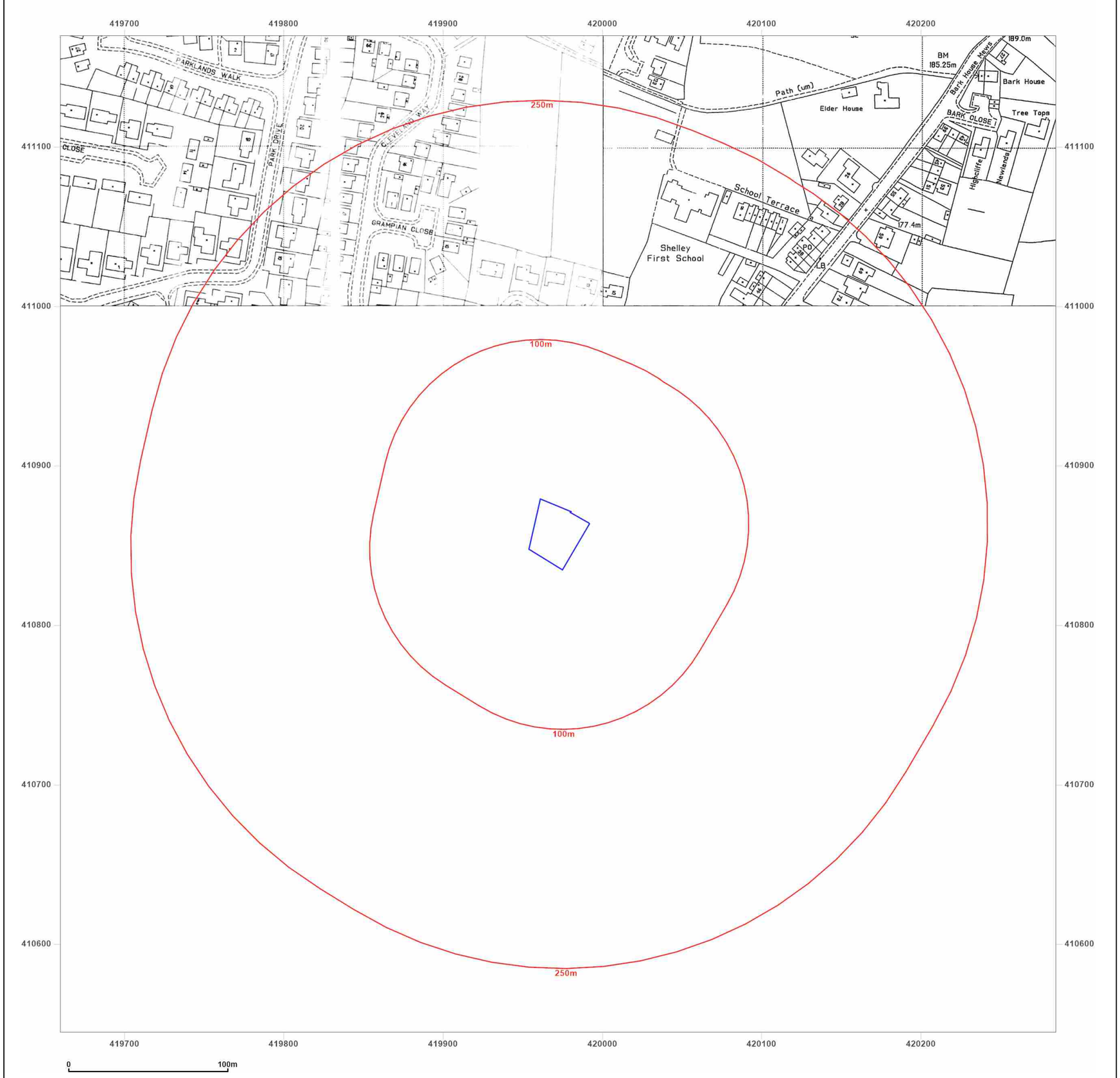

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Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid
Map date: **1995**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
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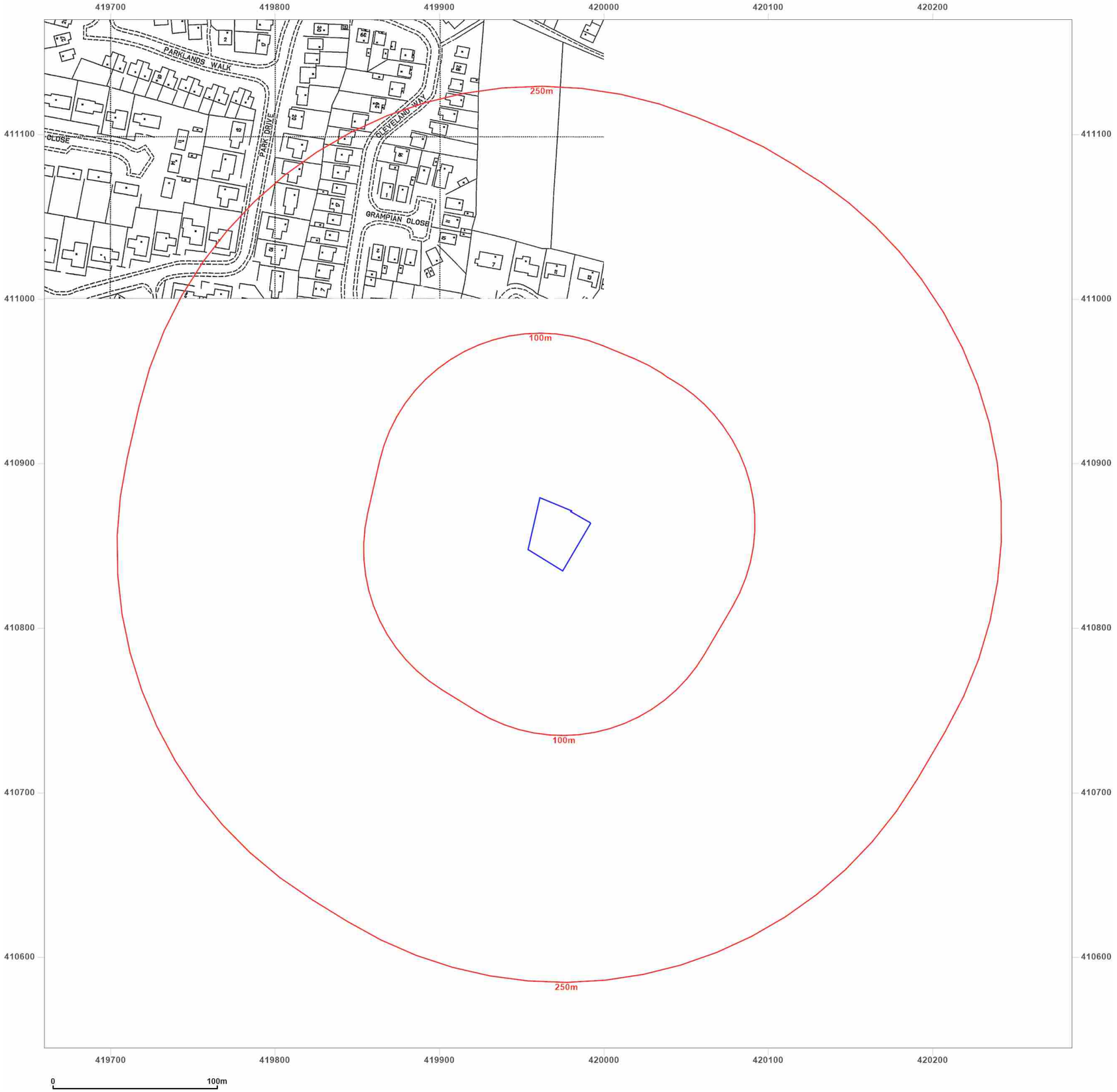

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid

Map date: **1995**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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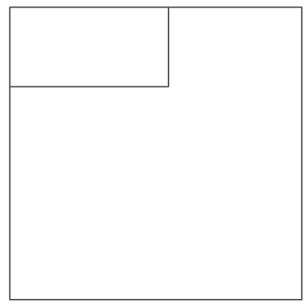
Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
Levelled N/A



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Site Details:

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Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: LandLine
Map date: **2003**
Scale: 1:1,250
Printed at: 1:1,250

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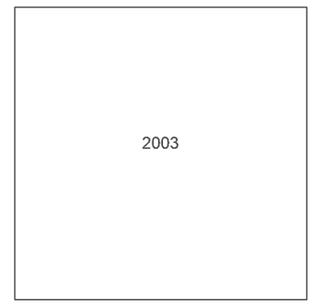

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Production date: 14 November 2024

Map legend available at:
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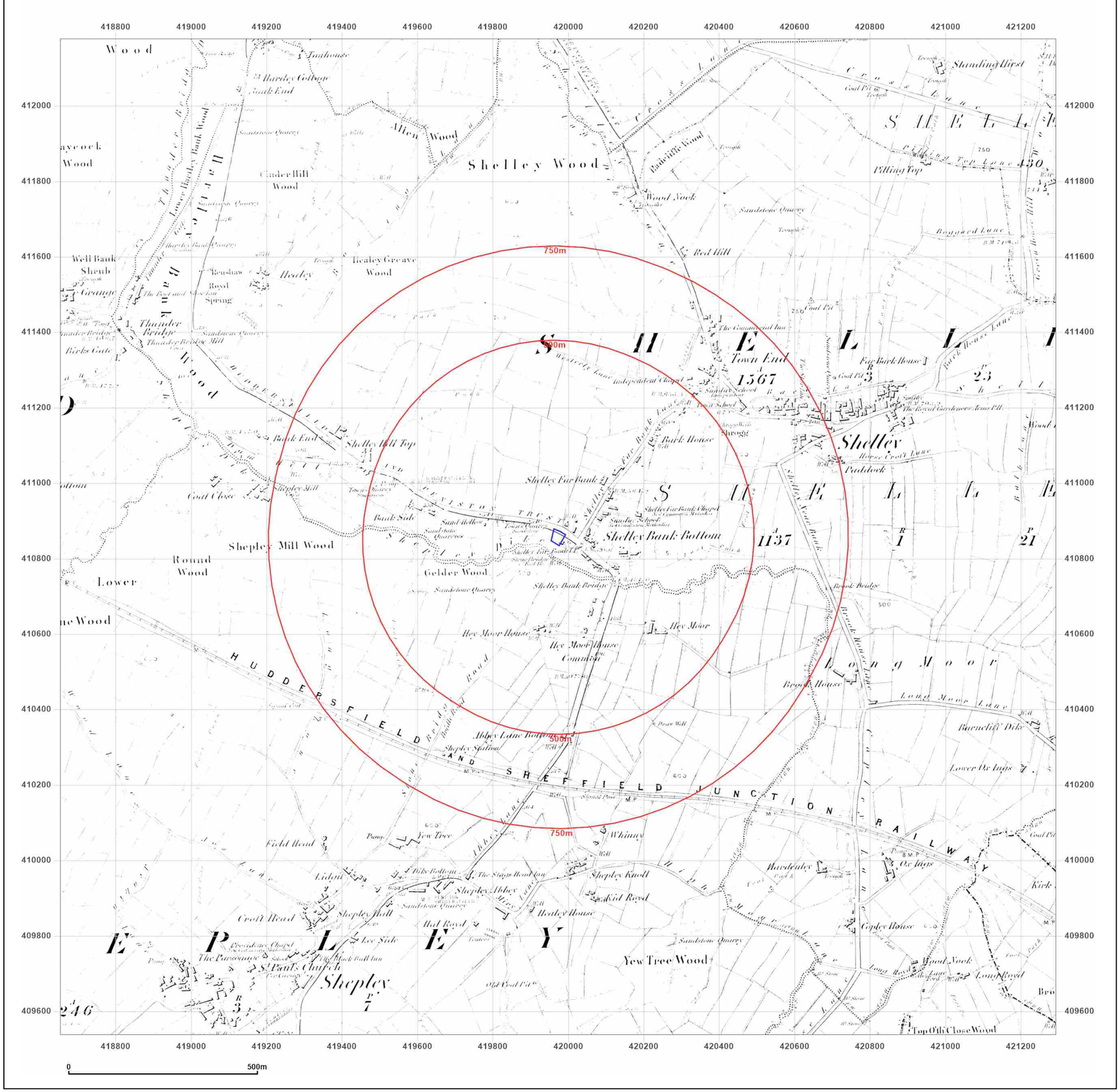

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Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: County Series

Map date: **1854**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1850
Revised N/A
Edition 1854
Copyright N/A
Levelled N/A

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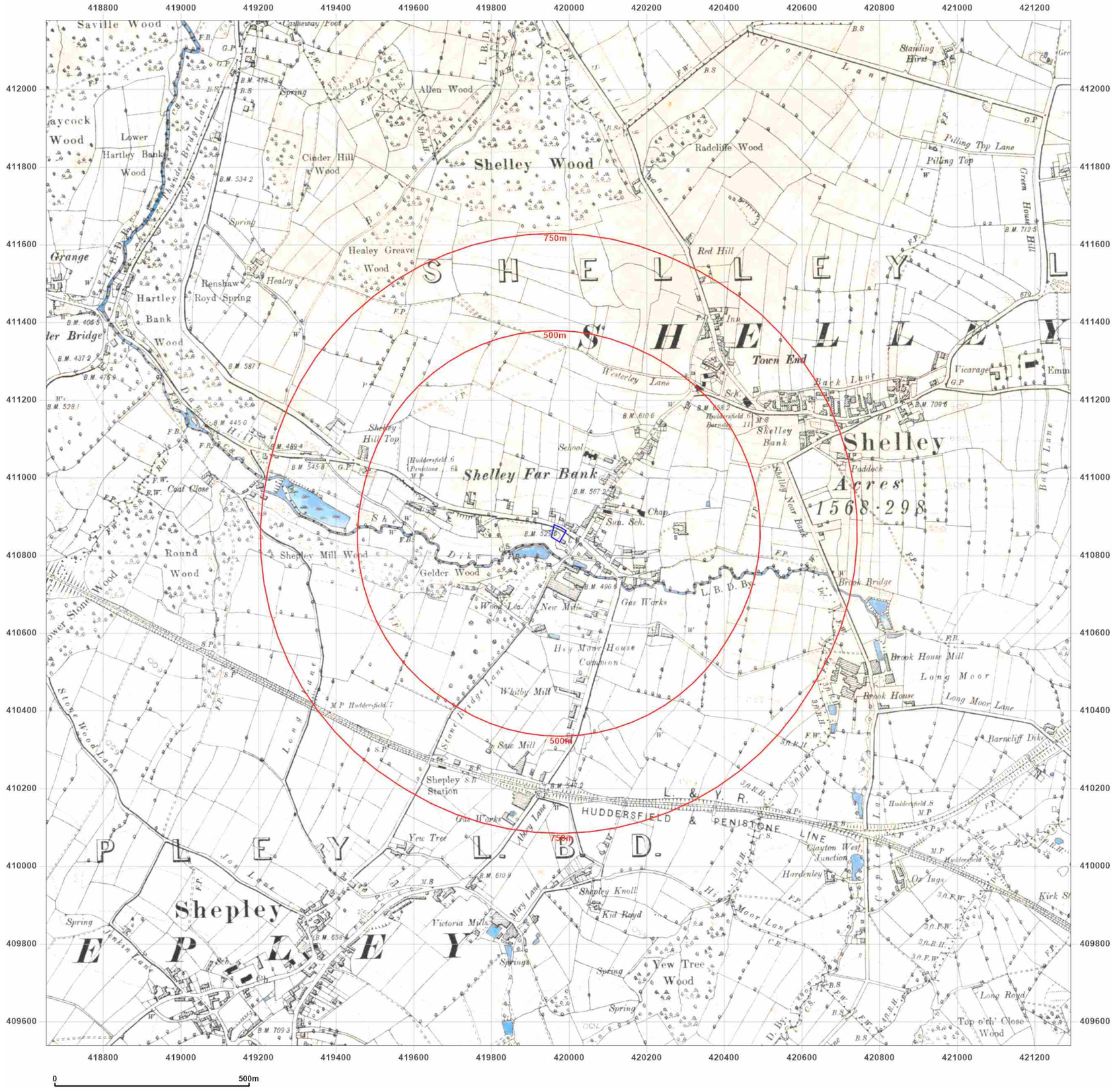
Production date: 14 November 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: County Series

Map date: **1892**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 14 November 2024

Map legend available at:
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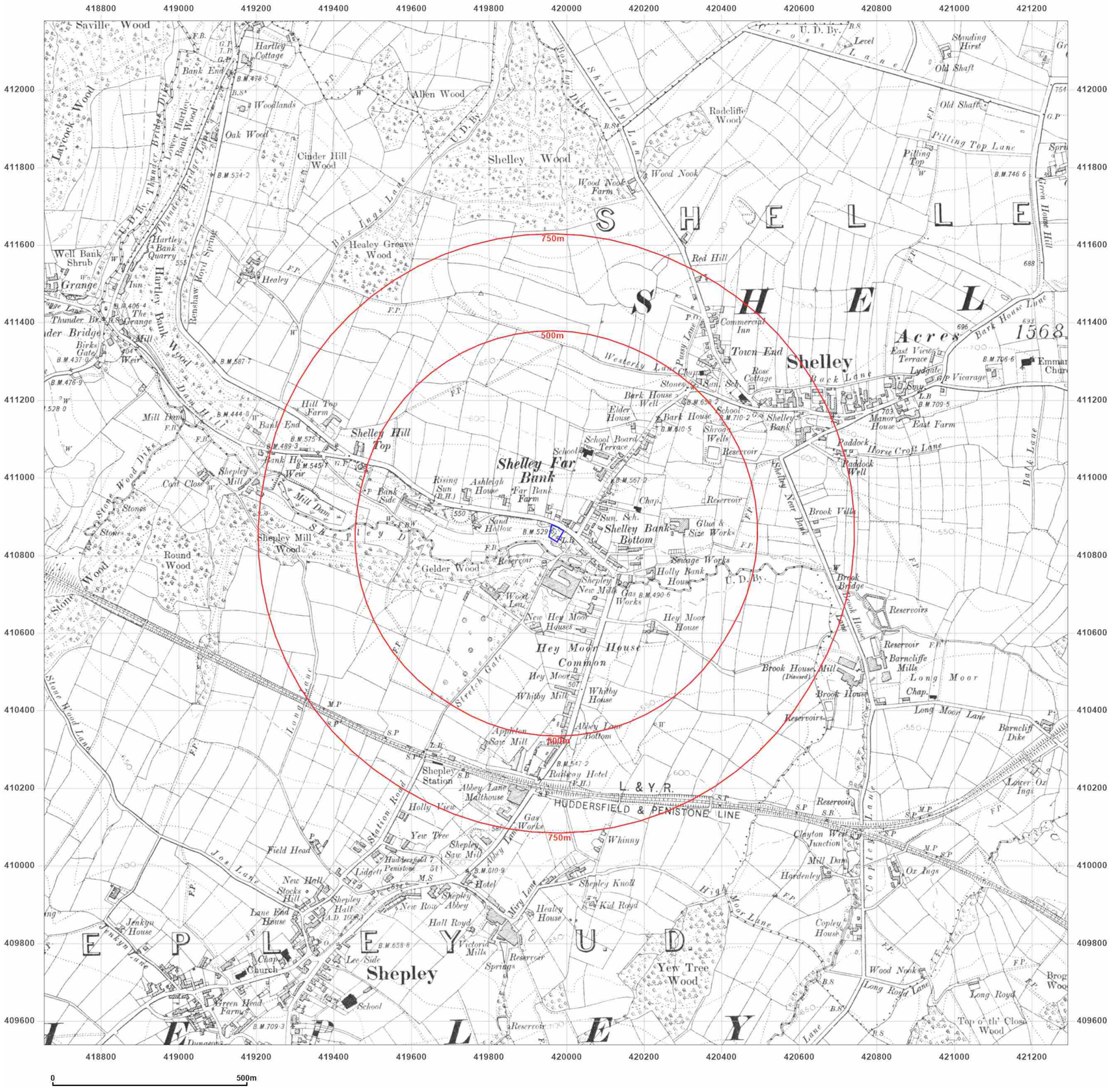

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: County Series

Map date: **1904**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1892
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

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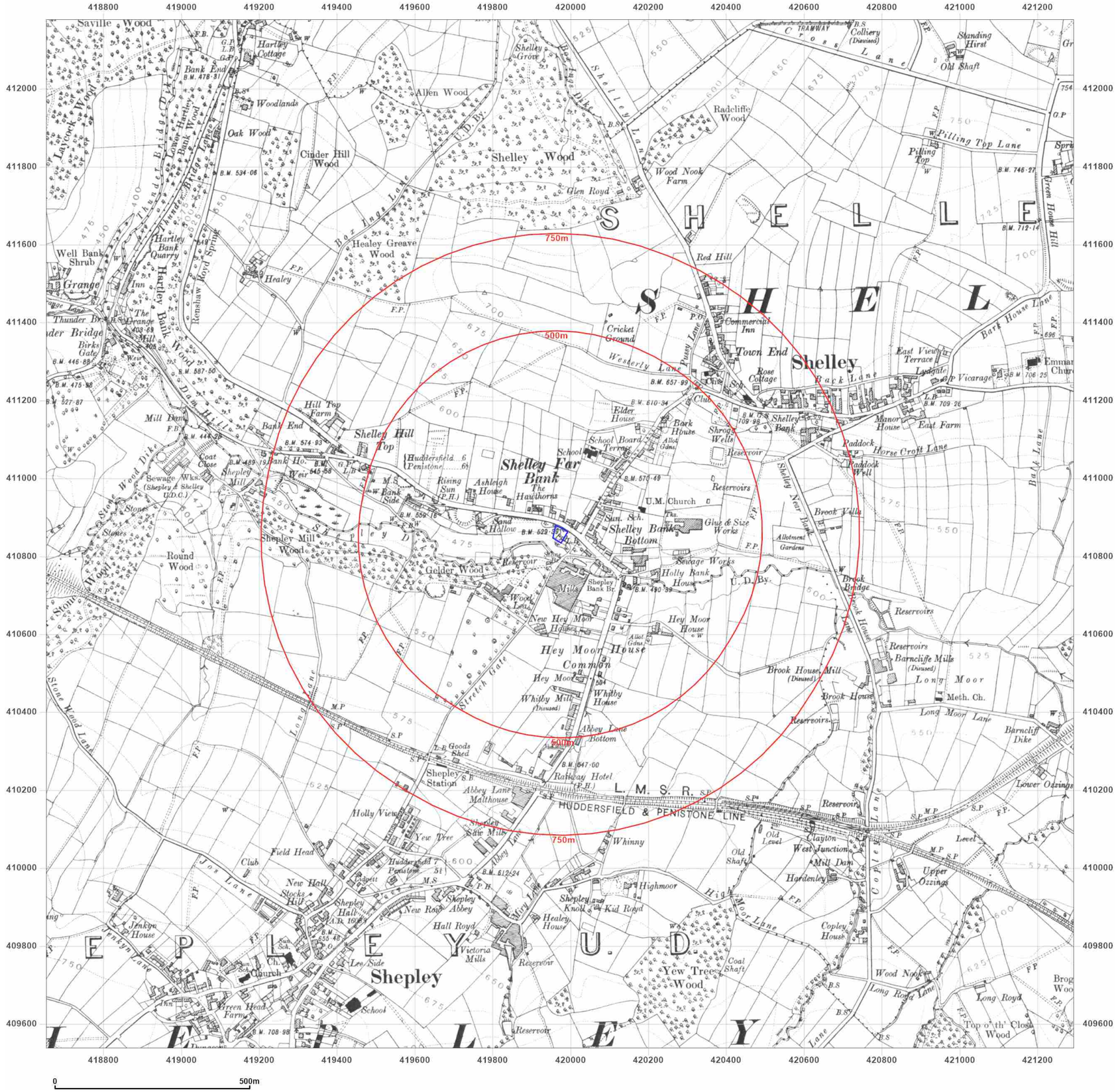

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: County Series

Map date: **1932**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1851
Revised 1932
Edition 1932
Copyright N/A
Levelled N/A

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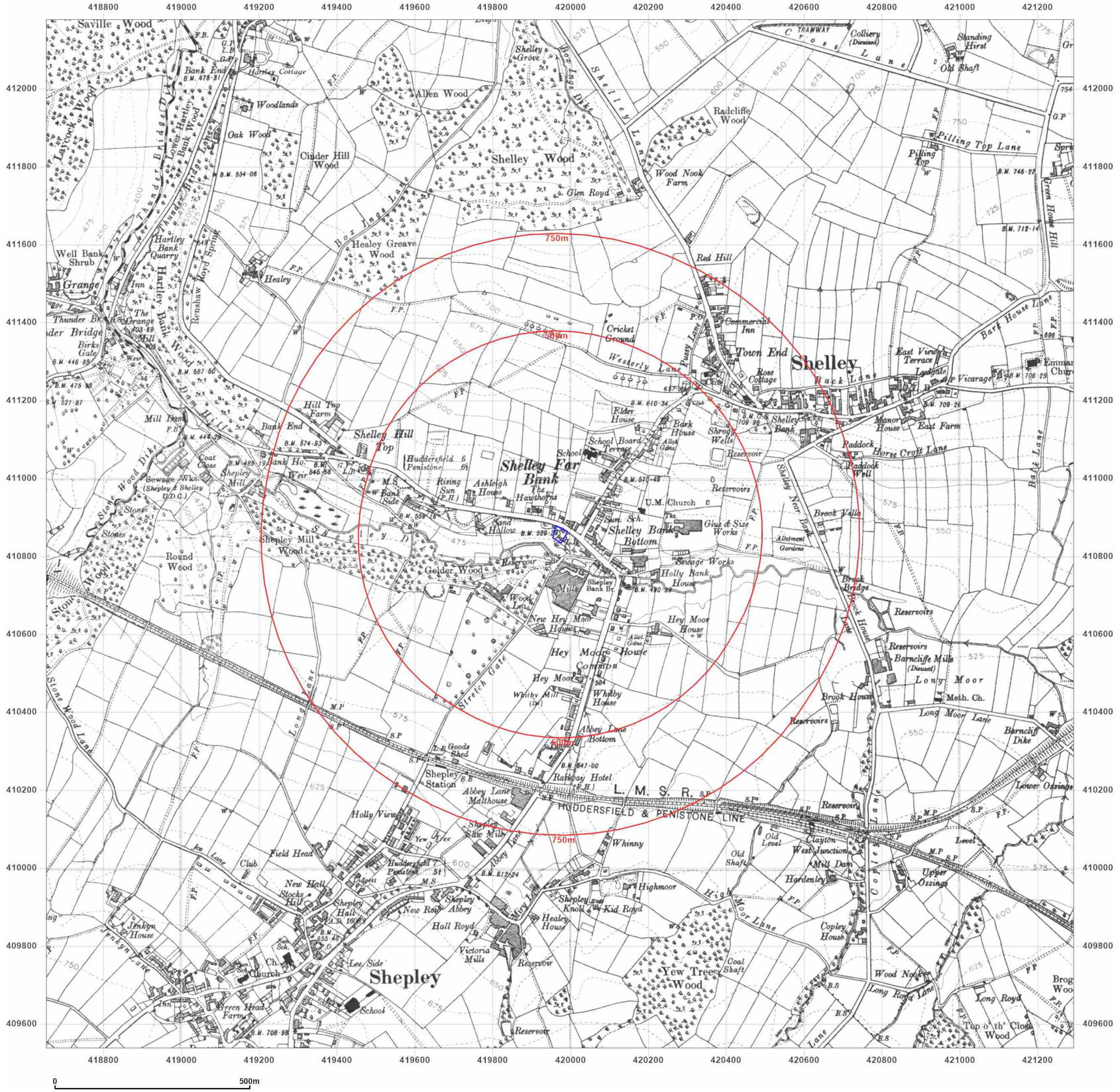

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: County Series

Map date: **1948**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1851
Revised 1948
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 14 November 2024

Map legend available at:
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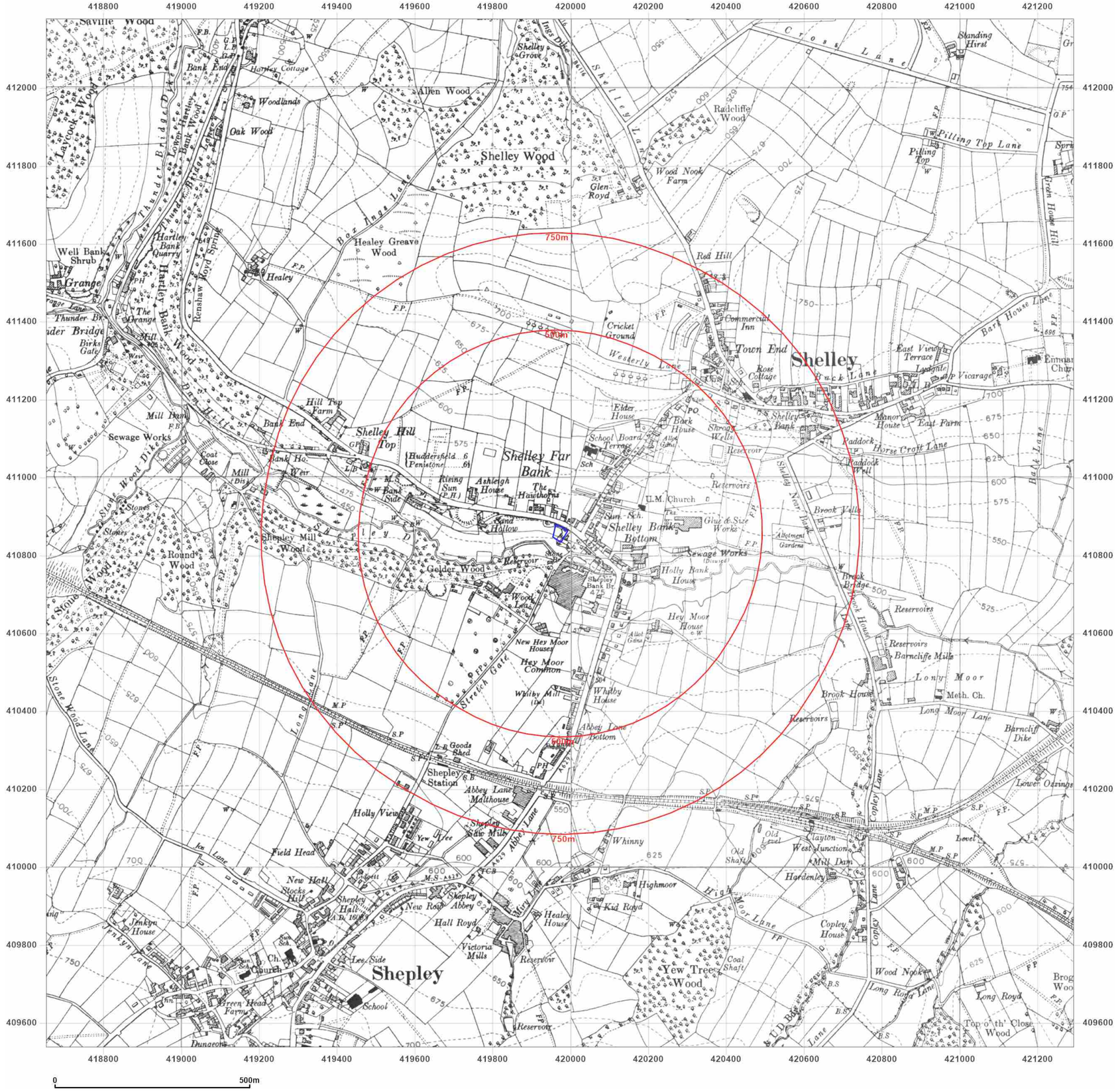

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: Provisional

Map date: **1951-1955**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed N/A
Revised 1955
Edition N/A
Copyright 1955
Levelled N/A

Surveyed N/A
Revised 1955
Edition N/A
Copyright 1955
Levelled N/A

Surveyed N/A
Revised 1955
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

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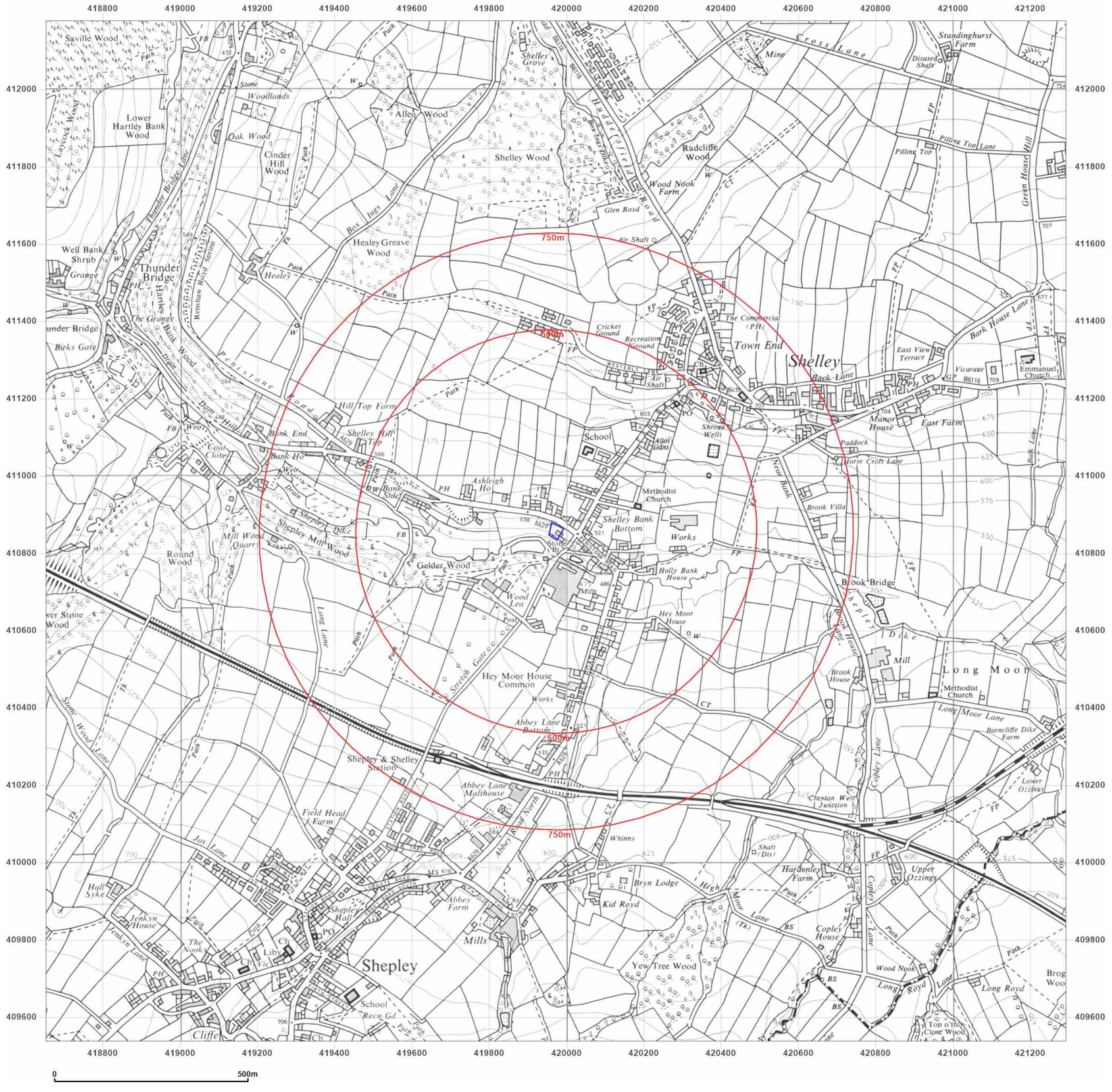

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: Provisional

Map date: **1967-1970**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1968
Revised 1968
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1968
Revised 1970
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

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CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley, Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid

Map date: **1977-1980**

Scale: 1:10,000

Printed at: 1:10,000

N
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Surveyed 1977
Revised 1977
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1977
Revised 1979
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1976
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

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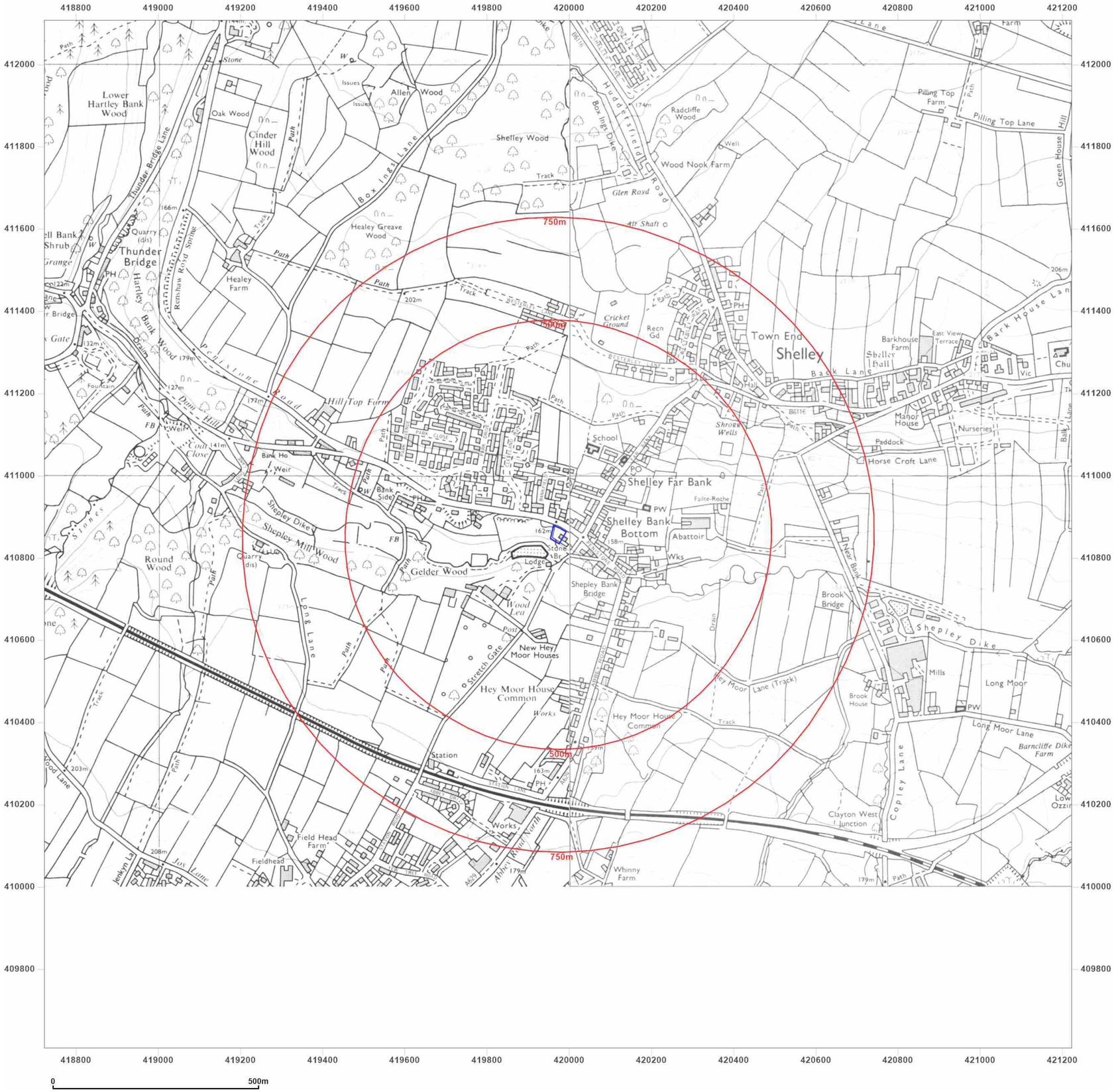

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley, Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid

Map date: **1990-1993**

Scale: 1:10,000

Printed at: 1:10,000

N
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Surveyed 1984
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1990
Revised 1993
Edition N/A
Copyright N/A
Levelled N/A

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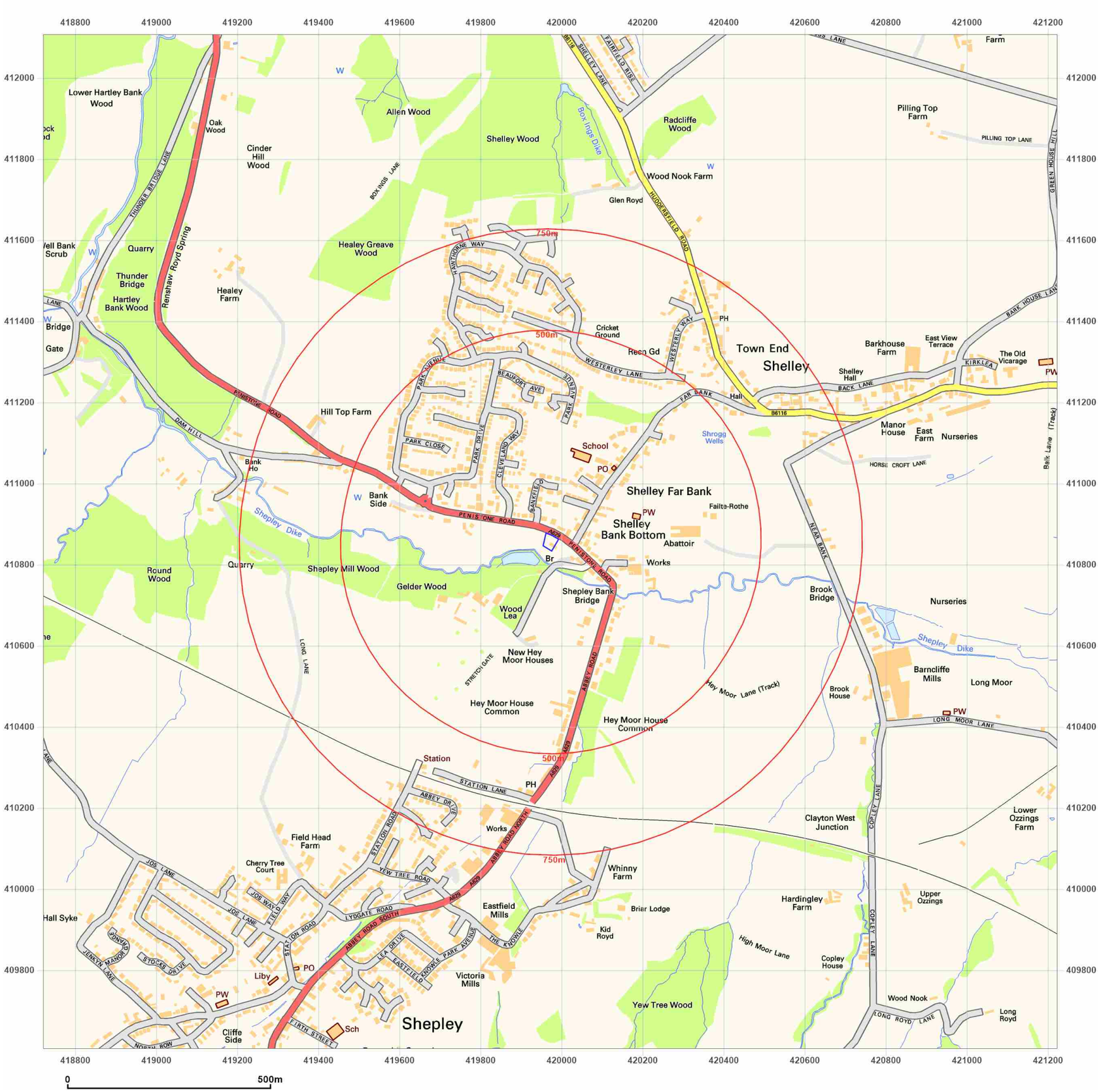

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley, Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid
Map date: **2001**
Scale: 1:10,000
Printed at: 1:10,000

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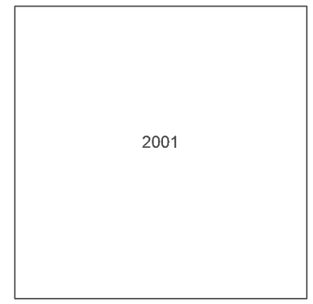

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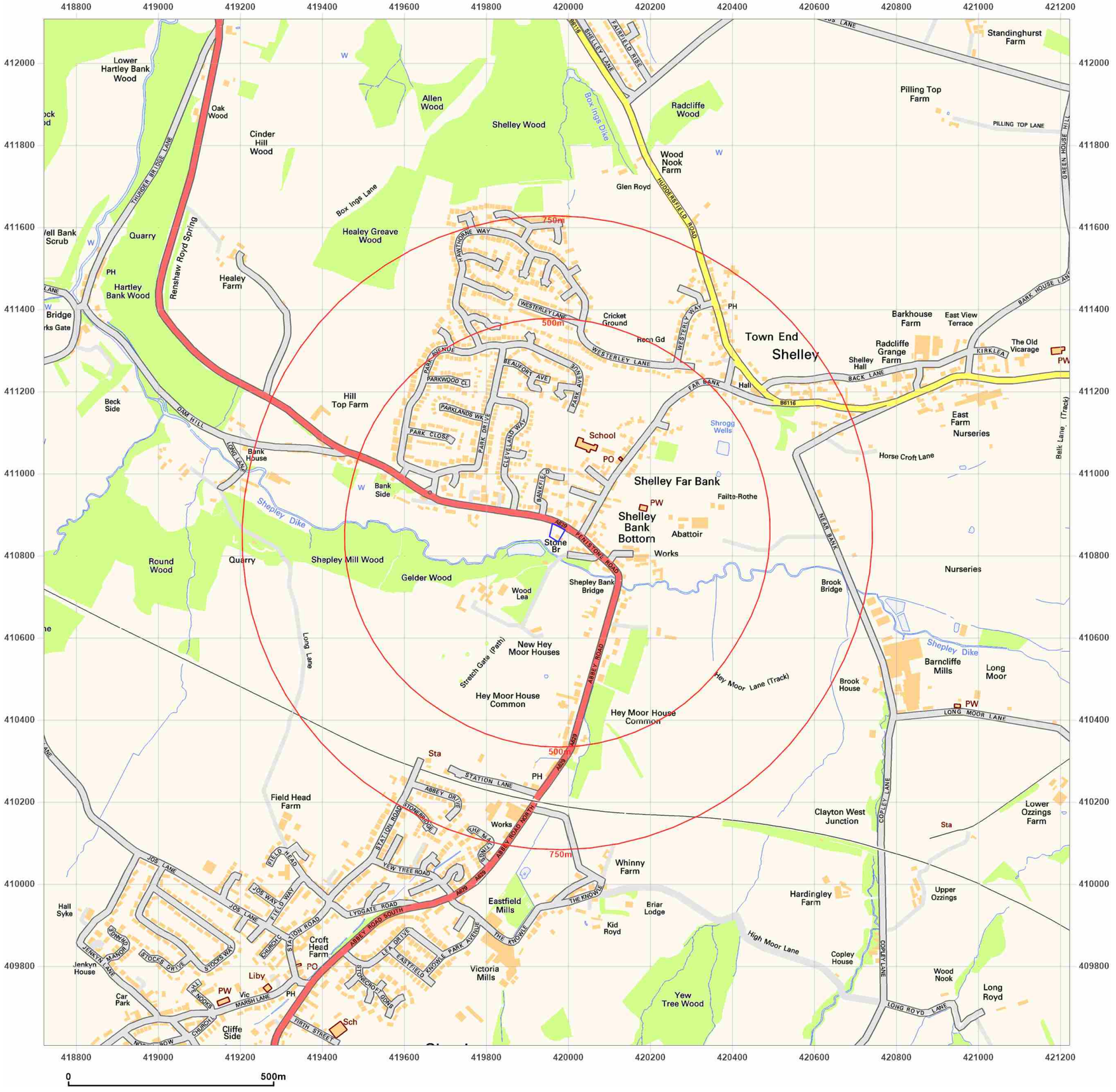

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley,
Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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2010

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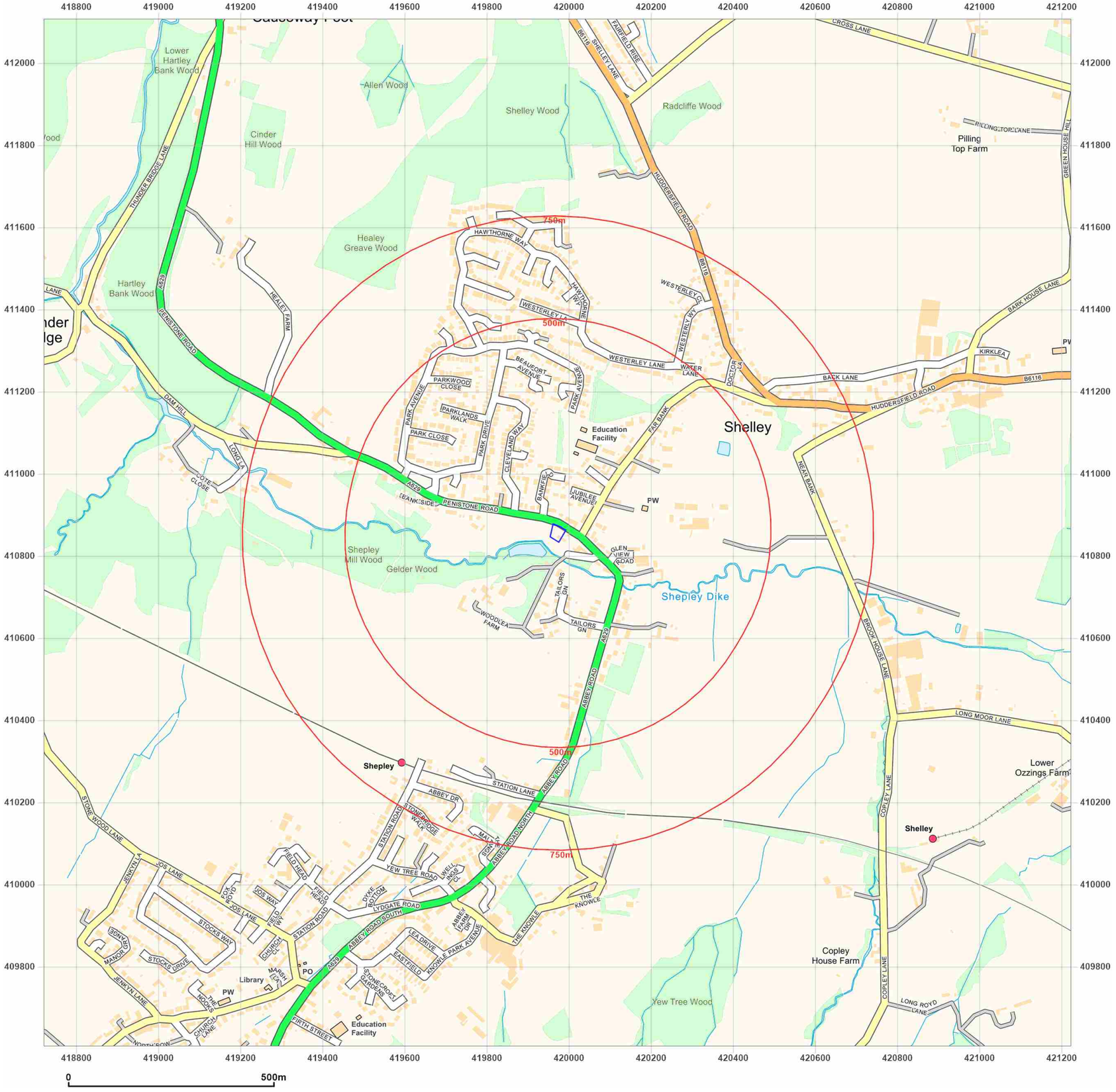

CENTRE MAPS LIVE.
FOR A BETTER POINT OF VIEW

Site Details:

170 Penistone Road, Shelley, Huddersfield, HD8 8HZ

Client Ref: CMAPS-CM-1194429-4873-141124
Report Ref: CMAPS-CM-1194429-4873-141124HIS
Grid Ref: 419972, 410857

Map Name: National Grid
Map date: **2024**
Scale: 1:10,000
Printed at: 1:10,000

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2024

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Appendix C

STRUCTURAL SOILS

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Mr I Sowerby, Shelley	**Ashton Bennett Limited**	**BH1**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
766015	**28.01.25** End: **29.01.25**	**---**	**E:19966.0 N:10868.0**	**1** of **2**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR SCR RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (m) (Thickness)	Legend
								Loose brown grey sandy TOPSOIL.	(0.50)	
								Loose to medium dense yellow brown sandstone gravel and cobbles in fine sand matrix.	0.50	
									(2.00)	
2.50-4.00				57 47 0				Strong thinly laminated to thickly laminated light grey locally orangeish brown coarse grained SANDSTONE with rare micaceous laminations. (LOWER PENNINE COAL MEASURES FORMATION) Discontinuities set 1: 0-10 degrees very closely to medium spaced planar smooth clean, locally infilled with brown clay. 2.50-3.15m : AZCL 3.30-3.45m : Non intact (potentially due to SPT at 2.50m)	2.50	
3.84-3.92	1	C							(2.28)	
4.00-5.50				47 47 23				4.00-4.80m : AZCL		
5.24-5.32	2	C						Very strong thinly laminated to thickly laminated light grey locally orangeish brown medium grained SANDSTONE with rare micaceous laminations (LOWER PENNINE COAL MEASURES FORMATION) Discontinuities set 1: 0-10 degrees very closely to medium spaced planar smooth clean, locally infilled with brown clay. 4.92m : 0-10 degrees undulating rough orange surface staining infilled with brown clay 5.01-5.18m : 75 degrees undulating rough orange and black surface staining clean. 5.30-5.39m : Strong thinly interlaminated light grey and orangeish brown medium grained SANDSTONE with frequent micaceous laminations.	4.78 (0.55)	
5.42-5.50	3	C							5.33	
5.50-7.00										
5.61-5.73	4	C			NI					
5.73-5.88	5	C			90					
5.88-5.99	6	C			220					
6.17-6.27	7	C		93 79 46				Extremely strong thinly laminated to thickly laminated light grey locally orangeish brown medium grained SANDSTONE with rare micaceous laminations (LOWER PENNINE COAL MEASURES FORMATION) Discontinuities set 1: 0-10 degrees very closely to medium spaced planar smooth clean, locally infilled with brown clay. 5.50-5.61m : AZCL 6.07-6.10m : Non intact 6.12-6.17m : Non intact 6.64-6.87m : Medium strong thinly interlaminated light grey and orangeish brown medium grained SANDSTONE with frequent micaceous laminations. 6.87-7.00m : Non intact 7.00-7.10m : AZCL 7.10-7.16m : Non intact 7.11-7.29m : Medium strong thinly interlaminated light grey and orangeish brown medium grained SANDSTONE with frequent micaceous laminations. 7.25-7.43m : Non intact		
6.27-6.37	8	C								
6.42-6.52	9	C								
6.52-6.64	10	C								
7.00-8.50										
7.43-7.74	11	C		93 74 67						
8.01-8.27	12	C						7.96-8.01m : Non intact	(6.17)	
8.50-10.00				90 87 81				8.50-8.65m : AZCL		

Boring Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)
29/01/25	17:00	11.50	4.00	139	Dry

General Remarks

1. Service pit to 0.80m bgl.
2. Window sampling to 2.50m bgl.
3. Monitoring pipe installed GL to 7m bgl, 1m plain and 6m slotted.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Rotary Cored	**Comacchio GEO 305**	**Geotron UK Ltd**	**KWood**	**MCharlottes**

STRUCTURAL SOILS

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Mr I Sowerby, Shelley	**Ashton Bennett Limited**	**BH1**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
766015	End: **29.01.25**	**---**	**E:19966.0 N:10868.0**	**2** of **2**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR SCR RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (m) (Thickness)	Legend
10.00-11.50				90 87 81 71 55 8	NI 90 220			Extremely strong thinly laminated to thickly laminated light grey locally orangeish brown medium grained SANDSTONE with rare micaceous laminations (LOWER PENNINE COAL MEASURES FORMATION) Discontinuities set 1: 0-10 degrees very closely to medium spaced planar smooth clean, locally infilled with brown clay. *(stratum copied from 5.33m from previous sheet)* 9.07-9.10m : Non intact 10.00-10.44m : AZCL 11.00-11.50m : Becomes more orange 11.06-11.30m : Non intact		
								Borehole terminated at 11.50m	11.50	

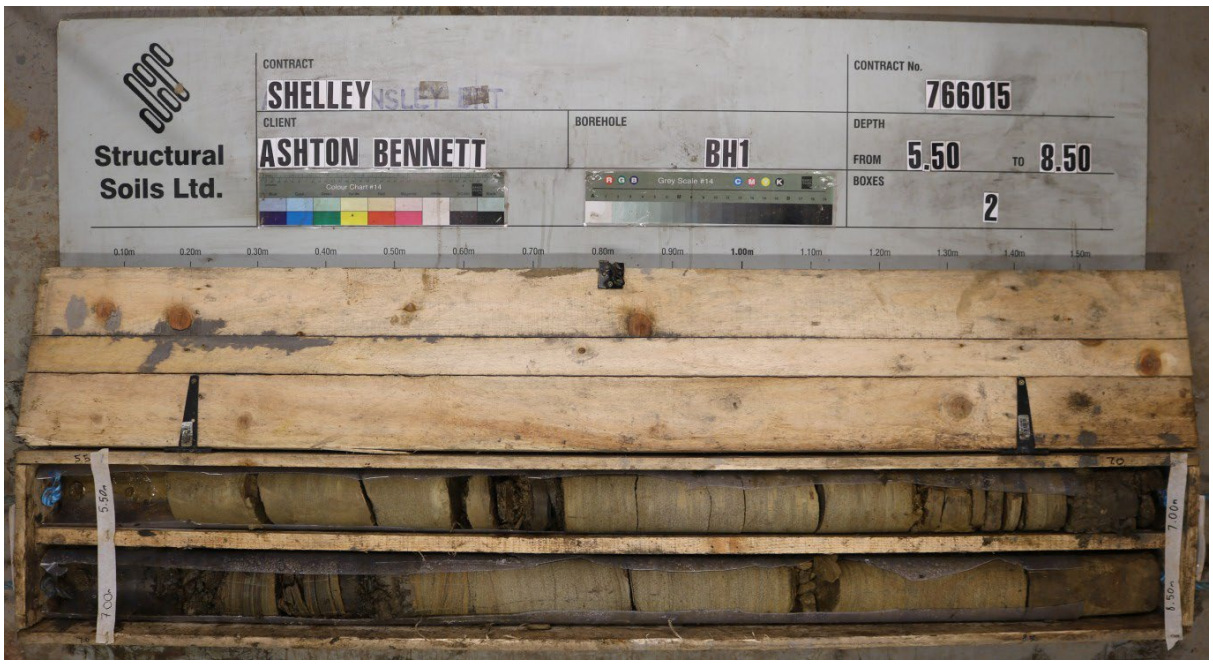
Boring Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Rotary Cored	**Comacchio GEO 305**	**Geotron UK Ltd**	**KWood**	**MCharlottes**

BH1 – 2.50 – 5.50



BH1 – 5.50 – 8.50


Structural
Soils Ltd.
CONTRACT
SHELLEY
CONTRACT No.
766015
CLIENT
ASHTON BENNETT
BOREHOLE
BH1
DEPTH
FROM 8.50 TO 11.50
BOXES
3

BH1 – 8.50 – 11.50

STRUCTURAL SOILS

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Mr I Sowerby, Shelley	**Ashton Bennett Limited**	**BH2**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
766015	**29.01.25** End: **30.01.25**	**---**	**E:19973.0 N:10871.0**	**1** of **2**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR SCR RQD (%)	If (mm)	Backfill	Water	Description of Strata	Depth (m) (Thickness)	Legend
								Loose brown grey sandy TOPSOIL	(0.50)	
								Loose to medium dense yellow brown sandstone gravel and cobbles in fine sand matrix.	0.50	
									(2.50)	
3.00-4.50				100 13 0	NI NI 450			Medium strong thinly laminated to thickly laminated light grey locally orangeish brown coarse grained SANDSTONE with rare micaceous laminations. (LOWER PENNINE COAL MEASURES FORMATION) Discontinuities set 1: 0-10 degrees very closely to medium spaced planar rough with orange surface staining clean locally infilled with brown clay. 3.00-3.33m : Non intact 3.40-3.74m : Non intact 3.40-4.50m : Discontinuities set 2: 75-80 degrees close to medium spaced undulating rough with orange surface staining clean. 3.79-3.82m : Non intact 3.89-4.50m : Non intact 4.15-4.38m : Black staining with no odour. 4.50-4.91m : Non intact 4.68-4.91m : Recovered as extremely weak orangeish brown sandy angular to subangular fine to coarse GRAVEL of sandstone. Sand is fine to coarse (RESIDUAL SOIL).	3.00	
4.50-6.00									(3.67)	
4.91-5.03	1	C								
5.04-5.31	2	C		100 45 37				5.03m : 25 degrees planar rough with orange surface staining clean		
					NI NI 0 40			5.50-6.00m : 75-85 degrees close to medium spaced undulating rough with orange surface staining clean. 5.58-6.00m : Non intact		
6.00-7.50					NI 110 420			6.00-6.02m : Non intact		
6.07-6.17	3	C								
6.34-6.44	4	C						6.47-6.74m : Non intact 6.47-7.57m : Discontinuities set 3: 70-85 degrees closely spaced undulating rough with orange surface staining clean locally infilled with grey.	6.67	
				100 53 35				Strong locally extremely weak thinly to thickly laminated orange, brown and black medium grained SANDSTONE with frequent micaceous laminations and concentric staining. (LOWER PENNINE COAL MEASURES FORMATION Discontinuities set 1: 0-10 degrees very closely to medium spaced planar rough with orange surface staining clean locally infilled with brown clay. 7.09-7.50m : Non intact 7.50-7.58m : Non intact 7.79-7.90m : Non intact	(1.23)	
7.50-9.00									7.90	
7.58-7.68	5	C								
7.90-7.98	6	C								
8.04-8.13	7	C								
8.24-8.35	8	C		100 84 48				*Description on next sheet* 8.68-8.73m : Non intact		

Boring Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)
30/01/25	17:00	10.50	4.50	139	Dry

General Remarks

1. Service pit to 0.80m bgl.
2. Window sampling to 2.50m bgl.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Rotary Cored	**Comacchio GEO 305**	**Geotron UK Ltd**	**KWood**	**MCharlottes**

STRUCTURAL SOILS

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Mr I Sowerby, Shelley	**Ashton Bennett Limited**	**BH2**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
766015	End: **30.01.25**	**---**	**E:19973.0 N:10871.0**	**2** of **2**

Depth (m)	Samples & Testing No	Type	Results	Mechanical Log TCR SCR RQD (%)	Mechanical Log If (mm)	Backfill	Water	Description of Strata	Depth (m) (Thickness)	Legend
8.91-9.00 9.00-10.50	9	C		100 76 55	NI 110 420			Extremely strong thinly laminated to thickly laminated light grey locally orangeish brown medium grained SANDSTONE with rare micaceous laminations. (LOWER PENNINE COAL MEASURES FORMATION Discontinuities set 1: 0-10 degrees very closely to medium spaced planar rough with orange surface staining clean locally infilled with brown clay. 7.90-8.91m : Very strong thinly laminated to thickly laminated light grey locally orangeish brown medium grained SANDSTONE with frequent micaceous laminations.*(stratum copied from 7.90m from previous sheet)* 9.65-9.69m : Non intact 9.69-9.98m : Medium strong thinly laminated to thickly laminated light grey locally orangeish brown medium grained SANDSTONE with frequent micaceous laminae 9.83-9.87m : Non intact 9.98-10.12m : Non intact 10.12-10.20m : 85 degrees undulating rough with orange surface staining and grey clay infill 10.20-10.25m : Soft grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to medium of mudstone and occasional sandstone (RESIDUAL SOIL). 10.20-10.34m : Non intact	(2.60)	
9.00-9.10	10	C								
9.44-9.55	11	C								
									10.50	
								Borehole terminated at 10.50m.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

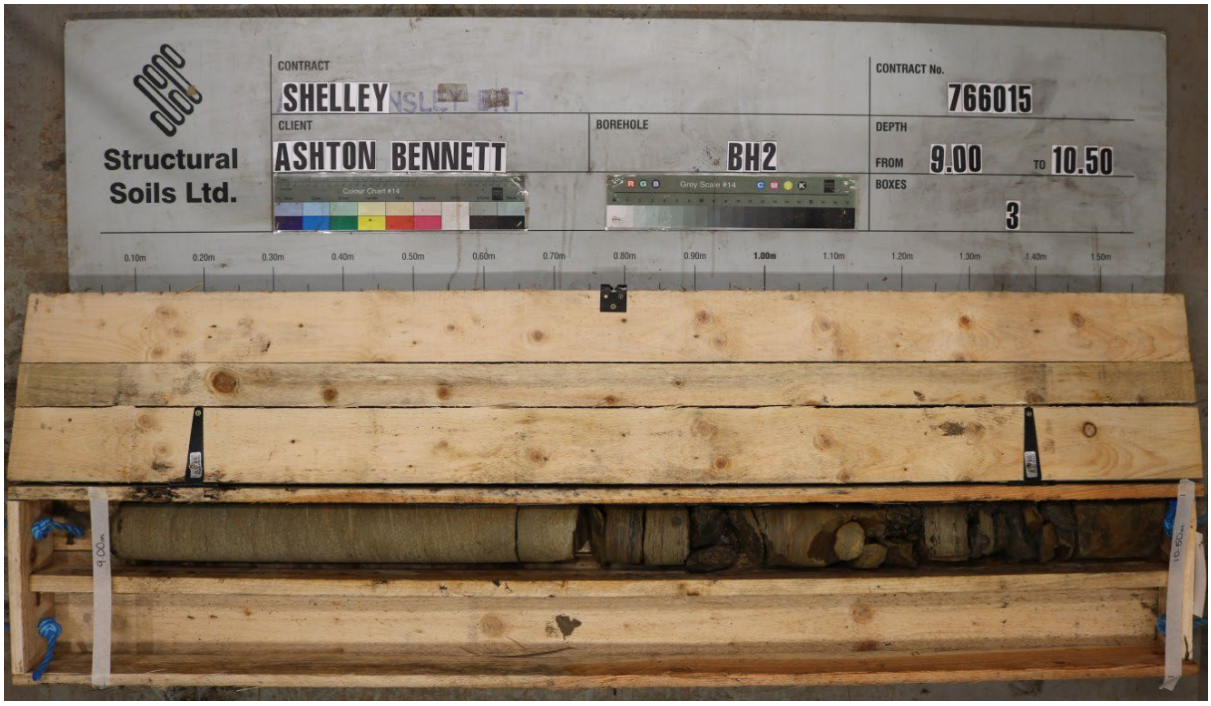
General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Rotary Cored	**Comacchio GEO 305**	**Geotron UK Ltd**	**KWood**	**MCharlottes**

BH2 – 3.00 – 6.00m

BH2 – 6.00 – 9.00m



BH2 – 9.00 – 10.50m

Appendix D

The Coal Authority

CON29M
coal mining report

170 PENISTONE ROAD, SHELLEY, HUDDERSFIELD, KIRKLEES, HD8 8HZ

Known or potential coal mining risks

Further action

No further reports from the Coal Authority are required. Further information on any next steps can be found in our Professional opinion.

For more information on our reports please visit www.groundstability.com

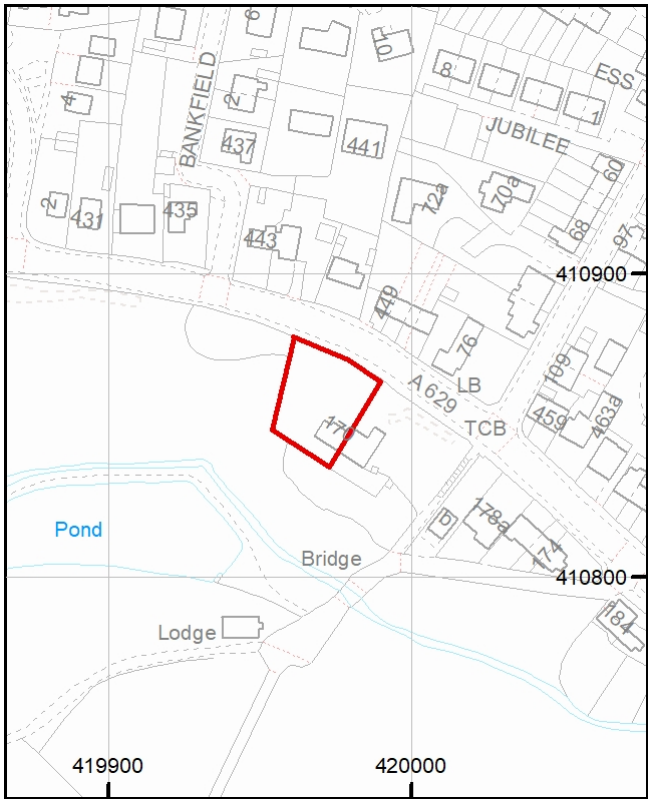
Professional opinion

According to the official mining information records held by the Coal Authority at the time of this search, evidence of, or the potential for, coal mining related features have been identified. It is unlikely that these features will impact on the stability of the enquiry boundary.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



We can confirm that the location is **on the coalfield**

Map data

This report is prepared in accordance with the latest Law Society's Guidance Notes 2018, the User Guide 2018 and the Coal Authority's Terms and Conditions applicable at the time the report was produced.

Accessibility

If you would like this information in an alternative format, please contact our communications team on 0345 762 6848 or email communications@coal.gov.uk.

What if this information changes?

If this report is for a residential property, insurance is included to cover any loss in property value caused by any changes in the information contained in this report. Please see the attached certificate of insurance for the terms and conditions of this insurance. The insurance does not cover non-residential property or further action reports.

Professional opinion

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

If you are looking to develop, or undertake works, within a coal mining development high risk area your Local Authority planning department may require a Coal Mining Risk Assessment to be undertaken by a qualified mining geologist or engineer. Should you require any additional information then please contact the Coal Authority on 0345 762 6848 or email cmra@coal.gov.uk.

Detailed findings

Information provided by the Coal Authority in this report is compiled in response to the Law Society's CON29M Coal Mining enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL.

The Coal Authority owns the copyright in this report and the information used to produce this report is protected by our database rights. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

1 Past underground coal mining

The property is not within a surface area that could be affected by any past recorded underground coal mining.

2 Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3 Future underground coal mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4 Mine entries

There are no recorded coal mine entries known to the Coal Authority within, or within 20 metres, of the boundary of the property.

5 Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6 Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7 Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8 Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9 Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10 Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11 Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

Statutory cover

Coal mining subsidence

In the unlikely event of any coal mining related subsidence damage, the Coal Authority or the mine operator has a duty to take remedial action in respect of subsidence caused by the withdrawal of support from land or property in connection with lawful coal mining operations.

When the works are the responsibility of the Coal Authority, our dedicated public safety and subsidence team will manage the claim. The house or land owner ("the owner") is covered for these works under the terms of the Coal Mining Subsidence Act 1991 (as amended by the Coal Industry Act 1994). Please note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

If you believe your land or property is suffering from coal mining subsidence damage and you need more information on what to do next, please use the following link to our website which sets out what your rights are and what you need to consider before making a claim.
www.gov.uk/government/publications/coal-mining-subsidence-damage-notice-form

Coal mining hazards

Our public safety and subsidence team provide a 24 hour a day, 7 days a week hazard reporting service, to help protect the public from hazards caused by past coal workings, such as a mine shaft or shallow working collapse. To report any hazards please call 0800 288 4242. Further information can be found on our website: www.gov.uk/coalauthority.

On behalf of the insurer

Coal Mining Report Insurance Policy Schedule

Policy number: 30430580

The insurer: Liberty Legal Indemnities – underwritten by Liberty Mutual Insurance Europe SE

Binding Authority contract number: RNMFP2403841

Property: 170 PENISTONE ROAD, SHELLEY, HUDDERSFIELD, KIRKLEES, HD8 8HZ

Report reference number: 51003466545001

Limit of cover: £100,000.00

Dated: 2 December 2024

This policy and schedule shall be read together and any word or expression to which a specific meaning has been attached in either shall bear such meaning wherever it may appear.

Where a Coal Mining Report has been obtained in connection with a sale of the property, cover is provided for the benefit of a purchaser and their lender; in the case of a re-mortgage or where the existing owner chooses to obtain a Coal Mining Report, cover is provided for the benefit of the owner and their lender.

The policy offers protection against loss sustained by the owner of the property if any new problems or adverse entries are revealed in a subsequent Coal Mining Report which were not revealed by the original report to which the policy was attached.

The insured shall at all times comply with the requirements of the Conditions of this Policy.

Coal Mining Report Terms and Conditions can be viewed online at this link:
https://www.groundstability.com//insurance/terms/20190404/terms.html

Glossary

Key terms

adit - horizontal or sloped entrance to a mine

coal mining subsidence - ground movement caused by the removal of coal by underground mining

Coal Mining Subsidence Act 1991 - the Act setting out the duties of the Coal Authority to repair damage caused by coal mining subsidence

coal mining subsidence damage - damage to land, buildings or structures caused by the removal of coal by underground mining

coal seams - bed of coal of varying thickness

future opencast coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal from the surface

future underground coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal underground. Although it is unlikely, remaining coal reserves could create a possibility for future mining, which would be licensed by the Coal Authority

mine entries - collective name for shafts and adits

mine gas - reports of alleged mine gas emissions received by the Coal Authority within the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded

payments to owners of former copyhold land - historically, copyhold land gave rights to coal to the copyholder. Legislation was set up to allow others to work this coal, but they had to issue a notice and pay compensation if a copyholder came forward

shaft - vertical entry into a mine

site investigation - investigations of coal mining risks carried out with the Coal Authority's permission

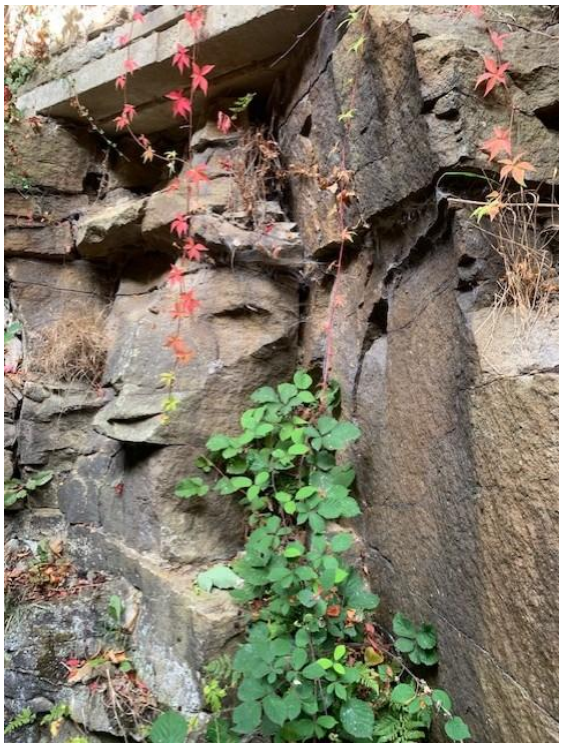
stop notice - a delay to repairs because further coal mining subsidence damage may occur and it would be unwise to carry out permanent repairs

subsidence claim - a formal notice of subsidence damage to the Coal Authority since it was established on 31 October 1994

withdrawal of support - a historic notice informing landowners that the coal beneath their property was going to be worked

working facilities orders - a court order which gave permission, restricted or prevented coal mine workings

Appendix **E**



Rock Face to rear of 172 Penistone Road

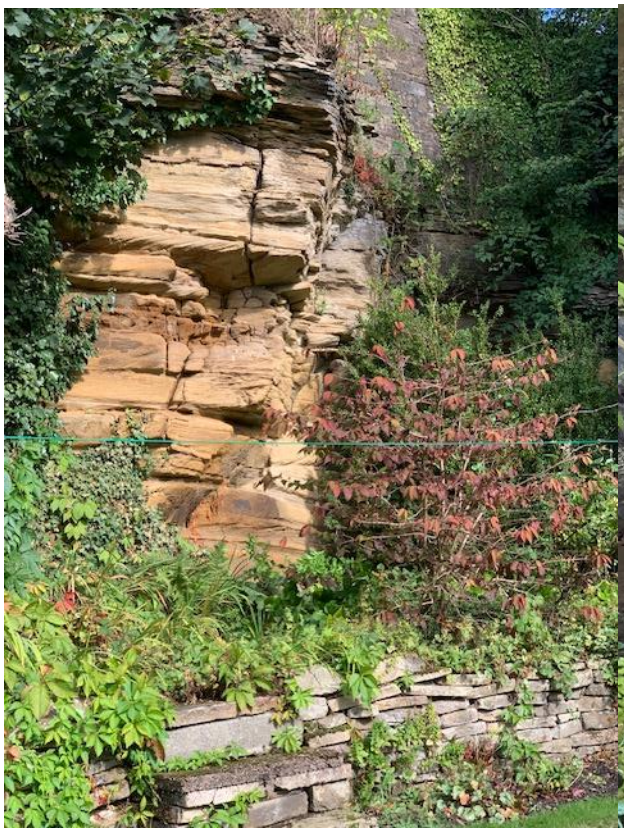
Excavating road for drilling rig access

Trial Pit 1

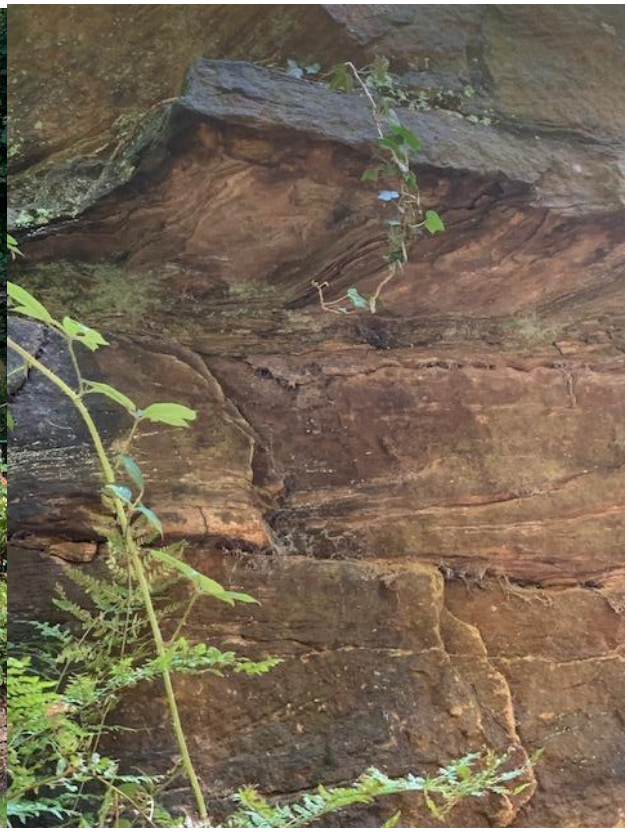
Trial Pit 2

BH02

BH01

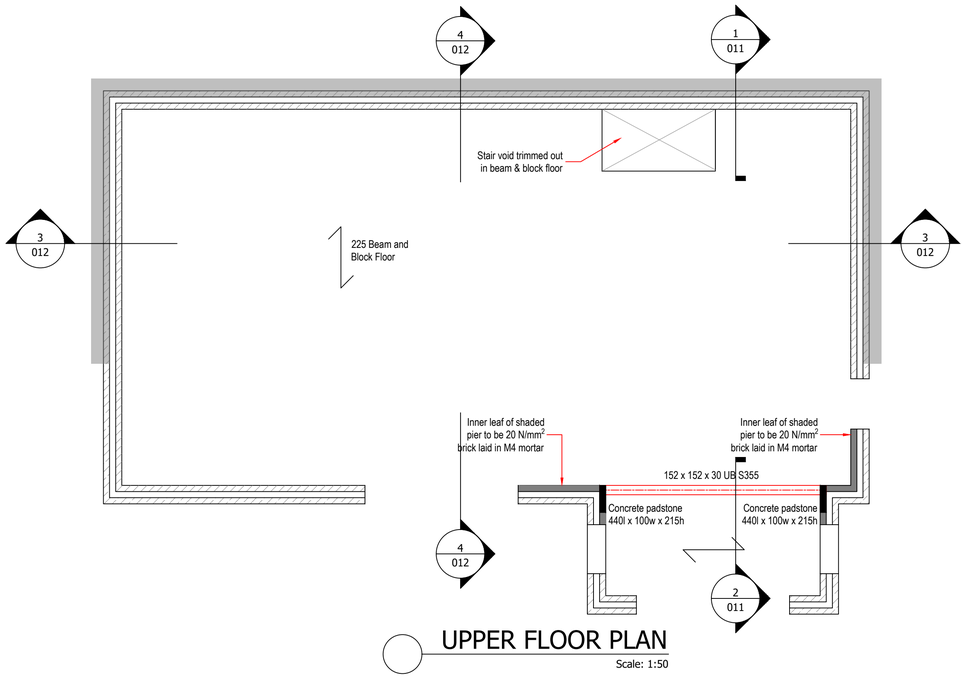


Quarry Face to rear of 172 house



Quarry Face showing dip to north

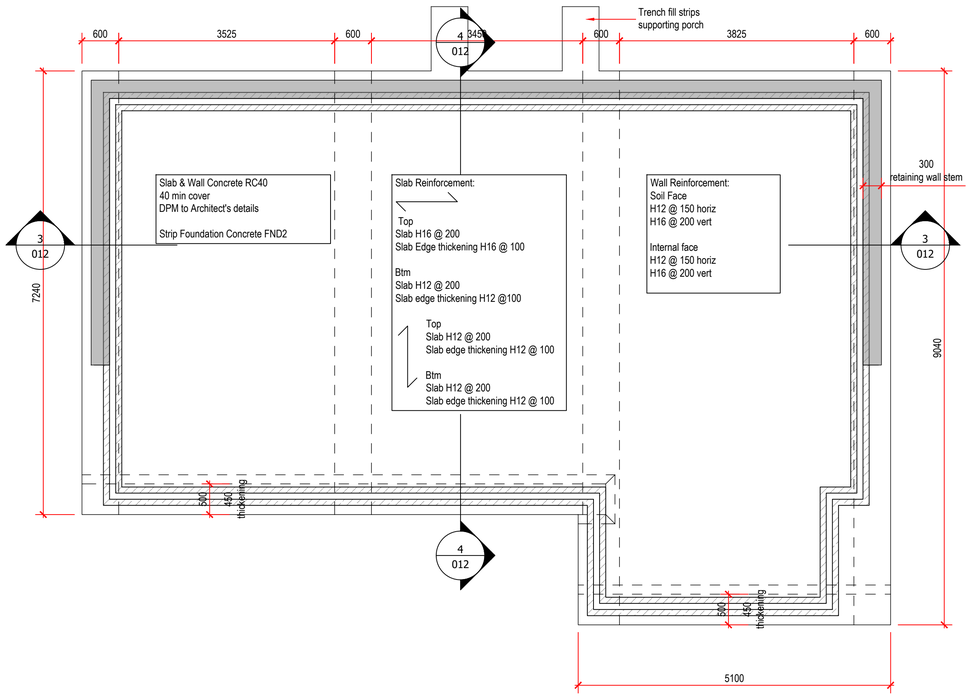
Appendix **F**



UPPER FLOOR PLAN

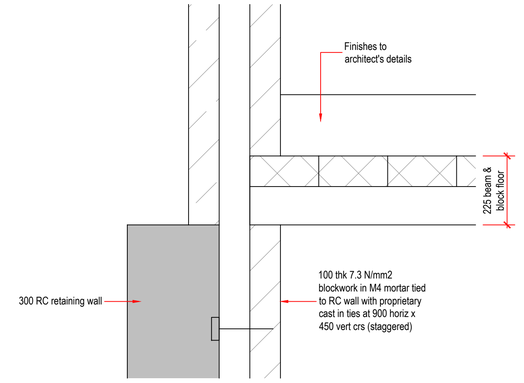
Scale: 1:50

ALL DIMENSIONS ARE PRELIMINARY AND ARE TO BE COORDINATED WITH ARCHITECT'S FINAL SETTING OUT



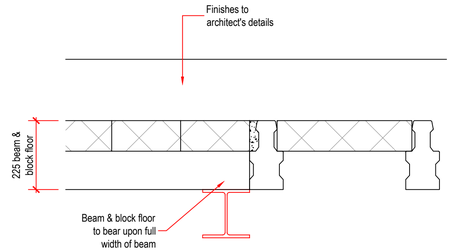
FOUNDATION PLAN

Scale: 1:50



1 SECTION

Scale: 1:10



2 SECTION

Scale: 1:10

NOT FOR CONSTRUCTION

NOTES-

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

DO NOT SCALE THIS DRAWING - IF IN DOUBT ASK

1. ALL DIMENSIONS & LEVELS TO BE CHECKED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK, ANY DISCREPANCY SHALL BE REPORTED IMMEDIATELY TO AVIE CONSULTING LTD
2. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH LOCAL AUTHORITY, STATUTORY AUTHORITY, HEALTH & SAFETY REQUIREMENTS AND REGULATIONS.
3. THE DRAWINGS SHALL BE READ IN ACCORDANCE WITH ALL OTHER CONTRACT DOCUMENTS RELEVANT AT THAT TIME OF ISSUE AND DURING THE PERIOD OF THE CONTRACT.
4. THE CONTRACTOR MUST ENSURE THE OVERALL STABILITY OF THE WORKS IS ADEQUATE AT ALL STAGES OF THE CONSTRUCTION.
5. NO ALLOWANCE HAS BEEN MADE FOR CUTOUTS, HOLES, NOTCHES, ETC. FOR SERVICES. ALL OF THESE ARE TO BE AGREED PRIOR TO THE START OF THE WORKS.

Rev	Date	Amendment	By	Chk
P00	13.05.25	Initial Issue	GH	GH

AVIE CONSULTING LTD
6 Killingbeck Court,
Killingbeck Office Village,
Killingbeck Drive,
Leeds LS14 6FD.
Tel: 0113 249 7416
www.avie-consulting.co.uk

15cm

Project:
170 Penistone Road, Shelley

Client:
Mr I Sowerby

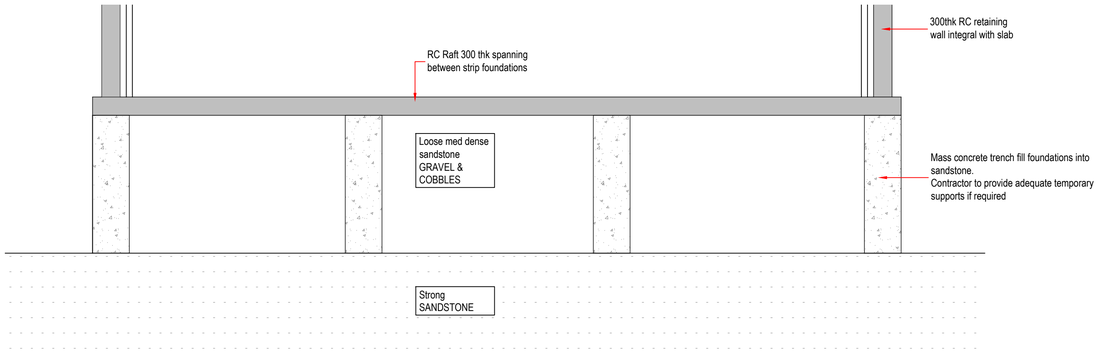
Drawing Title:
Structural Proposals

Drawn By:	Checked By:	Approved By:
GH		
Avie Project No:	Scale:	Sheet Size:
P4541	1:50, 10	A1
Revision Status:	Suitability Status:	Date:
		May 25

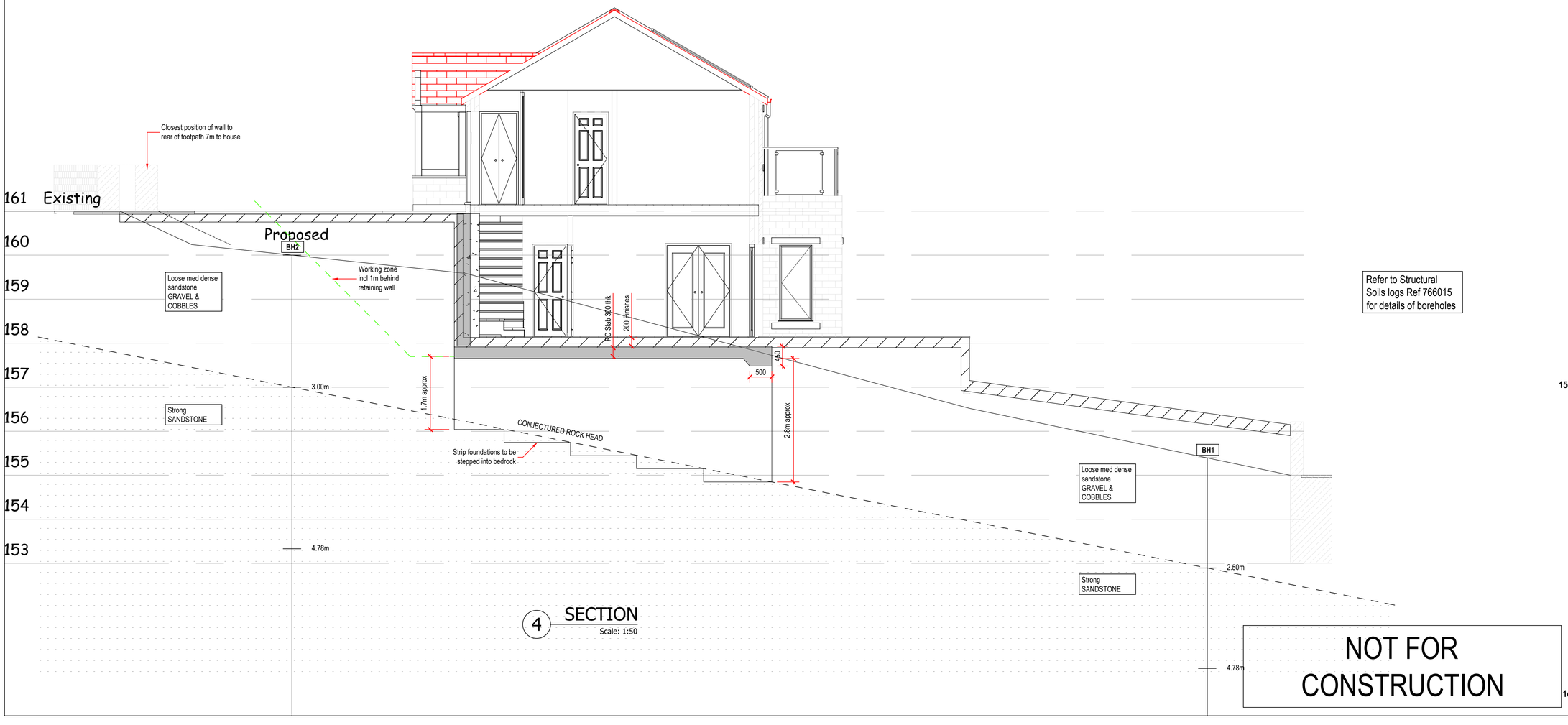
Suitability Description: FOR APPROVAL

Drawing Reference:
Project - Originator - Zone - Level - File Type - Discipline - Number
P4541-AVE-XX-FN-D-S-0011

1cm



3 SECTION
Scale: 1:50



4 SECTION
Scale: 1:50

Refer to Structural Soils logs Ref 766015 for details of boreholes

NOT FOR CONSTRUCTION

NOTES-

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

DO NOT SCALE THIS DRAWING - IF IN DOUBT ASK

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Rev	Date	Amendment	By	Chk
P00	13.05.25	Initial Issue	GH	GH

AVIE CONSULTING LTD
6 Killingbeck Court,
Killingbeck Office Village,
Killingbeck Drive,
Leeds LS14 6FD.
Tel: 0113 249 7416
www.avie-consulting.co.uk

15cm

Project:
170 Penistone Road, Shelley

Client:
Mr I Sowerby

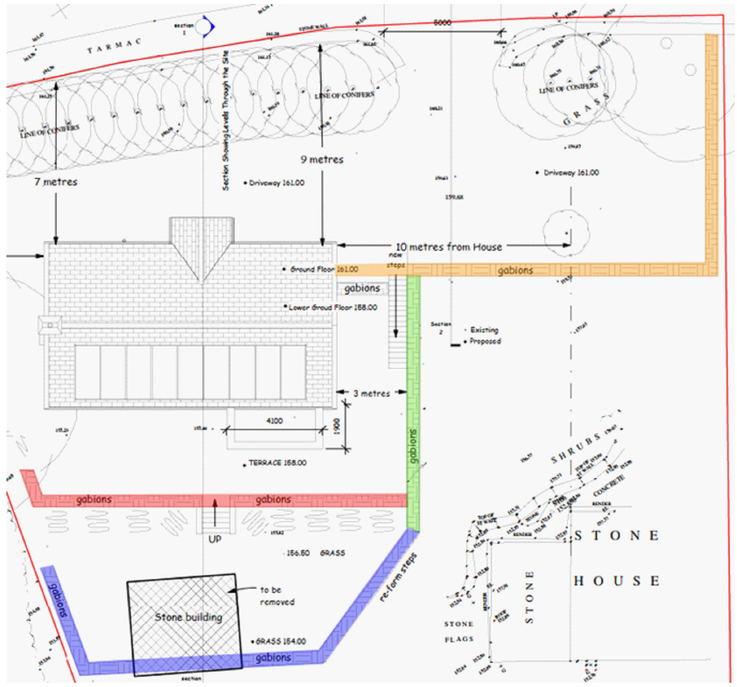
Drawing Title:
Foundation Sections

Drawn By:	Checked By:	Approved By:
GH		
Avie Project No:	Scale:	Sheet Size:
P4541	1:50	A1
Revision Status:	Suitability Status:	Date:
		May 25

Suitability Description:
FOR APPROVAL

Drawing Reference:
Project - Originator - Zone - Level - File Type - Discipline - Number
P4541-AVE-XX-FN-D-S-0012

1cm



KEY PLAN
NTS

WALL 1	Red	
WALL 2	Blue	
WALL 3	Green	
WALL 4	Yellow	

GABION WALL SPECIFICATION

1. Gabion baskets to be from bi-axial welded galvanized steel wire and comply with BS EN 10223-8:2013
2. Designs shown are indicative and gabion manufacturer it to carry out final design to suit their product
3. All installation is to be strictly in accordance with the manufacturer's instruction
4. Gabions to be on 300mm min MCHW Series 600 Class 6F5 sub-base
5. Gabion fill to be 100mm to 150mm or 100mm to 200mm quarried stone to MCHW Series 600 Class 6G
6. Face stone appearance to Architect's details
7. Backfill to gabions to be MCHW Series 600 Class 6N suitably rolled and compacted in max 300mm layers and raised with gabion stone fill
8. The rear face of the gabions is to have a geotextile filter membrane extended 300mm min from top back edge
9. Edge protection at top of gabion wall to architect's detail

NOTES-

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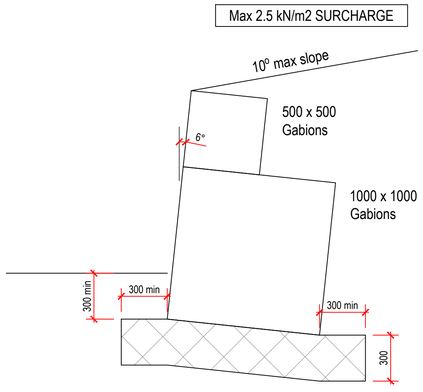
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

DO NOT SCALE THIS DRAWING - IF IN DOUBT ASK

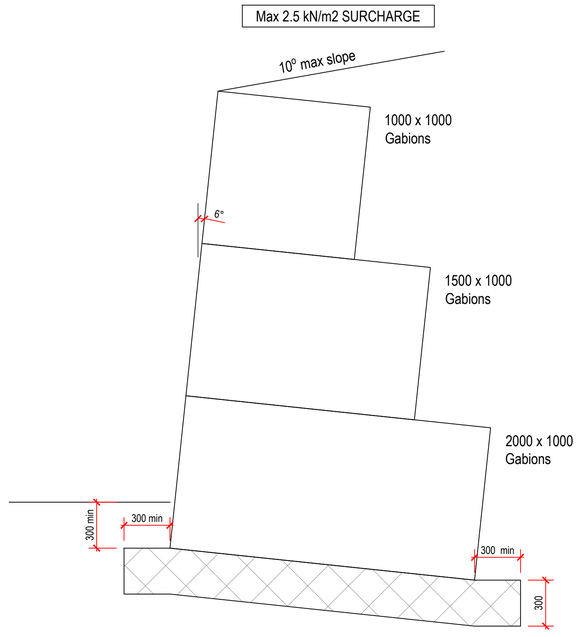
1. ALL DIMENSIONS & LEVELS TO BE CHECKED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK, ANY DISCREPANCY SHALL BE REPORTED IMMEDIATELY TO AVIE CONSULTING LTD
2. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH LOCAL AUTHORITY, STATUTORY AUTHORITY, HEALTH & SAFETY REQUIREMENTS AND REGULATIONS.
3. THE DRAWINGS SHALL BE READ IN ACCORDANCE WITH ALL OTHER CONTRACT DOCUMENTS RELEVANT AT THAT TIME OF ISSUE AND DURING THE PERIOD OF THE CONTRACT.
4. THE CONTRACTOR MUST ENSURE THE OVERALL STABILITY OF THE WORKS IS ADEQUATE AT ALL STAGES OF THE CONSTRUCTION.
5. NO ALLOWANCE HAS BEEN MADE FOR CUTOUTS, HOLES, NOTCHES, ETC. FOR SERVICES. ALL OF THESE ARE TO BE AGREED PRIOR TO THE START OF THE WORKS.

Max 2.5 kN/m2 SURCHARGE



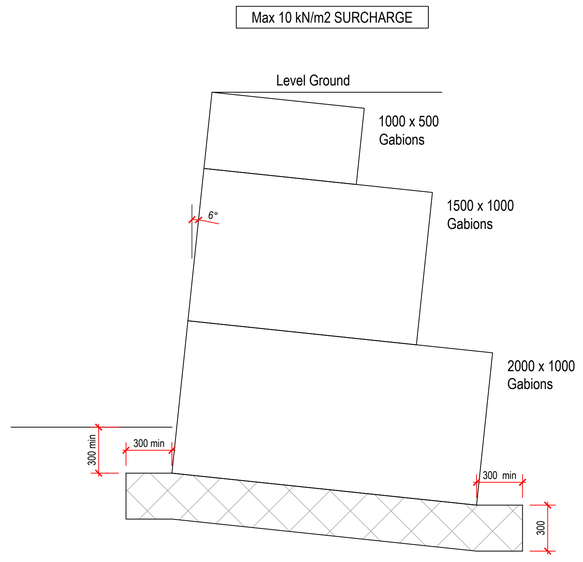
1,2 RETAINING WALL
Scale: 1:20

Max 2.5 kN/m2 SURCHARGE



3 RETAINING WALL
Scale: 1:20

Max 10 kN/m2 SURCHARGE



4 RETAINING WALL
Scale: 1:20

NOT FOR CONSTRUCTION

Rev	Date	Amendment	By	Chk
P00	25.07.25	Initial Issue	GH	GH

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170 Penistone Road, Shelley

Client:
Mr I Sowerby

Drawing Title:
Garden Gabion Wall Details

Drawn By:	Checked By:	Approved By:
GH		
Avie Project No:	**Scale:**	**Sheet Size:**
P4541	1:50	A1
Revision Status:	**Suitability Status:**	**Date:**
		July 25

Suitability Description:
FOR COMMENT

Drawing Reference:
Project - Originator - Zone - Level - File Type - Discipline - Number
P4541-AVE-XX-XX-D-S-0013

15cm
1cm