

# GROUND INVESTIGATION REPORT



## FOR BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD, GLOUCESTERSHIRE GL14 3HY

Report No. 5101/2

<b>Report Production Record</b>		
<b>Report No</b>	5101/2	
<b>Site Name</b>	Broadmoor Cottage, Cinderford, GL14 3HY	
<b>Client</b>	Mr M G Thompson	
<b>Report on</b>	Desk Study & Ground Investigation	
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**GROUND INVESTIGATION REPORT FOR**  
**BROADMOOR COTTAGE, 6 STEAM MILLS ROAD,**  
**CINDERFORD, GL14 3HY**

**1        INTRODUCTION**

- 1.1**        It is proposed to develop the above site with five residential dwellings. A ground investigation was requested, the primary objectives of which were to ascertain the ground conditions for appropriate foundation and ground floor slab design. A preliminary quantitative contamination risk assessment with regard to potential impacts to human health and/or controlled waters has also been undertaken.
- 1.2**        The geotechnical investigation has been carried out in general accordance with Eurocode 7 'Geotechnical Design', in particular BS EN 1997-1:2004 and 1997-2:2007 and BS EN ISO 14688-1:2002 and 14688-2:2004. The proposed development is considered to fall into the Geotechnical Category 2 classification, thus routine field and laboratory testing methods have been adopted. Reference has also been made to BS5930:2015 Code of Practice for Ground Investigations, and National House Building Council (NHBC) Standards Chapter 4.2 – 'Building Near Trees'.
- 1.3**        The geo-environmental assessment comprising initial Phase 1 desk study followed by Phase 2 testing and quantitative contamination risk assessment has been carried out in accordance with BS10175:2011 "Code of Practice for the Investigation of Potentially Contaminated Sites" and Environment Agency (EA) Document LCRM "Land Contamination Risk Management" (2020).
- 1.4**        This report has been prepared in accordance with quotation reference Q23152 dated 2<sup>nd</sup> June 2023 with written instruction received 12<sup>th</sup> June 2023 from Matthew Thompson (the Client), to whom reliance on this report is presently restricted.

## **2 SITE LOCATION AND DESCRIPTION**

- 2.1** Centred on National Grid Reference 365045, 215070 the approximately 'L' shape, 0.26 hectare site is located in the town of Cinderford, Gloucestershire approximately 1.0km north-west of the town centre as shown on drawing 5101/2/1.
- 2.2** A walkover was undertaken by this Practice immediately prior to intrusive investigation and a selection of representative photos is presented in Appendix 1, with their positions and orientations noted on drawing 5101/2. This identified the site to comprise a single small residential dwelling positioned adjacent the eastern site frontage, with a large grass and tree covered garden to the rear and limited tarmac hardstand driveway leading from Steam Mills Road at the east to a separate garage on the western boundary. An above ground domestic LPG tank is located near the dwelling. Beyond the site boundaries, residential properties lie to the north and to the southeast, to the east is the aforementioned Steam Mills Road, whilst to the west and south are the commercial properties of Gretton Motors Limited and Rubbertech 2000 Limited respectively.
- 2.3** Topographic mapping data provided by the client indicates that the site lies at an elevation of between 162m and 159m above Ordnance Datum (AOD) with a fall from east to west in line with the immediate surrounding area.

## **3 BACKGROUND SETTING**

### ***Recorded Geology***

- 3.1** The geology of the site is shown on the British Geological Survey (BGS) map SO 61SE dated 1981 and online. This indicates that the entire site is underlain by bedrock of the Cinderford Member (CIFD), characterised as reddish-grey, silty mudstone and siltstone with coal and sandstone. This is entirely overlain by a superficial mantle of Head Deposits (Hd), likely to comprise a poorly sorted mix of predominantly clay with sand and gravel (hill wash and soil creep). There are no areas of mapped made ground or geological faulting shown either inside or within likely influencing distance of the site.

- 3.2** This Practice has previously investigated within the site (as reported under WA report ref 5101, dated February 2023). Below a shallow surface mantle of made ground (fill) those borehole findings were found to generally concur with the expected ground profile, initially identifying undisturbed clay likely representing both superficial Hd and the upper weathered mantle of the recorded CIFD. Rockhead was encountered below depths of between 2.6m and 3.9m and consisted of interbedded mudstone and sandstone with coal seams.
- 3.3** Previous intrusive investigation has identified that this site does have a coal mining legacy, as suspected collapsed workings were locally identified within the Lowery coal seam. Despite the foregoing, this legacy is not considered to have any influence on the proposed development as it is considered that there is no viable risk of upward void migration from the Lowery which could pose a stability risk to the site surface. It is considered that the application site is safe and stable and meets the requirements of the National Planning Policy Framework with regard to development on unstable land.

#### ***Hydrogeology***

- 3.4** The MAGIC website confirms the bedrock CIFD and superficial Hd as “Secondary A” aquifers, meaning that they comprise permeable strata capable of supporting water supplies at a local rather than strategic level, and in some cases forming an important source of base flow to rivers. There are no nearby licensed groundwater abstractors and the site does not lie in a groundwater Source Protection Zone (SPZ).
- 3.5** Based upon the above information the site is considered to be within an area of low to moderate sensitivity in terms of groundwater resources by virtue of the Secondary A aquifer designations.

#### ***Hydrology***

- 3.6** The site itself contains no ponds or watercourses; the nearest significant water feature is Old Engine Brook c475m to the west. The EA does not consider the site to be at risk of flooding from either rivers or seas. The site surface comprises predominantly soft landscaped garden with localised building and hardstand driveway coverage so rainwater infiltration can be expected to be high, subject to natural permeability of the sub-surface material and the prevailing weather conditions. The site does not lie within

a Nitrate Vulnerable Zone (NVZ) and is not within 500m of a Drinking Water Protected Area (DWPA).

- 3.7 Based upon the above information the site is considered to be within an area of low sensitivity in terms of controlled surface waters.

### **Site History**

- 3.8 The history of the site has been deduced by inspection of historical Ordnance Survey maps dating back to 1878 together with historical aerial imagery provided as part of the online Google Earth mapping service, and a selection of relevant extracts are presented as drawing 5101/2/3. Any on and/or off-site points of interest that may affect or be affected by the proposed development have been summarised within Table 1 below.

**TABLE 1: SUMMARY OF SITE HISTORY**

Date (Source map scale)	On-Site	Off-Site	Potential Contaminants	Risk
1878 (1:10,560 and 1:2,500)	Site mostly comprises rough grassland	SE – Residential property NW – Residential property 5m S – Spoil heap for nearby coal mine (Regulator Colliery) 70m SW – Regulator Colliery Shaft 150m W - Disused Whimsey Colliery and an old shaft. 160m W - Railway line 180E – Old shaft	Toxic and phytotoxic metals	Very low/ Negligible
1903 (1:10,560 and 1:2,500)	Dwelling constructed adjacent eastern boundary that remains until present day	70m SW – Regulator Colliery Shaft now disused	As above	Very low/ Negligible
1922 (1:10,000 and 1:2,500)	No significant change	80m NW –Saw Mills	As above	Very low/ Negligible
1960-1961 (1:10,000, 1:2,500)	No significant change	80m NW – Saw Mills site redeveloped with a Works	As above	Low
1986-91	Rear garden of residential property	W – Commercial Works Buildings	As above plus Asbestos	Low / Moderate



Date (Source map scale)	On-Site	Off-Site	Potential Contaminants	Risk
(1:10,000, 1:2,500)	expanded and garage constructed	S – Commercial Works Building 190m E - Coal Yard 225m SW – Scrap Yard 230m SE - Garage 240m S – Timber Mill		
1991 – Present day (1:10,000, 1:2,500 and Google Earth Aerial Imagery)	No significant change	No significant change	As above	Low / Moderate

**3.9** Please note that Ordnance Survey plans only represent periodic snapshots in time, and do not provide a continuous record of previous site usage, there is therefore a risk (albeit negligible based upon the available mapping) that the site may contain buried remnant foundations of former buildings or waste products associated with unrecorded previous site usage, which may not be evident from the site walkover inspection and desk study researches.

#### ***Landfill Gas and Radon Gas***

**3.10** Consistent with the site history researches the EA landfill register shows no record of either active or historic landfills within potential influencing distance. Whilst historical mapping does show a heap of colliery spoil from the nearby Regulator Colliery to the southwest, given that at least 120 years has passed since the colliery closed (and therefore stopped tipping fresh spoil material), such arisings are no longer considered to pose a gassing risk to future development at this site. Gas protection measures are therefore presently considered unnecessary in new development at this site, subject to ground investigation findings.

**3.11** Consultation of the UK Health Security Agency UKRadon website indicates greater than 30% of homes in this area to be above the actionable level, suggesting that full radon protection measures are required in new development at this site. As ever it would be advisable to confirm this with the relevant Building Control Officer.

### ***Unexploded Ordnance Risk***

- 3.12 An online review of regional unexploded bomb data on the Zetica website indicates that this area of Gloucestershire is considered to constitute a low risk (less than fifteen bombs per thousand acres), and for which a more detailed unexploded ordnance (UXO) assessment is considered unnecessary.

## **4 PROPOSED DEVELOPMENT**

- 4.1 It is proposed to develop the site with five two-storey residential dwellings complete with private gardens, off-road parking and garages/ car ports, soft landscaping and access road infrastructure. The proposed development layout (based upon TNR Architects Drawing Number 010.12.013, Revision A dated 23<sup>rd</sup> March 2022) has been reproduced as drawing 5101/2/2.

## **5 PRELIMINARY RISK ASSESSMENT AND CONCEPTUAL SITE MODEL**

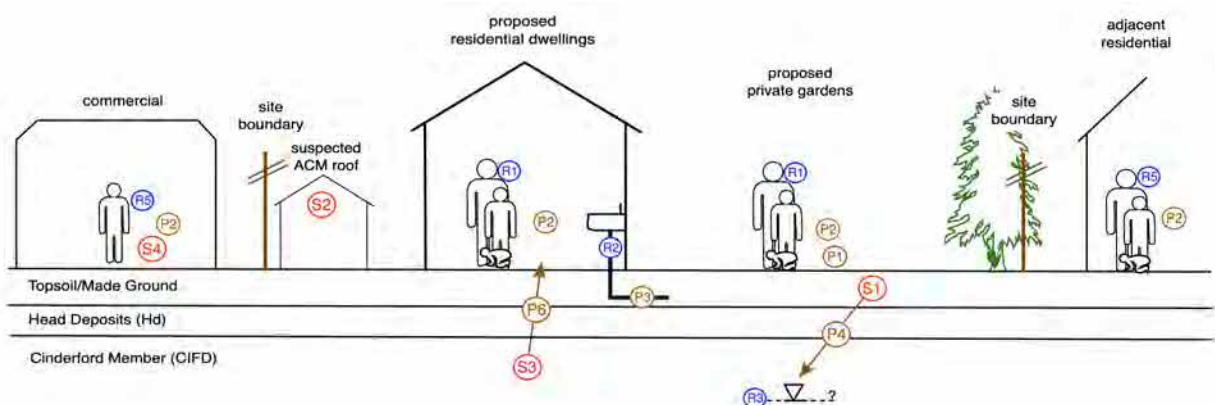
- 5.1 The site and its immediate surroundings have been assessed in terms of current and historical land use and the environmental, geological and hydrogeological setting; the methodology is described in Appendix 3. In view of the proposed residential development, for risk assessment purposes the **critical receptor** would be a female child (age class 1-6) and our assessment has been progressed on this basis.
- 5.2 Review of historical mapping suggests that the site appears to have remained as an undeveloped rough grassed field since the earliest available mapping of 1878-1881 until the present day.
- 5.3 In view of the foregoing the potential sources and the **principal contaminants of concern** are presented in Table 2 below.

**TABLE 2: POTENTIAL SOURCES AND PRINCIPAL CONTAMINANTS OF CONCERN**

Potential Sources		Principal Contaminants of Concern
ON-SITE	Topsoil and unrecorded made ground	Toxic and phytotoxic metals
	Garage Roof	Suspected Asbestos Containing Material (ACM)
	Cinderford Member	Radon gas
OFF-SITE	Commercial Works - Gretton Motors Limited / Rubbertech 2000 Limited	Toxic and phytotoxic metals Polyaromatic Hydrocarbons (PAH) Petroleum Hydrocarbons (TPH) Suspected Asbestos Containing Material (ACM)

5.4 The above information is converted into the preliminary Conceptual Site Model shown in Figure 1 below, and the **potential pollutant linkages** involving future residents, proposed services and local environmental receptors are discussed in Table 3, with appropriate risk levels.

**FIGURE 1: PRELIMINARY CONCEPTUAL SITE MODEL (NTS)**



**TABLE 3: SUMMARY OF PRELIMINARY POTENTIAL POLLUTANT LINKAGES**

Potential Sources	Pathways	Receptors					Comments	Preliminary Risk Assessment
		R1	R2	R3	R4	R5		
<b>ON-SITE</b>								
<b>S1</b>	P1	X					No change is site usage from residential. Limited made ground anticipated	Very Low
	P2	X				X		
	P3		X					
	P4			X				
	P5							
	P6							
<b>S2</b>	P1						Existing garage to be removed. Roof containing suspected ACM	High
	P2	X				X		
	P3							
	P4							
	P5							
	P6							
<b>S3</b>	P1						Radon gas naturally emitted	High
	P2							
	P3							
	P4							
	P5							
	P6	X						
<b>OFF-SITE</b>								
<b>S4</b>	P1						No evidence of chemical or fuel storage or of spillages due to poor site maintenance	Low
	P2	X						
	P3							
	P4							
	P5							
	P6							
<b>SOURCES</b>	<b>S1</b>	Topsoil and unrecorded made ground potentially elevated in toxic/phytotoxic metals						
	<b>S2</b>	Existing garage roof containing suspected ACM						
	<b>S3</b>	Cinderford Member						
	<b>S4</b>	Active Commercial properties						

<b>PATHWAYS</b>	<b>P1</b>	Direct dermal contact or ingestion via soil attached to vegetables
	<b>P2</b>	Inhalation of dust and vapours
	<b>P3</b>	Permeation into new water supply pipework
	<b>P4</b>	Vertical leaching in unsaturated zone and lateral migration in saturated zone
	<b>P5</b>	Landfill gas migration through unsaturated zone and accumulation within confined spaces
	<b>P6</b>	Radon gas migration through unsaturated zone and accumulation within confined spaces
<b>RECEPTORS</b>	<b>R1</b>	Future site users (critical residential receptor is female child age class 1-6)
	<b>R2</b>	Potable water supply
	<b>R3</b>	Groundwater (Hd and CIFD classified as 'Secondary A aquifers)
	<b>R4</b>	Surface waters (Old Engine Brook 475m W)
	<b>R5</b>	Adjacent site users (residential/commercial)

**5.5** The findings of the Phase 1 desk study suggest a generally very low risk that the site may contain contaminants at elevations sufficient to pose a significant risk to human health or environmental receptors, however it is recognised that the existing garage has a roof suspected to contain asbestos fibres. That said, the roof is in good unbroken condition and as long as its carefully removed without damage and disposed of off-site there should be negligible risk to future site users.

**5.6** It was considered prudent to undertake an intrusive investigation and the results of which are reported below. All contamination test results have been incorporated into an appropriate quantitative risk assessment to determine risk levels to the obvious receptors in the form of future site users and groundwater quality, as well as those less obvious such as the proposed buildings and infrastructure, such that any necessary remedial measures can be identified and recommended to ensure that the developed site will be "fit for purpose".

## **6** **GROUND INVESTIGATION REPORT**

### ***Site Works***

**6.1** The Phase 2 intrusive investigation was undertaken 19<sup>th</sup> June 2023 by way of windowless sample boreholes and hand pits. The number and location of all exploratory hole positions were selected by this Practice with due regard to the proposed development layout and were marked out on site using on and off-site

reference points; their positions are indicated on drawing 5101/2/2. No service plans were made available for review so as a precaution a CAT electrical service scanner was deployed prior to all intrusive works in addition to a 1.2m inspection pit at all locations. No services (recorded or unrecorded) were physically encountered during the intrusive works.

## 6.2

Six windowless sampler boreholes (WS1-WS6) and three hand pits (HP1-HP3) were drilled/manually excavated to establish the near surface ground profile and obtain samples for laboratory analysis. All boreholes/pits were logged by a suitably qualified engineering geologist from this Practice in accordance with Eurocode 7 and representative disturbed samples taken for geotechnical and contamination testing as appropriate. A detailed description of all the strata encountered, position and types of samples taken as well as groundwater observations are included on the logs presented in Appendix 2. Upon completion all exploratory holes were backfilled with arisings and topsoil replaced.

### **Laboratory Testing - Geotechnical**

## 6.3

A number of disturbed samples were taken for routine geotechnical classification testing, comprising moisture content and plasticity determinations, along with classification to the Unified Soil Classification Scheme (USCS) and NHBC Standards, plus acidity and sulphate analysis to BRE Special Digest 1 requirements. Results are tabulated below.

**TABLE 4: INDEX TEST RESULTS AND CLASSIFICATION**

TP No	Depth (m)	Sample of	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Plasticity / USCS	Consistency Index	<425u m (%)	Modified Plasticity Index (%)	Volume Change Potential (NHBC)
WS1	1.0	Hd	23	49	25	24	CIM	1.08	83	20	Medium
WS1	2.6	CIFD	15	24	19	5	CIL/SiL	1.80	84	4	None
WS2	1.00	Hd	38	44	24	20	CIM	0.3	100	20	Medium
WS3	0.6	Hd	29	41	23	18	CIM	0.67	92	17	Low
WS4	1.3	Hd	9.4	30	15	15	CIL	1.37	81	12	Low
WS5	1.5	Hd	17	38	20	18	CIM	1.17	97	17	Low
WS6	0.5	Hd	28	37	19	18	CIM	0.5	100	18	Low
WS6	1.0	Hd	22	45	21	24	CIM	0.96	100	24	Medium
WS6	2.0	CIFD	20	29	18	11	CIL	0.82	100	11	Low

Classification to EN ISO 14688-2:2004

Hd: Head Deposits. CIFD: Cinderford Member

**TABLE 5: CHEMICAL TEST RESULTS AND CLASSIFICATION**

TP No	Depth (m)	Sample of	Water soluble sulphate SO <sub>4</sub> (mg/l)	pH	Total sulphate (%SO <sub>4</sub> )	Total Sulphur (%)	Total Potential Sulphate (%)	BRE Special Digest 1 classification	
								DS	ACEC
WS3	1.4-1.5	Hd	3.6	7.5	0.008	0.006	0.018	DS-1	AC-1
WS4	2.0	CIFD	36.3	7.4	0.011	0.010	0.030	DS-1	AC-1
WS5	2.5	CIFD	2.7	7.9	0.006	<0.005	<0.015	DS-1	AC-1

*Hd: Head Deposits.*

*CIFD: Cinderford Member*

- 6.4** Three representative samples of near surface soil were taken from HP1-3 for recompacted California Bearing Ratio (CBR) tests. At the time of writing these results are yet to be received from the laboratory and the results will be issued as an addendum to this report.

#### ***Laboratory Testing - Contamination***

- 6.5** The contamination sampling scheme was conducted in accordance with BS10175:2011 with sampling targeting areas of proposed soft landscaping. All test results have been incorporated into an appropriate risk assessment to determine risk levels to the receptors, such that any necessary remedial measures can be identified and recommended to ensure that the proposed development site is 'fit for use'.
- 6.6** Representative samples of topsoil and natural undisturbed subsoil were taken from the upper 1.0m of extracted ground. All samples were sent to UKAS accredited i2 Analytical Limited where analysis selectively comprised the following:

Toxic and phytotoxic metals

pH

Speciated Polycyclic Aromatic Hydrocarbons (PAH)

Asbestos screening and analysis

Total Petroleum Hydrocarbons (TPH)

Soil organic matter content

- 6.7 The potential risk to groundwater resources was determined by leachate analysis on two representative samples of made ground, selectively tested to determine the leachable content of toxic and phytotoxic metals and speciated PAH.
- 6.8 The certified laboratory test results are presented as Appendix 3 and for convenience these have also been summarised to facilitate comparison against assessment criteria. All results and their implications upon the preliminary CSM are further discussed in Sections 8 and 9.

### ***Discussion on Ground Conditions***

- 6.9 Ground conditions appear to be commensurate with geological mapping and anticipated findings. Beneath surface topsoil and made ground all boreholes encountered a mixture of granular and cohesive deposits representing the recorded superficial Head. This lies above the Cinderford Formation recovered as layers of clay, silt, sand, gravel and sandstone. A summary of the observed strata is presented in Table 6 below, although for specific descriptions of ground conditions, reference should be made to the borehole logs presented in Appendix 2.

**TABLE 6: SUMMARY OF OBSERVED STRATA**

<b>Stratum</b>	<b>Base Depth (m)</b>	<b>Notes</b>
TOPSOIL: dark brown, gravelly SILT with frequent roots from surrounding trees and overlying grass. Gravel includes coal and brick fragments	0.3	Encountered in all exploratory holes
MADE GROUND: mostly recovered as probable soft, slightly gravelly, CLAY/SILT. Gravel includes coal and brick fragments	0.5-0.7	WS2, WS3, WS4, WS5 & WS6
CLAY: generally soft, light brownish grey, gravelly, silty locally desiccated CLAY. Gravel is sub-rounded, medium to coarse claystone/mudstone (HEAD)	1.3-1.8	Encountered in all exploratory holes
SAND/SILT: variably recovered as sandy CLAY, silty SAND, sandy GRAVEL (see individual logs for details) (CINDERFORD FORMATION)	2.8-3.0	Encountered in all exploratory boreholes
SANDSTONE: Extremely weak light brown SANDSTONE (CINDERFORD FORMATION)	>3.0	Encountered to terminal depth in all exploratory boreholes except WS2
Perched/Groundwater	WS1 – 2.0m (Strike) 2.6m (Standing) WS2 – 2.0m (Strike) 1.3m (Standing) WS3 – 2.7m (Strike) 2.35m (Standing)	



	WS4 – Dry WS5 – Dry WS6 - Dry
Roots	WS1 – Live roots to 0.6m WS2 – Topsoil only WS3 – Live roots to 0.45m WS4 – Live roots to 0.45m / Dead roots to 2.0m WS5 – Live roots to 1.7m WS6 – Live roots to 2.0m Generally roots to 0.4m-0.6m & hair sized roots to 2.0mbgl at WS6
Desiccation	Desiccation fissures evident to 1.3m in WS1

- 6.10** Based upon on-site visual and olfactory examination of the subsoil and consistent with the site history there was nothing to suggest the presence of obviously significantly contaminated subsoil, although it is recognised that a thin layer of made ground is present.
- 6.11** Index testing performed upon undisturbed material of the superficial Hd classifies it as predominantly inorganic gravelly clay of low to medium plasticity and low to medium volume change potential in accordance with NHBC Standards. Consistency index (CI) values were recorded between 0.30 and 1.37, with those values greater than >1.0/1.1 (as recorded in WS1, WS4 and WS5) possibly suggestive of desiccation.
- 6.12** The CIFD was identified as a mixture of cohesive and granular material. Samples of silty sand and sandy clay were selected for index testing and these classify as inorganic clay/silt of low plasticity and low to none volume change potential. CI values of 0.96 and 1.8 were recorded, and whilst the latter value initially suggests desiccation, given the depth of the sample (WS1/2.6m) and proportion of granular sand within the sample this is thought to represent a natural reduction in moisture content.
- 6.13** Please note that on and off-site vegetation would be expected to continue to desiccate the soil throughout the summer months with worst-case conditions expected at the end of a normal summer season, so depending upon the time of year of development the foregoing may change from that reported.
- 6.14** Water was encountered in boreholes WS1-3 only with strikes occurring between 2.35m and 2.6m bgl. Whilst the water level in WS2 rose slightly under sub-artesian conditions, in boreholes WS1 and WS3 the standing water level fell. Boreholes WS4-6 remained dry during the time that they were left open prior to backfilling, therefore it is considered that the water encountered in WS1-3 represents perched water rather

than groundwater. The perched/groundwater levels are of course subject to seasonal fluctuation according to prevailing weather conditions, and the situation encountered and described above could potentially change in the future, especially in a period of seemingly ever-apparent but unpredictable climate change.

## **7 GEOTECHNICAL DESIGN REPORT**

**7.1** The site investigation works achieved by the six boreholes have proven ground conditions beneath the site to be in accordance with recorded mapping and expectation. Beneath a nominal surface mantle of topsoil and made ground, superficial Head deposits were encountered over bedrock of the recorded Cinderford Member.

**7.2** In the absence of definitive information pertaining to structure and/or anticipated design loads etc, foundation recommendations at this stage are relatively generic, based upon assumed/envisaged methods of construction in light of the ground conditions encountered.

### ***Foundation Design***

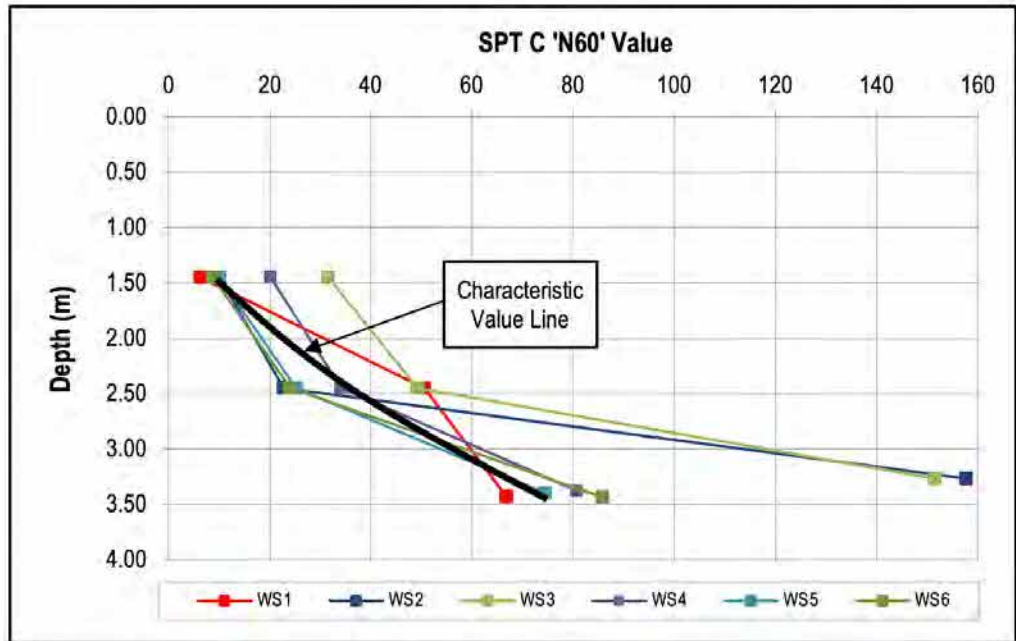
**7.3** The natural weathered cohesive soils of the superficial Hd classify as low to medium volume change potential, with underlying bedrock classifying as low to none volume change potential, therefore (following NHBC Standards) a minimum founding depth of 0.9m is considered appropriate, locally deepened within the radius of influence of trees and obviously subject to those foundations also penetrating through any localised softer, infilled or disturbed deposits to found in competent undisturbed and normally hydrated natural material. Visual observations and CI values indicated that cohesive soils (WS1 up to 1.3m, WS4 up to 1.4m and WS5 up to 1.8m) may be desiccated. Plot-specific recommended minimum founding depths are presented on drawing 5101/2.

**7.4** Consideration has been given as to whether any foundation deepening is required (beyond the above minimum) to account for potential future tree root activity. Based on proposed development layout drawing 5101/2/2, there are one or more existing trees within potential influencing distance of all proposed buildings. Based on this Practice's visual inspection, trees include red oak and leylandii cypress (of high water demand), lime, sycamore, crab apple, monkey puzzle and yew (of moderate water

demand) and hazel, silver birch and yew (of low water demand), although as always it is recommended that all tree species are confirmed by an arboriculturist. Plot-specific recommended minimum founding depths are presented on drawing 5101/2/2.

- 7.5** All buildings will require heave protection in the form of a 50mm thick compressible membrane against the inside faces of all those external trench fill foundations deeper than 1.5m in order to overcome potential unbalanced lateral heave forces (unless the appointed Building Control inspector is satisfied that the soil is not desiccated at that time). Such protection should be applied on the inner face of external foundation walls only, with the lower 0.5m left unprotected. The same buildings will also require suspended ground floor slabs, which should incorporate a subfloor void of 100mm for insitu concrete or 250mm for pre-cast concrete and timber floors.
- 7.6** Design calculations in Eurocode 7 (BS EN 1997-1) require the establishment of design values for actions, ground properties and ground resistances, definition of the limits that must not be exceeded (usually a serviceability limit state), the setting up of calculation models for the relevant ultimate or serviceability limit state, and showing by such calculation that these limits will not be exceeded. Design values for such calculations are derived by applying partial factors to characteristic values for actions, ground properties and ground resistances, and based upon the foregoing geotechnical model and following the requirements of Design Approach 1, both Combination 1 and Combination 2 calculations have been undertaken. Calculation sheets can be presented upon request.
- 7.7** BS EN 1997-2:2007 and BS EN ISO 22475-1:2006 require quality class 1 samples for determination of soil shear strength, and such samples can only be obtained by category A sampling methods. To avoid the costly complexities of such sampling in-situ tests can alternatively be undertaken, the borehole cone penetration test (CPT) being a commonly adopted method. Field results are adjusted or 'normalised' in accordance with Eurocode requirements (BS EN ISO 22476-9:2009), to enable the generation of characteristic values of undrained shear strength that can then be used for determination of bearing resistance as described above.
- 7.8** The results of the insitu SPT's are shown on the respective logs in Appendix 2 and the normalised 'N' values have been presented as  $N_{60}$  versus depth in Figure 2 below. Equivalent undrained shear strength has subsequently been calculated which also takes account of plasticity index values.

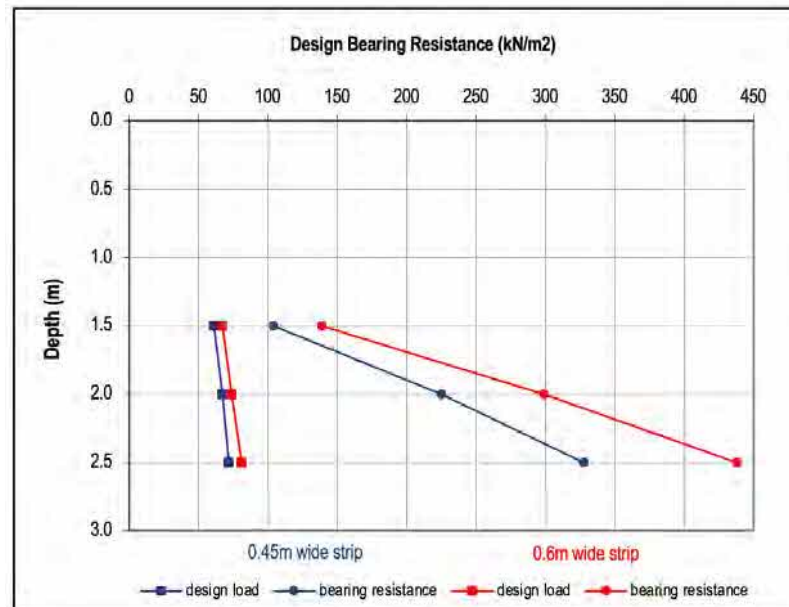
**FIGURE 2: SPT 'N60' VALUES -v- DEPTH**



**7.9** Using the characteristic value line in Figure 2, characteristic SPT  $N_{60}$  values have been adopted at the minimum founding depth from which to determine the design bearing resistance (bearing capacity).

**7.10** By adopting a characteristic SPT  $N_{60}$  value of 16 at 1.5m depth, based on a conventional two-storey residential line load of 45kN/m, the design bearing resistance (bearing capacity) for a standard 0.6m wide trenchfill foundation is estimated to be approximately 194kN/m<sup>2</sup>, which exceeds the likely bearing pressure of 67kN/m<sup>2</sup> and confirms suitability. Similar calculations demonstrate suitability for 0.45m wide foundations at this depth (bearing capacity of 146kN/m<sup>2</sup>). Design bearing resistance increases with increasing depth. is plotted against depth in Figure 3 below, so that values can be assigned to any other depths as necessary due to tree influence.

**FIGURE 3: DESIGN BEARING RESISTANCE -v- DEPTH**



**7.11** Shallow excavations should remain stable and in the short term whilst it is not anticipated that groundwater will be encountered, perched water entry is anticipated within Plot 1 foundation trenches and pumping will likely be necessary. As always it is recommended that any excavations are not left open and unsupported for any longer than necessary and if encountered water should not be permitted to sit on the foundation base to avoid potential softening. Perched/groundwater levels may vary seasonally, and water may therefore be encountered at levels in variance to those recorded by this investigation.

***Buried Concrete Protection***

**7.12** The results of acidity and sulphate testing presented in Table 5 show that buried concrete associated with foundations and floor slabs constructed up to 2.70m depth can be designed to Design Sulphate Class-1 and Aggressive Chemical Environment for Concrete Class ACEC-1 in accordance with BRE Special Digest 1 (2005), i.e. no special measures required.

***Road / Pavement Design***

**7.13** With regard to road/pavement design, near-surface (0.5m depth) plasticity results compared to Highways Agency Interim Advice Note 73/06, Rev 1 (2009), indicate a provisional CBR value of circa 4-5% for near-surface soils. As mentioned in Section

**6.4** laboratory remoulded CBR tests have been scheduled, and this data will be forwarded on upon receipt. Near surface soils may be frost-susceptible.

### ***Recommendations for Monitoring of Ground Conditions During Construction***

- 7.14** In view of the importance of founding on natural ground, a careful watch must be maintained during all foundation excavations to ensure that this requirement has been satisfied.
- 7.15** Consideration should be given to access into/around the site since the surface soils have the potential to be subject to softening during periods of sustained wet weather.
- 7.16** Due to the potential for cohesive soils to shrink and swell, inspection during foundation excavations should ensure that no live roots or evidence of desiccation is visible at the founding horizon.
- 7.17** In the event of any doubt in the above matters, this Practice would be pleased to attend site as instructed.

## **8 CONTAMINATION RISK ASSESSMENT**

### ***Human Health***

- 8.1** The contamination risk assessment has been carried out in general accordance with the methodology described within Appendix 3. Testing has included samples of the near-surface made ground and natural soil to assess their suitability for retention within the proposed development. In light of the residential development proposal Tier 1 risk modelling has adopted the most-sensitive '***Residential with Plant Uptake***' land use scenario, including the pathway of direct ingestion via vegetables grown for consumption, and the 'critical receptor' is taken as a female child of age class 1-6. Sampling targeted proposed garden areas and borehole WS2 was positioned near the existing garage with suspected ACM roof.
- 8.2** A number of disturbed samples were taken for laboratory contamination testing as previously detailed in Section . Whilst these results are presented in full in Appendix 3, for ease of reference Table 7 below provides a summary of the maximum measured concentration of each determinand against respective Tier 1 GAC.

**TABLE 7: COMPARISON OF SOIL CHEMICAL TEST RESULTS WITH GUIDELINE VALUES**

Determinand	Maximum Measured Concentration (mg/kg)	LQM/CIEH S4UL Residential with plant uptake (mg/kg) \$	Tests Undertaken (No.)	Exceedances (No.)	Notes
Arsenic	47	37	6	1	WS3 @ 0.4m bgl in Made Ground
Cadmium	<0.2	11	6	0	
Chromium III	18	910	6	0	
Chromium VI	<1.2	6	6	0	
Lead	190	200**	6	0	
Mercury	<0.3	40	6	0	
Selenium	<1.0	250	6	0	
Nickel	83	180	6	0	
Copper	65	2400	6	0	
Zinc	160	3700	6	0	
Asbestos ID	ND	<0.001%	3	0	
Speciated PAH	0.36	Various	1	0	
TPH (C6 – C40)	<LOD	Various	2	0	
<b>Notes:</b>					
* C4SL used in absence of S4UL					
\$ based on soil organic matter = 6%					
ND = None Detected					

**8.3** The findings presented in Table 7 and Appendix 3 indicate that there are no elevations of phytotoxic metals, speciated PAH or TPH and additionally no asbestos was identified, which suggests that the site generally does not appear to pose a significant risk to the health of future site users, however it is recognised that a single elevation of the toxic metal arsenic was recorded that exceeds its Tier 1 GAC. This has been considered in more detail below.

**8.4** Considering arsenic, a single elevated value of 47mg/kg was recorded at 0.4m depth in WS3, which mildly exceeds the GAC threshold of 37mg/kg. Despite the mild exceedance, statistical analysis using the CIEH Statistical Calculator tool indicates that this value is not an outlier to the main population of results which means that it is unlikely to be representative of a potentially larger area of significant contamination. Given the foregoing, further investigation, sampling and testing is not considered

necessary as this is likely an isolated value. There is currently considered to be no requirement for remediation/mitigation to protect human health.

### ***Water Supply Pipework***

- 8.5** In addition to the above, consideration has been given to the potential effects of recorded concentrations on new water utility pipework. Given the absence of organic contaminants there ought to be no requirement for upgraded barrier pipework and the results of the contamination testing undertaken as part of this investigation would seem to support this. As always it is recommended that advice be sought from the local regulatory authority prior to ordering, since it is possible that their specific in-house thresholds may differ markedly from those within the most recent guidance by UK Water Industry Research (UKWIR) report "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (2010).

### ***Landfill Gas and Radon Gas***

- 8.6** It was previously established in the desk study researches that the site is unlikely to be affected by landfill gases. This was confirmed by the boreholes which found no evidence of methanogenic material beneath the site. However, full radon protection measures are required for the dwellings within the new development.

### ***Controlled Waters***

- 8.7** The risk to controlled waters has been assessed by leachate analysis on two representative samples of made ground, which were tested to determine the leachable content of toxic and phytotoxic metals and speciated PAH. Consistent with the soil phase results it will be seen that there are no significant elevations exceeding EA EQS and/or WFD thresholds, and on this basis it is considered that the site does not pose a significant risk to controlled waters or groundwater resources and pre-construction remedial actions is not currently considered necessary.

### ***Caveats***

- 8.8** In line with best industry practice the scope of contamination testing has been based upon the site history, current land usage and actual findings, with reference where necessary to DoE Industry Profiles and DEFRA/EA guidance. To the best of our knowledge information concerning the land quality assessment is accurate at the date



of issue, however subsurface conditions including ground contamination may vary spatially and with time. There may be conditions pertaining to the site not disclosed by the above sources of information, which might have a bearing upon the recommendations made, were such conditions known. We have however used our professional judgement in order to limit this during the investigation.

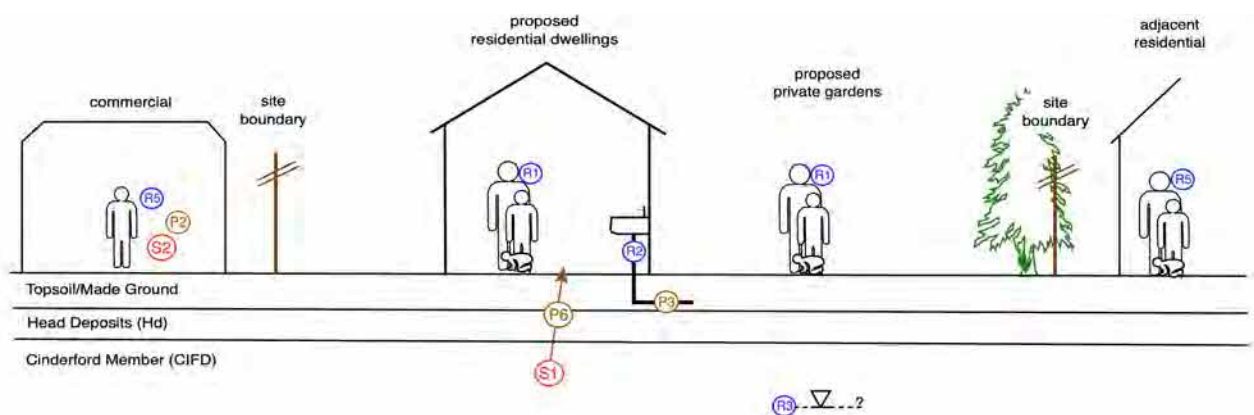
**8.9** The conclusions and recommendations made in respect of land quality do not address any potential risks to site operatives or ground workers during the construction stage. These issues should be addressed by the Principal Contractor in accordance with the relevant statutory procedures and regulations (CDM Regulations 2015).

**8.10** It is important that these limitations be clearly recognised when the findings and recommendations of this report are being interpreted. Additional assessment may be necessary should a significant delay occur between report date and implementation of the proposed scheme to which it relates.

**9 REFINED CONCEPTUAL SITE MODEL**

**9.1** In view of the above discussions the preliminary conceptual site model has been refined as shown in Figure 4 and Table 8 below.

**FIGURE 4: REFINED CONCEPTUAL SITE MODEL (NTS)**



**TABLE 8: SUMMARY OF POTENTIAL / IDENTIFIED POLLUTANT LINKAGES**

Potential Sources	Pathways	Receptors					Comments	Refined Risk Rating	Remedial/ Mitigation Requirements
		R1	R2	R3	R4	R5			
<b>ON-SITE</b>									
<b>S1</b>	P1						Radon gas naturally emitted	High	Full Radon Protection Measures
	P2								
	P3								
	P4								
	P5								
	P6	X							
<b>OFF-SITE</b>	<b>NONE</b>								
<b>S2</b>	P1						No evidence of chemical or fuel storage or of spillages due to poor site maintenance	Low	None required
	P2	X							
	P3								
	P4								
	P5								
	P6								
<b>OFF-SITE</b>	<b>NONE</b>								
<b>SOURCES</b>	<b>S1</b>	Natural undisturbed bedrock naturally emitting Radon Gas							
	<b>S2</b>	Active Commercial properties							
<b>PATHWAYS</b>	<b>P1</b>	Direct dermal contact or ingestion via soil attached to vegetables							
	<b>P2</b>	Inhalation of dust and vapours							
	<b>P3</b>	Permeation into new water supply pipework							
	<b>P4</b>	Vertical leaching in unsaturated zone and lateral migration in saturated zone							
	<b>P5</b>	Landfill gas migration through unsaturated zone and accumulation within confined spaces							
	<b>P6</b>	Radon gas migration through unsaturated zone and accumulation within confined spaces							
<b>RECEPTORS</b>	<b>R1</b>	Future site users (critical residential receptor is female child age class 1-6)							
	<b>R2</b>	Potable water supply							
	<b>R3</b>	Groundwater (Hd and CIFD classified as 'Secondary A aquifers)							
	<b>R4</b>	Surface waters (Old Engine Brook 475m W)							
	<b>R5</b>	Adjacent site users (residential/commercial)							

## **10 CONCLUSIONS AND RECOMMENDATIONS**

- 10.1** The foregoing discussions and recommendations are based upon the results of a geo-environmental desk study, followed by intrusive ground investigation comprising boreholes and trial pits plus insitu testing and laboratory geotechnical and contamination testing. The boreholes appear to present a consistent pattern of subsoil conditions concordant with both recorded geological mapping and anticipated findings, comprising superficial Head over recorded bedrock of the Cinderford Member. As always however a careful watch should be maintained for any anomalous conditions during site stripping and excavation, which should be reported back to this Practice for further investigation and assessment.
- 10.2** Based upon historic Ordnance Survey mapping the site appears to have remained as undeveloped rough grassland since the earliest available mapping of 1878 up until circa 1903 when it was developed with the residential property that remains until the present day. The site appears to have remained unchanged until circa 1986-91 when the property boundary was expanded to create a larger garden and the site has remained the same up until the present day.
- 10.3** The intrusive investigation has proven a nominal surface mantle of topsoil across the majority of the site up to 0.30m depth, which is mostly underlain by a gravelly clay/silt made ground up to 0.7m depth. Below the foregoing, natural undisturbed superficial soils of the recorded Head deposits were encountered below to depths of between 1.3m and 1.8m, which overlay medium dense/dense sand and gravel of the CIFD. All boreholes terminated upon insitu CPT test refusal on extremely weak sandstone at or just below 3.0m depth. Perched water was struck in WS1-3 only between 2.0m and 2.7m depth with water level locally rising (WS2 only) up to 1.3m depth. The boreholes remained stable during the works, and the short-term stability of side walls within open excavations for foundations and services is unlikely to be an issue during construction, although some pumping control measures are likely to be required when excavating foundation trenches for Plot 1. It is recommended that any excavations are not left open and unsupported for any longer than necessary. As always perched/groundwater levels do vary seasonally and care should be taken if development is proposed during traditionally wetter winter months, as a high-water table may then result in an adverse effect upon short-term side wall stability.

- 10.4** Foundations will need to penetrate any near surface disturbed, softer and/or desiccated ground to found within normally hydrated soil of the CIFD at a minimum depth of 1.5m (please refer to **Section 7** and drawing 5101/2/2 for specific details). All buildings are within the zone of influence of one or more trees and both suspended ground floor slabs and heave protection will be required.
- 10.5** Buried concrete for floor slabs and conventional trenchfill foundations in any open excavations can be constructed with a classification of Design Sulphate Class DS-1 and Aggressive Chemical (AC) Class AC-1 in accordance with BRE Special Digest 1 (2005) i.e. special sulphate resistance measures are unnecessary.
- 10.6** In terms of proposed external pavement design, a provisional CBR value of 4-5% has been estimated (based upon correlation of laboratory index test results) at a presumed 0.5m formation depth horizon. Soil has the potential to be frost-susceptible. Laboratory remoulded CBR tests have been scheduled and this information will be provided upon receipt.
- 10.7** A detailed contamination risk assessment indicates that the site is uncontaminated, with no perceived risk to the health of future site users or controlled waters.
- 10.8** There is no landfill gas risk, however full radon protection measures are required within new dwellings.
- 10.9** Should planning consent be subject to certain conditions, this report and attachments should be lodged with the local planning authority, such that they can update their records.
- 10.10** The above recommendations must not be used in respect of any development differing in any way from the proposals described in this report, without reference back to this Practice or to another geotechnical specialist. This report is subject to our standard terms and conditions.

## 11 REFERENCES

### **Geotechnical**

- BS EN 1997-1:2004 'Geotechnical Design - *General Rules*'
- BS EN 1997-2:2007 'Geotechnical Design - *Ground Investigation and Testing*'
- British Standards Institute, BS5930:2015 '*Code of Practice for Ground Investigations*'
- National House Building Council (NHBC) Standards: Chapter 4.2 '*Building Near Trees*' (2020)
- BS EN 14688: '*Geotechnical Investigation and Testing - Identification and Classification of Soil Part 1 Identification and Description*' (2002)
- BS EN 14688: '*Geotechnical Investigation and Testing - Identification and Classification of Soil Part 2 Principles for a Classification*' (2004)
- BS EN 14689: '*Geotechnical Investigation and Testing - Identification and Classification of Rock Part 1 Identification and Description*' (2003)
- British Standards Institute, BS 1377: '*British Standard Methods of Test for Soils for Civil Engineering Purposes*', Parts 1 - 9, (1990)
- Highways Agency *Interim Advice Note 73/06 Rev.1 (2009) Design Guidance for Road Pavement Foundations*
- Building Research Establishment (BRE) Special Digest 1 '*Concrete in Aggressive Ground*' (2005)
- British Geological Survey (England & Wales) Sheet SO61 SE 1981 and 'online'
- Building Research Establishment (BRE) Digest 365 "*Soakaway Design*" (2016)
- Department of Transport Series 600: '*Specification for Earthworks*' (1991)

### **Environmental**

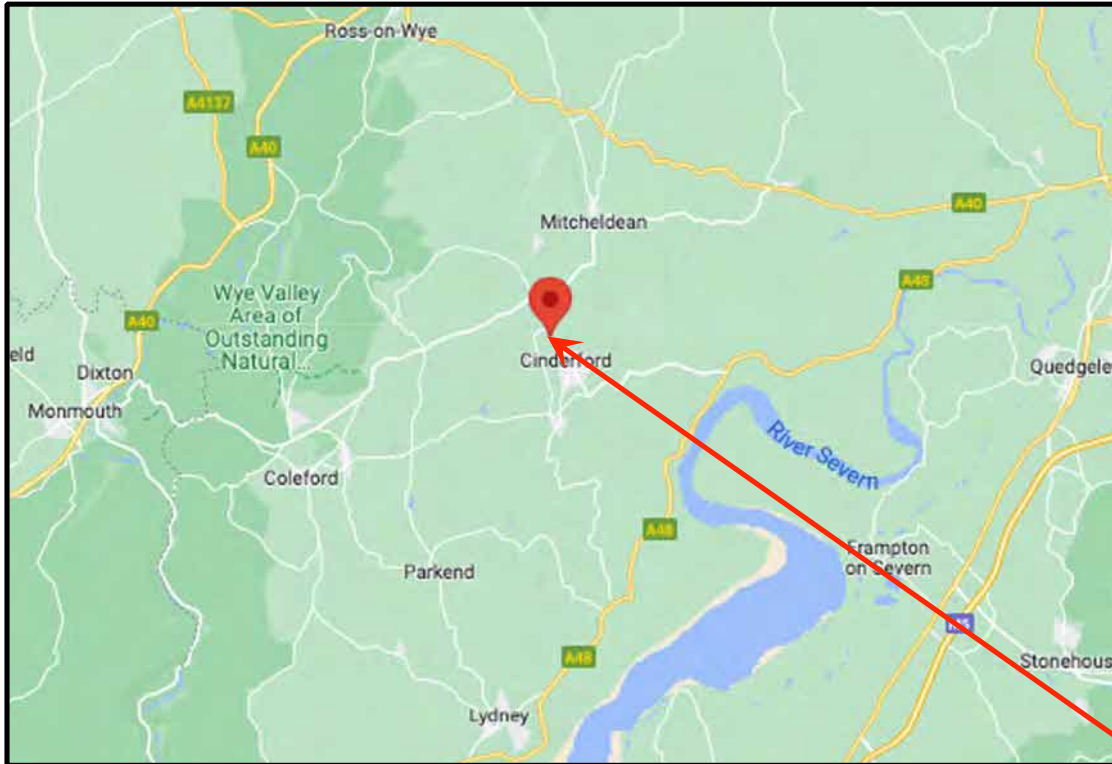
- British Standards Institute, BS 10175: '*Code of Practice for the Investigation of Potentially Contaminated Sites*' (2011)
- Environment Agency LCRM: Land Contamination Risk Management (2020)
- Environment Agency/National House Building Council (NHBC) R & D 66 '*Guidance for the Safe Development of Housing on Land Affected by Contamination*' (2000)
- Chartered Institute of Environmental Health (CIEH)/Land Quality Management Limited (LQM). The LQM/CIEH '*Generic Assessment Criteria for Human Health Risk Assessment*' (2<sup>nd</sup> Edition). Land Quality Press
- DEFRA: SP1010: '*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document* (2014)
- CIEH/LQM. '*S4ULs for Human Health Risk Assessment*' (2015); Land Quality Press"
- Department of the Environment, Transport & the Regions: '*The Environmental Protection Act 1990: Part IIA*' (2000)
- Construction Industry Research & Information Association (CIRIA) 665: '*Assessing Risks Posed by Hazardous Ground Gases to Buildings*' (2007)
- CIRIA C735:2014 '*Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases*'
- British Standards Institute, BS8485: '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*' (2015)
- Building Research Establishment (BRE BR211): Radon – '*Guidance on protective measures for new buildings*' (2015)
- Environment Agency. '*River Basins Typology, Standards and Groundwater (Water Framework Directive) (England and Wales) Directions*' (2010)
- Environment Agency. '*The Water Framework Directive (Standards and Classification) Directions (England and Wales)*' (2015)
- The Water Supply (Water Quality) Regulations 2000 (Amendment) Regulations (2007)
- UK Water Industry Research Limited (UKWIR). '*Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites*' (2010)
- Technical Guidance Waste Management 3 (TGW3, EA Version 1.2, October 2021)
- Building Research Establishment (BRE)- '*Cover Systems for Land Regeneration*' (2004)
- Landmark Historical Mapping Ref: 299592182\_1\_1 dated 9<sup>th</sup> August 2022
- Environment Agency ([www.environment-agency.gov.uk](http://www.environment-agency.gov.uk))
- Zetica ([www.zetica.com](http://www.zetica.com))
- Google Earth (current and historical aerial mapping plus street view)
- UK Grid Reference Finder ([www.gridreferencefinder.com](http://www.gridreferencefinder.com))

BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD GL14 3HY!



SITE LOCATION (based on Microsoft Bing Mapping)

Job No. 5101/2	Drawing No. 5101/2/1	Scale: NTS	Date: 22-06-23
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THE!  
SITE





Gretton!  
Motors!  
Limited

- BH01-BH05 M & J boreholes!  
from previous investigation
- WS1-WS6 this investigation
- HP1-HP3
- 1.5 Minimum founding depths!  
calculated in line with!  
NHBC guidance
- P1 Number and direction of!  
photograph (Appendix 1)

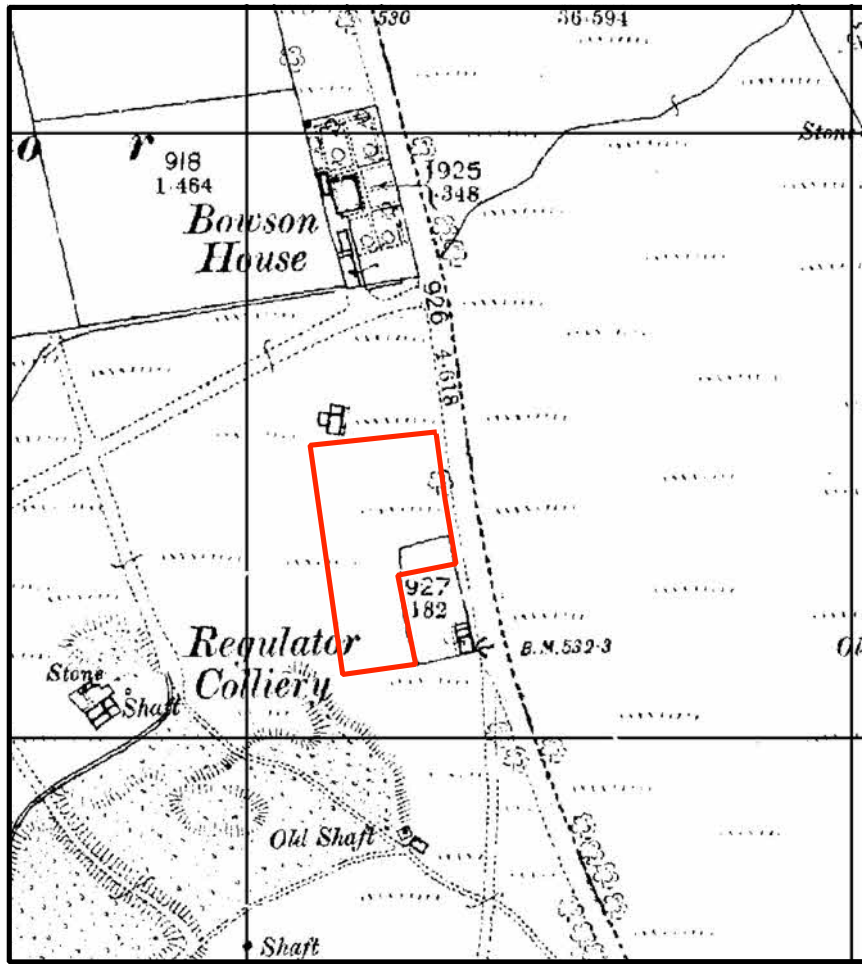
BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD!  
GLOUCESTERSHIRE GL14 3HY!



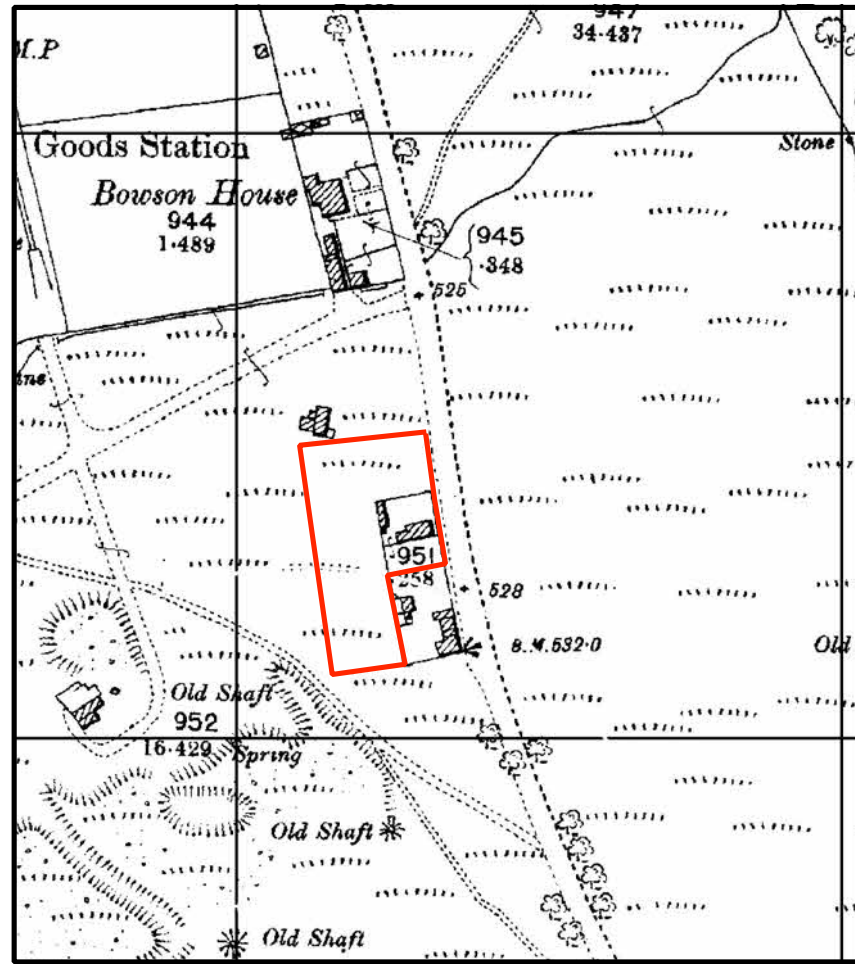
PROPOSED DEVELOPMENT LAYOUT (based on TNR drg. 010.12.013 Rev A, dated March 2022) SHOWING INVESTIGATION LOCATIONS

Job No. 5101/2	Drawing No. 5101/2/2	Scale: c1:250 @A3	Date: 22-06-23
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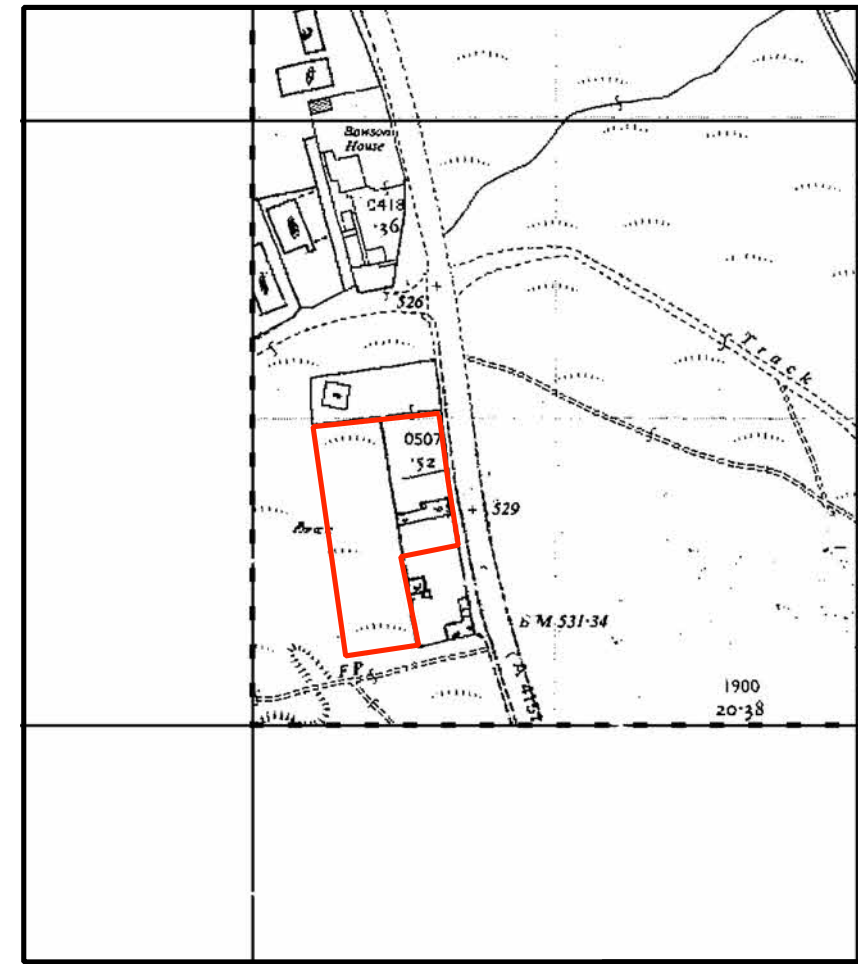




**1878-81!**  
(scale 1:2500)

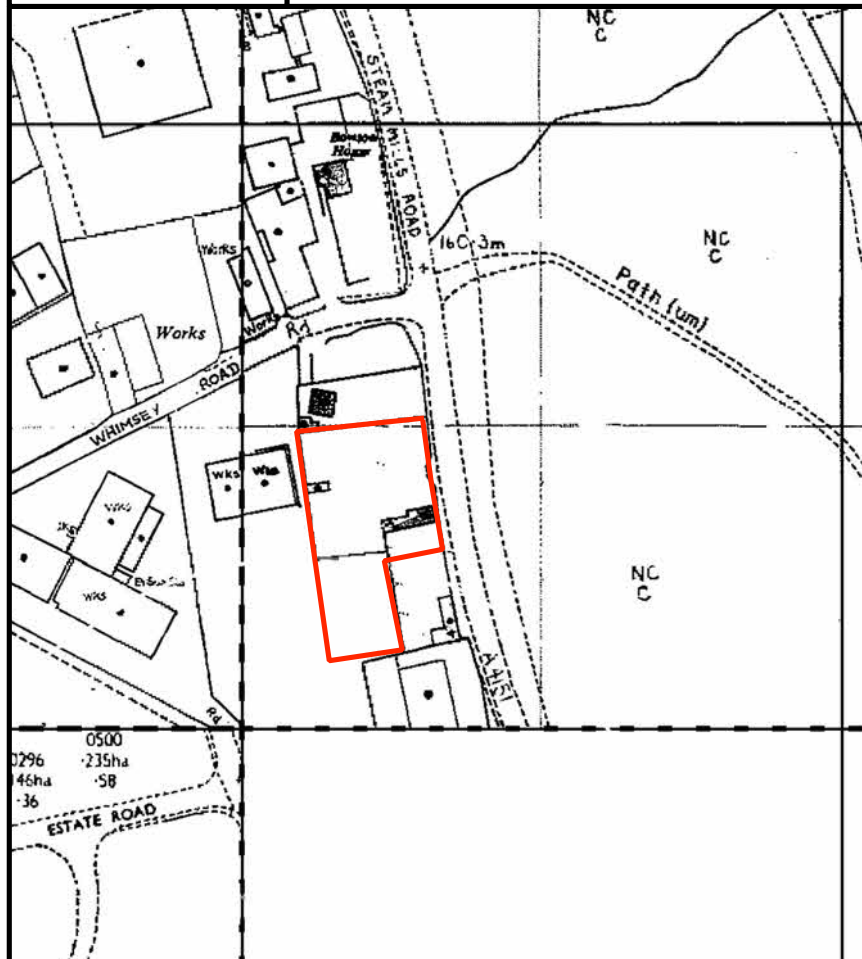


**1903!**  
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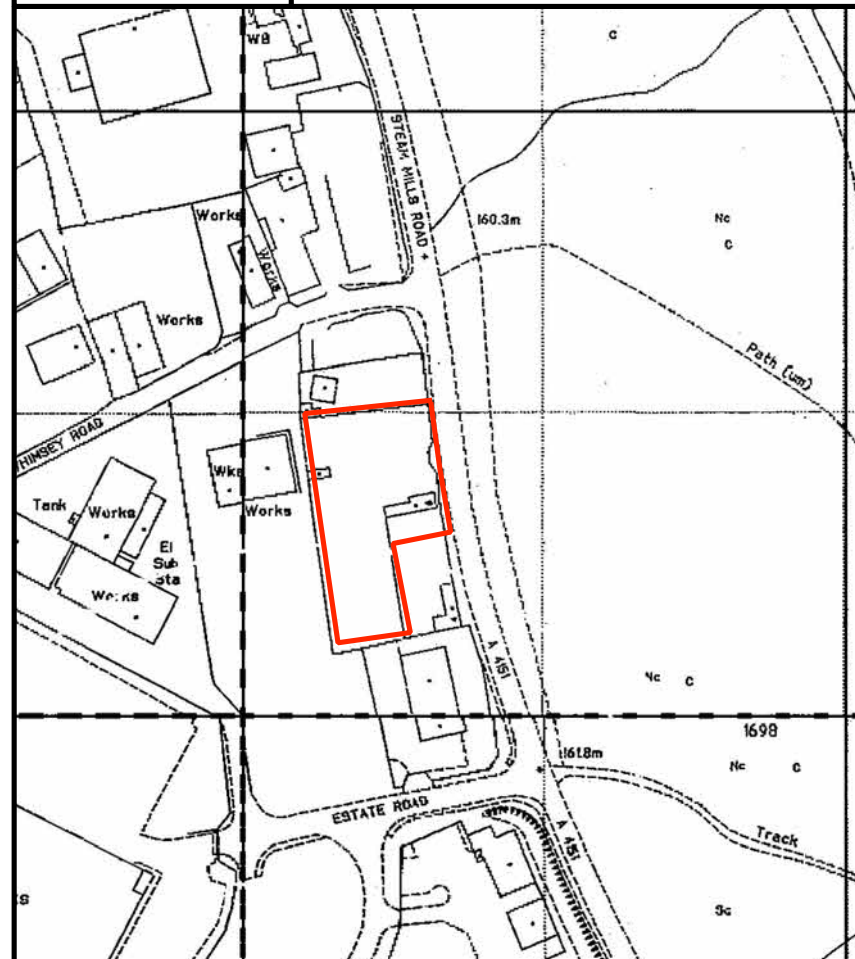


**1974!**  
(scale 1:2500)

**1986-91!**  
(scale 1:2500)



**1994!**  
(scale 1:2500)



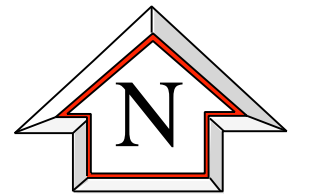
**1999!**  
(scale 1:2500)



BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD  
GL14 3HY!

EXTRACTS OF ORDNANCE SURVEY PLANS TO SHOW SITE HISTORY

Job No.	5101/2	Drawing No.	5101/2/3	Scale:	as shown	Date:	26-07-23
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# **APPENDIX 1**

## **SITE PHOTOGRAPHS**



Photograph P1



Photograph P2



Photograph P3



Photograph P4



Photograph P5



Photograph P6



Photograph P7



Photograph P8


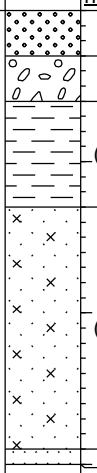
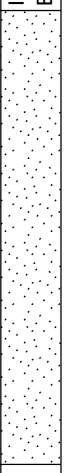


## **APPENDIX 2**

### **BOREHOLE LOGS (INCLUDING PHOTOGRAPHS)**

## BOREHOLE LOG

Project BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD GL14 3HY				<b>BOREHOLE No</b>  <b>WS1</b>	
Job No 5101/2	Date 19-06-23	Ground Level (c.m,AOD) 161.00	Co-Ordinates (c.) E 365,039 N 215,095		
Contractor Cook Ground Investigation Limited				Sheet 1 of 1	

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)	DESCRIPTION		
1.00-1.10	D					0.30	TOPSOIL: dark brown, gravelly SILT. Gravel is sub-angular to sub-rounded, fine to coarse sandstone with occasional brick silt and coal		
1.00-1.45	SPT C			0.60	0.00 - 0.60 - roots (<5mm)				
1.45		N5		(0.70)	GRAVEL: loose grey desiccated silty GRAVEL of sub-angular, medium to coarse laminated mudstone	Hd			
1.50	ES			1.30	CLAY: soft light brownish grey, silty desiccated CLAY with structure and frequent sand bands				
2.00-2.45	SPT C			(1.60)	SAND: loose light brown, silty SAND	Hd			
2.45		N40		2.90	2.00 - becoming dense				
2.60	D			3.00	SANDSTONE: extremely weak SANDSTONE	CIFD			
3.00-3.43	SPT C								
3.43		N50/ 285 mm							
<p>Core Recovery:                      0.00 - 1.00m: hand-dug starter pit                      1.00 - 2.00m: 100%                      2.00 - 3.00m: 100%</p> <p>Hand dug starter pit: 0.00-1.00m: Continuous disturbed sampling using 101mm sample barrels: 1.00-3.00m. No casing used.                      Perched water encountered at 2.00m falling to 2.60m after 20 minute monitoring period. Upon completion borehole backfilled with arisings.</p>									

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19/06/2023	101	3			2.60						Borehole position scanned using Cable Avoidance Tool (CAT), no services detected  Hd = Head CIFD = Cinderford Member

All dimensions in metres Scale 1:50	Client Mr M G Thompson	Method/ Plant Used Archway Competitor Dart	Logged By DB
--	---------------------------	--	-----------------

<b>Project</b> BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD GL14 2HY	<b>Borehole No.</b> <b>WS1</b>
<b>Job No.</b> 5101/2	

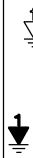
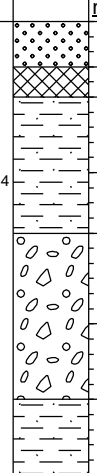



Borehole Core  
1.0-3.0m

<b>Client</b> Mr M. G. Thompson	<b>Method/Plant Used</b> Archway Dart / Window Sampling	<b>Logged By</b> DB
------------------------------------	--	------------------------

## BOREHOLE LOG

Project BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD GL14 3HY				<b>BOREHOLE No</b>  <b>WS2</b>	
Job No 5101/2	Date 19-06-23	Ground Level (c.m,AOD) 160.00	Co-Ordinates (c.) E 365,032 N 215,086		
Contractor Cook Ground Investigation Limited				Sheet 1 of 1	

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill	
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)	DESCRIPTION			
0.40-0.50	ES					0.30 0.50 (0.90) 1.40 (1.10) 2.50 (0.50) 3.00	<p>TOPSOIL: dark brown, gravelly SILT. Gravel is sub-angular to sub-rounded, fine to coarse sandstone with occasional brick silt and coal</p> <p>MADE GROUND: probable soft black, gravelly CLAY. Gravel is sub-angular sandstone, concrete tile with occasional brick and coal</p> <p>CLAY: soft, light brownish grey, sandy CLAY</p> <p>GRAVEL: medium dense, light brown, sandy GRAVEL of sub-angular to sub-rounded, medium to coarse sandstone/ironstone</p> <p>2.45 - 2.80 - extremely weak sandstone bands with sand bands</p> <p>CLAY: very stiff, light brownish grey sandy CLAY with frequent sandstone gravel</p> <p>3.00 - terminated on firm sandy clay</p>	Hd		
1.00	D									
1.00	H									
1.00-1.45	SPT C									
1.45		N8								
2.00-2.45	SPT C									
2.45		N18								
2.50-2.70	D									
3.00-3.27	SPT C									
3.27		N50/ 120 mm								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19/06/2023	101	3			2.00						

All dimensions in metres Scale 1:50	Client Mr M G Thompson	Method/ Plant Used Archway Competitor Dart	Logged By DB
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<b>Project</b> BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD GL14 2HY	<b>Borehole No.</b> <b>WS2</b>
<b>Job No.</b> 5101/2	



Hand-dug starter pit: 0.00-1.00m














Borehole Core: 1.00-3.00m

<b>Client</b> Mr M. G. Thompson	<b>Method/Plant Used</b> Archway Dart / Window Sampling	<b>Logged By</b> DB
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## BOREHOLE LOG

Project <b>BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD GL14 3HY</b>				<b>BOREHOLE No</b>  <b>WS3</b>	
Job No <b>5101/2</b>	Date <b>19-06-23</b>	Ground Level (c.m,AOD) <b>160.00</b>	Co-Ordinates (c.) <b>E 365,044 N 215,078</b>		
Contractor <b>Cook Ground Investigation Limited</b>				Sheet <b>1 of 1</b>	

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)	DESCRIPTION		
0.40	ES					0.30	TOPSOIL: dark brown, gravelly SILT with frequent roots throughout. Gravel is sub-angular to sub-rounded, fine to coarse sandstone with occasional brick silt and coal 0.00 - 0.45 - rare hair roots (<2mm)	Hd	
0.60-0.80	D					0.60			
1.00	H					(0.80)	MADE GROUND: loose black gravelly SILT. Gravel is subangular, fine to coarse brick and coal	Hd	
1.00-1.45	SPT C					1.40	CLAY: soft, light brownish grey, gravelly, silty CLAY. Gravel is sub-rounded, medium to coarse claystone/mudstone		
1.30	H					1.70	SILT: light brownish grey, sandy SILT	Hd	
1.40-1.50	D					1.75	SAND: probable dense, light brown sand with thin 1mm iron layer	CIFD	
1.45		N25				(0.65)	SAND: probable dense, light brownish grey SAND with bands of extremely weak medium grained sandstone	CIFD	
2.00	H					2.40	GRAVEL: medium dense to dense, light brownish grey, sandy GRAVEL of sub-angular, medium to coarse sandstone	CIFD	
2.00-2.45	SPT C					3.00	3.00 - terminated on extremely weak sandstone		
2.45		N39							
3.00-3.27	SPT C								
3.27		N50/ 125 mm							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19/06/2023	101	3			2.70						Borehole position scanned using Cable Avoidance Tool (CAT), no services detected  Hd = Head CIFD = Cinderford Member

All dimensions in metres Scale 1:50	Client Mr M G Thompson	Method/ Plant Used Archway Competitor Dart	Logged By DB
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<b>Project</b> BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD GL14 2HY	<b>Borehole No.</b> <b>WS3</b>
<b>Job No.</b> 5101/2	



Hand-dug starter pit : 0.00-1.00m











Borehole Core: 1.00-3.00m

<b>Client</b> Mr M. G. Thompson	<b>Method/Plant Used</b> Archway Dart / Window Sampling	<b>Logged By</b> DB
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## BOREHOLE LOG

Project BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD GL14 3HY				<b>BOREHOLE No</b>  <b>WS4</b>	
Job No 5101/2	Date 19-06-23	Ground Level (c.m,AOD) 159.00	Co-Ordinates (c.) E 365,029 N 215,060		
Contractor Cook Ground Investigation Limited				Sheet 1 of 1	

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)	DESCRIPTION		
0.30-0.70	ES					0.30	TOPSOIL: dark brown, gravelly SILT with frequent roots throughout. Gravel is sub-angular to sub-rounded, fine to coarse sandstone with occasional brick silt and coal		Hd
0.70-1.00	D					(0.40) 0.70	MADE GROUND: probable soft, mid brown, slightly gravelly SILT. Gravel is sub-angular, fine to coarse, brick and coal 0.45 - 0.45 - roots		
1.00	H					(0.70)	CLAY: soft to firm, light brownish grey, very sandy CLAY		
1.20-1.40	D					1.40			
1.45		N16					SAND: medium dense, light brownish grey gravelly SAND. Gravel is sub-angular to sub-rounded, medium to coarse sandstone		CIFD
2.00	D					(1.60)	2.00 - dead roots		
2.45		N27					2.70 - becoming very gravelly		
3.00						3.00	3.00 - extremely weak sandstone, light brownish-grey (CIFD)		
3.38		N50/ 235 mm					Core Recovery: 0.00 - 1.00m: hand-dug starter pit 1.00 - 2.00m: 100% 2.00 - 3.00m: 100%  Hand dug starter pit: 0.00-1.00m: Continuous disturbed sampling using 101mm sample barrels: 1.00-3.00m. No casing used. No groundwater encountered. Upon completion borehole backfilled with arisings.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19/06/2023	101	3			DRY						

All dimensions in metres Scale 1:50	Client Mr M G Thompson	Method/ Plant Used Archway Competitor Dart	Logged By DB
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<b>Project</b> BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD GL14 2HY	<b>Borehole No.</b> <b>WS4</b>
<b>Job No.</b> 5101/2	



Hand-dug starter pit: 0.00-1.00m







Borehole Core: 1.00-3.00m

<b>Client</b> Mr M. G. Thompson	<b>Method/Plant Used</b> Archway Dart / Window Sampling	<b>Logged By</b> DB
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## BOREHOLE LOG

Project <b>BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD GL14 3HY</b>				<b>BOREHOLE No</b>  <b>WS5</b>	
Job No <b>5101/2</b>	Date <b>19-06-23</b>	Ground Level (c.m,AOD) <b>159.00</b>	Co-Ordinates (c.) <b>E 365,033 N 215,046</b>		
Contractor <b>Cook Ground Investigation Limited</b>				Sheet <b>1 of 1</b>	

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)	DESCRIPTION		
0.30-0.60	D					0.30	TOPSOIL: dark brown, gravelly SILT with frequent roots (2mm) throughout. Gravel is sub-angular to sub-rounded, fine to coarse sandstone with occasional brick silt and coal		
						0.60	MADE GROUND: reworked mid brown, gravelly SILT with roots. Gravel is sub-angular, fine to medium, brick and coal		
1.00	D					(1.20)	CLAY: soft to firm light brownish grey gravelly, sandy CLAY. Gravel is sub-rounded to sub-angular, fine to coarse sandstone	Hd	
1.00	H								
1.00-1.45	SPT C	N8							
1.45									
1.50-1.80	D					1.80	1.70 - live roots to 1.70m		
1.80	H								
2.00-2.45	SPT C					(0.50)	SAND: medium dense, light brownish grey clayey SAND	CIFD	
						2.30			
2.45		N20				(0.50)	GRAVEL: medium dense, light brown, /grey and black sandy GRAVEL of subangular, medium to coarse sandstone and ironstone	CIFD	
2.50	D					2.80			
3.00-3.40	SPT C					3.00	SANDSTONE: extremely weak, light brownish grey SANDSTONE	CIFD	
							3.00 - terminated on sandstone		
3.40		N50/ 255 mm					Core Recovery: 0.00 - 1.00m: hand-dug starter pit 1.00 - 2.00m: 100% 2.00 - 3.00m: 100%		
							Hand dug starter pit: 0.00-1.00m: Continuous disturbed sampling using 101mm sample barrels: 1.00-3.00m. No casing used. No groundwater encountered. Upon completion borehole backfilled with arisings.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19/06/2023	101	3			DRY						

All dimensions in metres Scale 1:50	Client Mr M G Thompson	Method/ Plant Used Archway Competitor Dart	Logged By DB
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<b>Project</b> BROADMOOR COTTAGE, 6 STEAM MILLS ROAD, CINDERFORD GL14 2HY	<b>Borehole No.</b> <b>WS5</b>
<b>Job No.</b> 5101/2	



Hand-dug starter pit: 0.00-1.00m



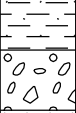
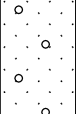
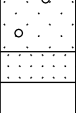






Borehole Core: 1.00-3.00m

<b>Client</b> Mr M. G. Thompson	<b>Method/Plant Used</b> Archway Dart / Window Sampling	<b>Logged By</b> DB
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## BOREHOLE LOG

Project BROADMOOR COTTAGE, STEAM MILLS ROAD, CINDERFORD GL14 3HY				BOREHOLE No <b>WS6</b>	
Job No 5101/2	Date 19-06-23	Ground Level (c.m,AOD) 160.00	Co-Ordinates (c.) E 365,035 N 215,027		
Contractor Cook Ground Investigation Limited				Sheet 1 of 1	

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Undrained Shear Strength	Legend	Depth (Thickness)	DESCRIPTION		
0.30-0.50	ES					0.30	TOPSOIL: dark brown, gravelly SILT with frequent roots throughout. Gravel is sub-angular to sub-rounded, fine to coarse sandstone with occasional brick silt and coal		
0.50	D					0.50			
1.00	D					(0.80)	MADE GROUND: reworked silty GRAVEL of sub-angular, fine to coarse sandstone, brick, coal and rare roots CLAY: soft sandy CLAY. Roots throughout	Hd	
1.00-1.45	SPT C					1.30			
1.45		N7				(0.40)	GRAVEL: medium dense sandy GRAVEL of sub-angular, fine to coarse coal and sandstone 1.30 - coal band 1.55 - sandstone band	CIFD	
2.00	D					1.70			
2.00-2.45	SPT C					(1.10)	SAND: medium dense gravelly clayey SAND 2.00 - sand increasing and live roots up to 2.0m	CIFD	
2.45		N19				2.80			
3.00-3.44	SPT C					3.00	SANDSTONE: extremely weak SANDSTONE	CIFD	
3.44		N50/ 290 mm					Core Recovery: 0.00 - 1.00m: hand-dug starter pit 1.00 - 2.00m: 100% 2.00 - 3.00m: 100%  Hand dug starter pit: 0.00-1.00m: Continuous disturbed sampling using 101mm sample barrels: 1.00-3.00m. No casing used. No groundwater encountered. Upon completion borehole backfilled with arisings.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Hole Dia. mm	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19/06/2023	101	3			DRY						

All dimensions in metres Scale 1:50	Client Mr M G Thompson	Method/ Plant Used Archway Competitor Dart	Logged By DB
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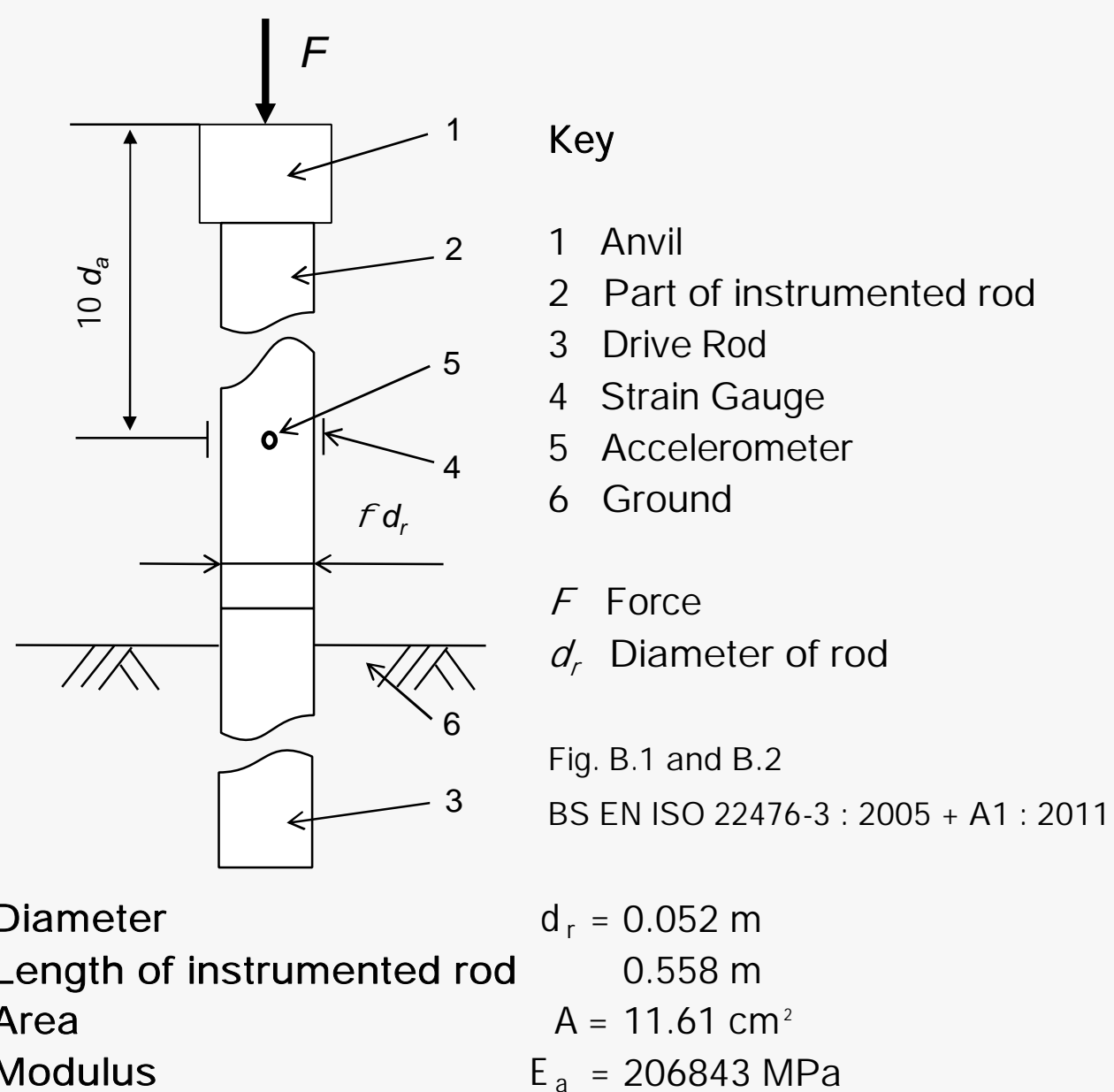


# SPT Calibration Report

## Hammer Energy Measurement Report

Type of Hammer                      Dart  
 Test No                                    EQU2023\_124  
 Client                                     Cook Ground  
    Investigation  
 Test Depth (m)                        9.70  
 Mass of hamme                         $m = 63.5\text{kg}$   
 Falling height                          $h = 0.76\text{m}$   
 $E_{\text{theor}} =$                                  $m \times g \times h = 473\text{J}$

### Characteristics of the instrumented rod



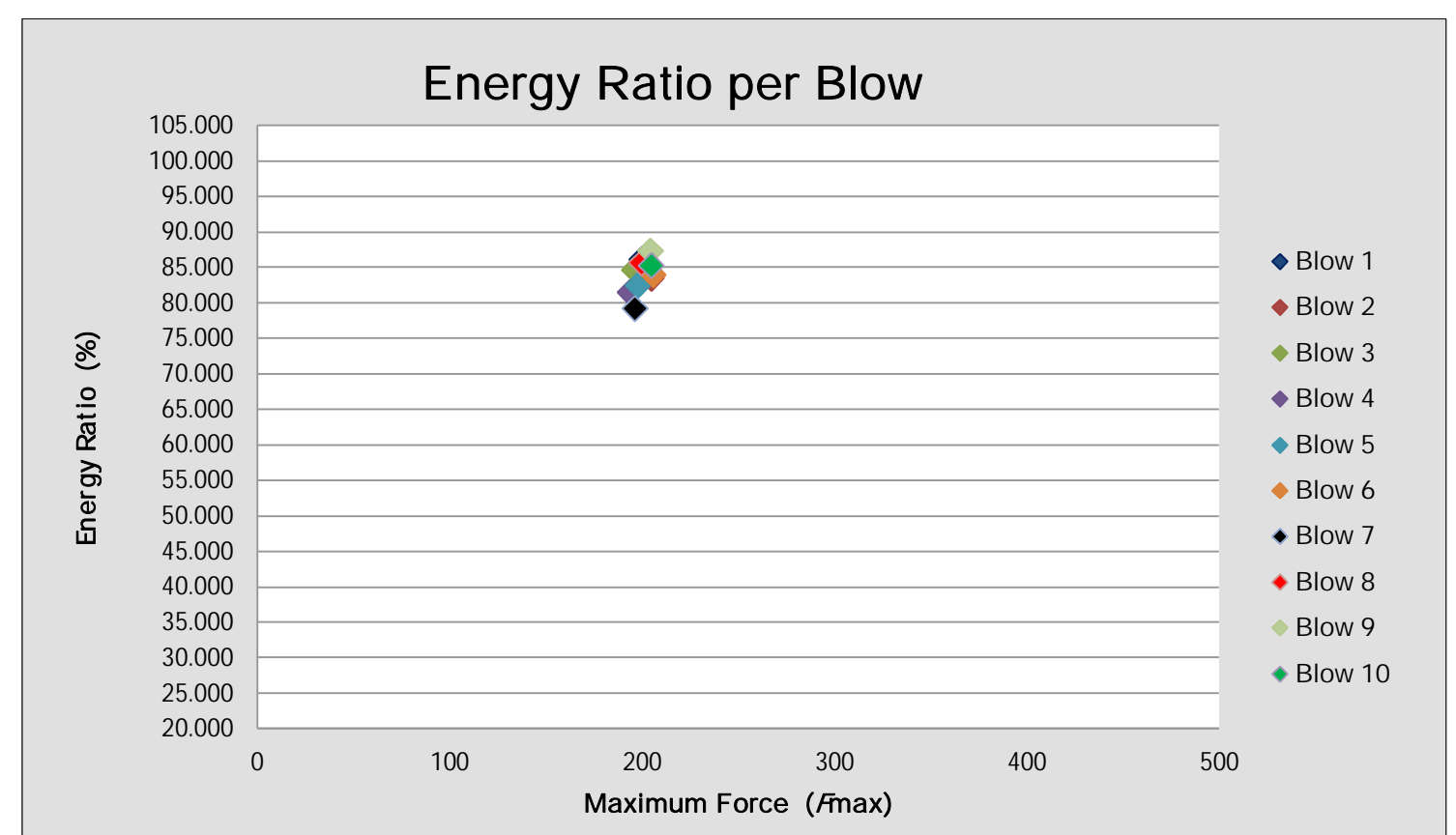
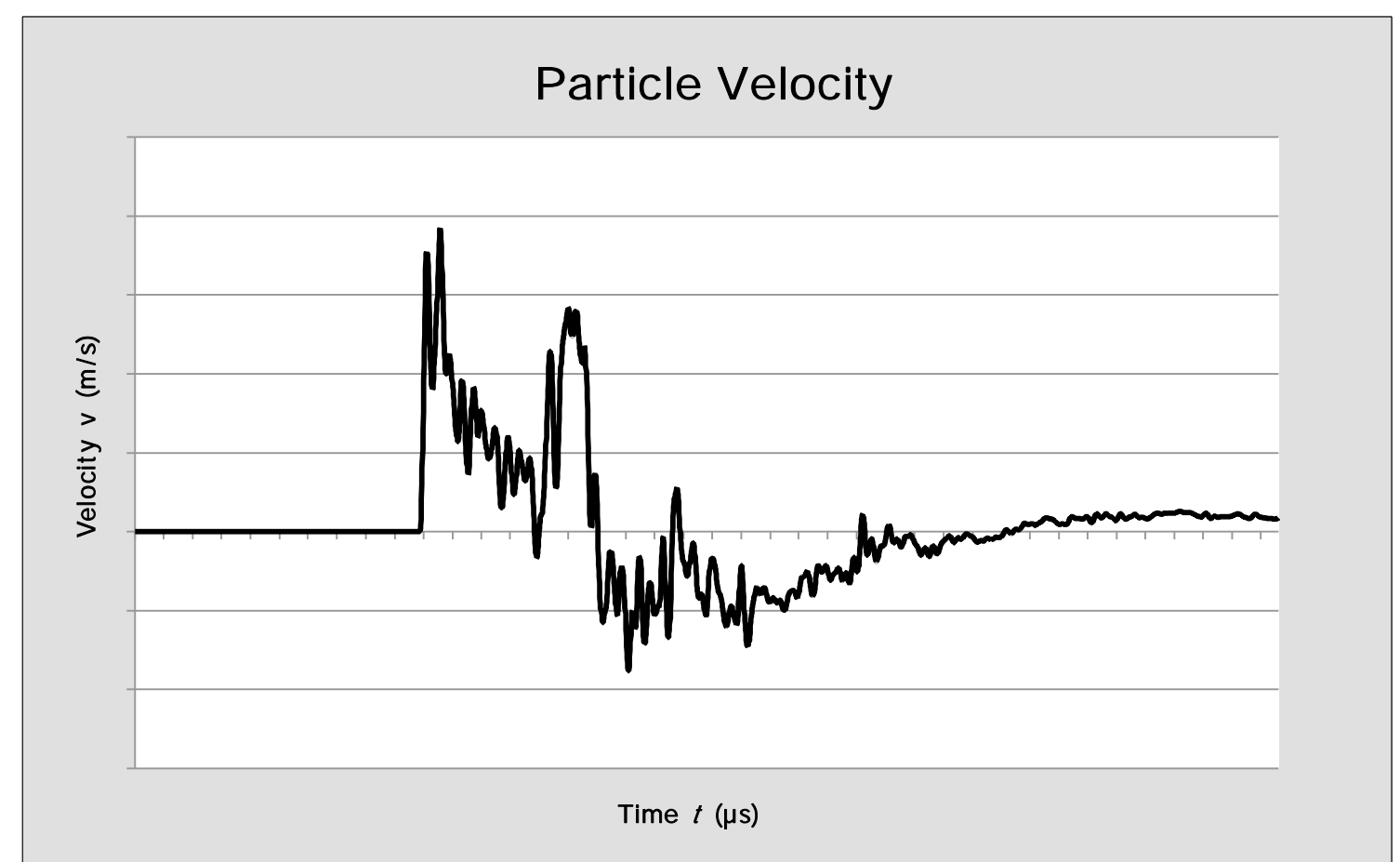
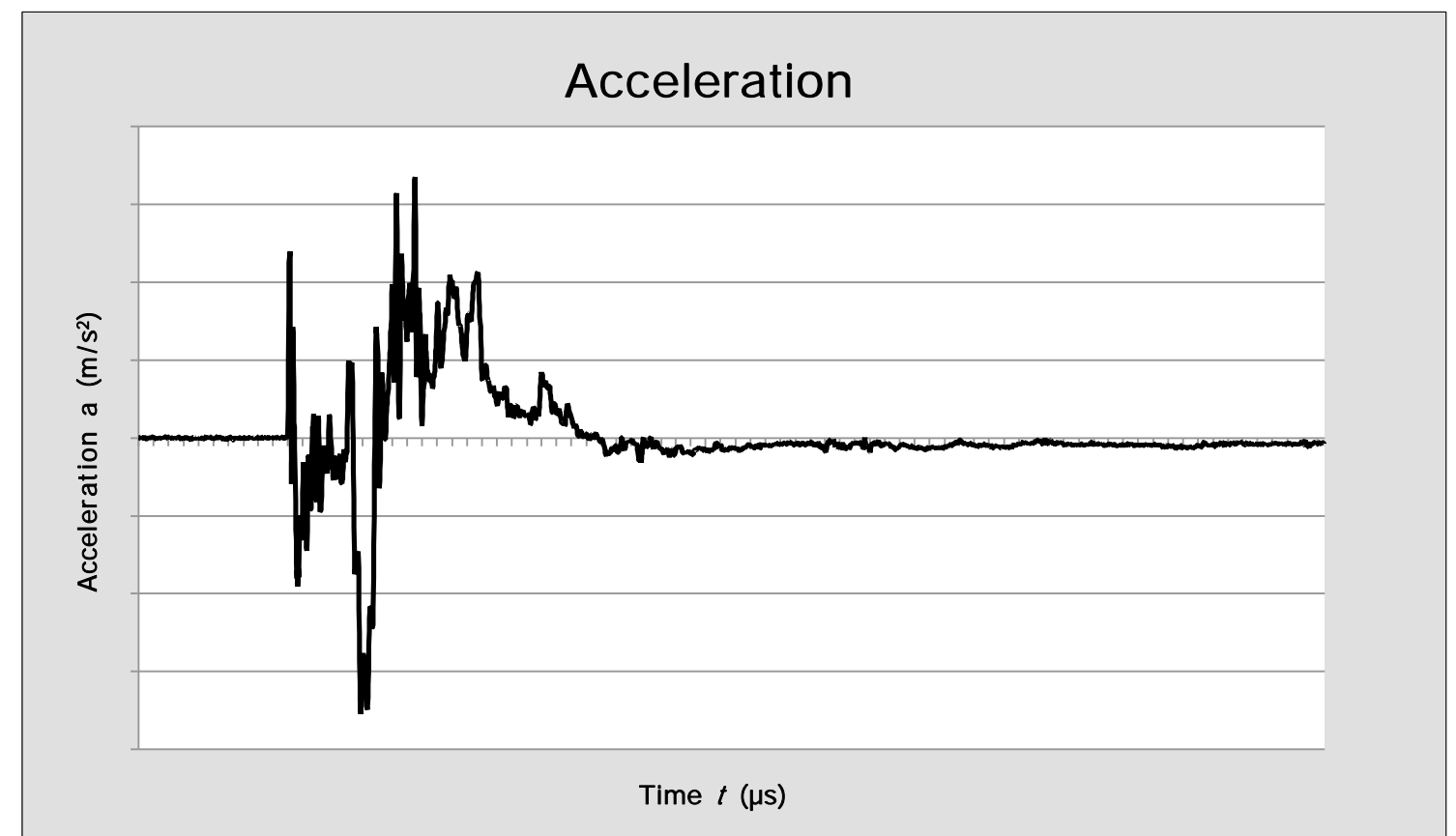
DATE OF TEST    VALID UNTIL    HAMMER ID

18/07/2023	17/07/2024	
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$E_{\text{meas}} =$                                 0.392 kN-m

$E_{\text{theor}} =$                                 0.473 kN-m

Comments



Energy Ratio ( $E_r$ ) =  $\frac{E_{\text{meas}}}{E_{\text{theor}}}$       **82.88%**  
 © COPYRIGHT 2023

Equipe SPT Analyzer Operator <b>KS</b>	Certificate prepared by 	Certificate checked by 	Certificate date <b>27/07/2023</b>
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## KEY TO BOREHOLE LOG SYMBOLS

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Symbol	Explanation
D or J	Small Disturbed Sample (tub or jar sample)
B	Large Disturbed Sample
U	Undisturbed Sample
W	Water Sample
U70	Undisturbed Sample

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### Undrained Shear Strength Test (HSV)

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90	Hand vane - direct reading in kN/m <sup>2</sup>
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### Standard Penetration Test (SPT)

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15	SPT 'N' Value (BS EN ISO 22476-3:2005)
125/50	Where full test drive not completed, penetration (125mm) and blow count (50) recorded
NR	No effective penetration

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### Water



Water struck



Water standing

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### Test/Core Range

TCR	Total Core Recovery - as percentage of core run. Where value significantly exceeds 100%, a note is given on remarks on log
SCR	Solid Core Recovery - as percentage of core run. Note: assessment of solid core is based on full diameter
RQD	Rock Quality Designation - the amount of solid core greater than 100mm expressed as percentage of core run  Where SPT has been carried out at beginning of core run, disturbed section of core excluded from SCR and RQD assessment

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### Instrumentation



Bentonite Seal



Solid / Perforated Standpipe



Granular Response Zone

## **APPENDIX 3**

**CONTAMINATION  
STATUTORY FRAMEWORK / METHODOLOGY  
AND  
CERTIFIED CONTAMINATION TEST RESULTS**

### **A3 CONTAMINATION RISK ASSESSMENT**

#### ***Statutory Framework***

**A3.1** Part 2A of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a regime for the control of specific threats to health or the environment from existing land contamination. In accordance with the Act and the statutory guidance document on the Contaminated Land (England) Regulations 2000, the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only 'contaminated land' where it appears to the regulatory authority to be in such a condition, by reason of substances within or under the land, that:

harm is being caused or has significant possibility of significant harm to be caused to human health, or

pollution is being caused or has significant possibility of significant pollution to be caused to controlled waters.

**A3.2** In 2012 revised Statutory Guidance for Part 2A of the Environmental Protection Act (1990) came into force for England and Wales. This introduced a new four category approach for classifying land affected by contamination to assist decisions by regulators in cases of Significant Possibility of Significant Harm (SPOSH) to specified receptors, including humans, and significant pollution of controlled waters.

**Category 1** describes land which is clearly problematic e.g. because similar sites are known to have caused a significant problem in the past. The legal definition is where "there is an unacceptably high probability, supported by robust science-based evidence, that significant harm would occur if no action is taken to stop it".

**Categories 2 and 3** cover land where detailed consideration is needed before deciding whether it may be contaminated land. Category 2 is defined as land where "there is a strong case for considering that the risks from the land are of sufficient concern that the land poses a significant possibility of significant harm". Category 3 is defined as land where there is not the strong case described in the test for Category 2, and may include "land where the risks are not low, but nonetheless the authority considers that regulatory intervention under Part 2A is not warranted". The decision basis is initially related to human health risks, and if this is not conclusive due to uncertainty over risks, wider socio-economic factors (e.g. cost, local perception etc).

**Category 4** describes land that is clearly not contaminated land, where there is no risk or the level or risk posed is low.

**A3.3** This same 4 category system has also been introduced to assist in identifying whether there is a significant possibility of significant pollution of controlled waters. Part 2A states that normal levels of contaminants in soil should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise.

**A3.4** Once land has been determined as contaminated land, the enforcing authority must consider how it should be remediated and, where appropriate, it must issue a remediation notice to require such remediation. The enforcing authority for the purposes of remediation may be the local authority which determined the land, or the Environment Agency which takes on responsibility once land has been determined if the land is deemed to be a “special site”. The rules on what land is to be regarded as special sites, and various rules on the issuing of remediation notices, are set out in the Contaminated Land (England) Regulations 2006.

**A3.5** The UK guidance on the assessment of land contamination has developed as a direct result of the introduction of the above two Acts. The current technical guidance supporting the legislation has been summarised in the document Land Contamination Risk Management (LCRM), originally published in October 2020 by the Environment Agency (EA).

### ***Contamination Assessment Methodology***

**A3.6** LCRM guidance proposes a three-stage risk based assessment process for identifying if a hazard exists within a site.

Stage 1: Risk assessment

Stage 2: Options appraisal

Stage 3: Remediation and verification

**A3.7** Stage 1 is to collect detailed information about the site, firstly to establish the likelihood of a hazard being present, and if a potential hazard is identified, to assess (through the source-pathway-receptor potential pollutant linkage concept) whether it has the

potential to pose an unacceptable risk. That unacceptable risk is subsequently estimated and /or evaluated.

- A3.8** Stage 1 can be achieved through a preliminary desk-based risk assessment and if considered appropriate, by progression to a generic or detailed quantitative risk assessment using appropriate intrusive investigation methods supported by UKAS accredited laboratory testing.
- A3.9** Quantitative assessment of human health risk posed by ground contamination is achieved by comparison of soil concentrations with Tier 1 Suitable for Use Levels (S4UL) as published by LQM/CIEH (2015) or (in the case of the toxic metal Lead only) with a Category Four Screening Level (C4SL) published by DEFRA (2014). The official Soil Guideline Values utilise a soil organic matter content of 6% which is considered to be higher than typical UK soils, however three sets of S4UL's have been developed for organic matter contents of 1%, 2.5% and 6%, thus the most appropriate set is selected based upon proven site conditions.
- A3.10** Contaminant concentrations below the threshold screening values are considered not to warrant further risk assessment. Concentrations of contaminants above these screening values require further consideration of potential pollutant linkages and may indicate potentially unacceptable risks to site users that warrants either further detailed quantitative risk assessment or progression to Stage 2. It should be noted that S4UL/C4SL's are not absolute thresholds and an exceedance does not necessarily indicate that a potential pollutant linkage is automatically established.
- A3.11** In order to assess any risk to controlled waters posed by contaminants within the underlying soils and groundwater, laboratory results are screened against Level 1 Environmental Quality Standard (EQS) values derived from the Water Framework Directive (Standards & Classification) Directions (England & Wales) 2015 and the current UK Drinking Water Supply (Water Quality) Regulations (DWS), dependent upon the most vulnerable receptor. The EQS is usually an upper concentration set for the receiving watercourse and not the discharge itself. The DWS is established for compliance at the point of use or abstraction and not the source area.
- A3.12** Stage 2 follows on from the risk assessment completed in Stage 1 by firstly identifying all feasible remediation options, then through consideration of additional factors including but not limited to; sustainability, limitations, timescales and budgets and regulatory controls, narrow the list of remediation options down to a favoured

remediation/mitigation approach. Note that this approach is not restrictive and may include the adoption of as many remediation options as necessary in order to achieve the remediation objective(s).

**A3.13** Stage 3 takes the chosen remediation/mitigation approach from Stage 2 and from which a remediation strategy 'that can be implemented in practice' is developed and agreed with the regulatory authority. Once agreed the approved remediation works can take place as per the strategy, whilst still being mindful of whether the chosen remedial strategy is working as anticipated and also for the presence of unexpected contamination. Subject to findings, the agreed remedial strategy may require adjustment in order to ensure that the remediation objectives(s) can be met.

**A3.14** Upon completion of the remedial works a verification plan is produced detailing the works undertaken and demonstrating that the risk has been reduced, that the remediation objective(s) and criteria have been met and that the site no longer presents a risk to human health and/or controlled waters, and therefore can be considered 'suitable for use'.

#### ***Waste Classification***

**A3.15** In terms of controlled off-site disposal to landfill of site arisings, if/where intended, waste classification is carried out in line with European Waste Catalogue (EWC) and Technical Guidance Waste Management 3 (TGWM3, EA Version 1.2, October 2021) using contamination test results obtained for that material. The assessment utilises the 'HazWasteOnline' software to establish a 'Hazardous' (170503\*) / 'Non-hazardous' (170504) classification. Where required, the foregoing may be supplemented by Waste Acceptance Criteria (WAC) analysis, in order that the waste can further be designated as 'Hazardous' / 'Stable non-reactive' / 'Inert', for use by the receiving landfill operator. It should be noted that WAC is only required for disposal of wastes at certain classes of landfill; if arisings are not intended for removal to landfill, then WAC testing is not applicable.





## CONDITIONS OF CONTRACT - CONSULTANCY SERVICES

- 1 Wilson Associates (Consulting) Limited ("the Consultant") shall carry out the Services, including any proposal, report or other document, as detailed in any relevant correspondence, which forms part of this Agreement, for the Client with reasonable skill, care and diligence. The Consultant shall use reasonable endeavours to adhere to any agreed programme. Each instruction or acceptance of a quotation shall be deemed to be an offer to purchase the services subject to the conditions laid out in this document.
- 2 An interim invoice will normally be submitted upon completion of the site works, to include all disbursements and fees to date, and for contracts extending over a long period, monthly invoices will be submitted for payment. The final report will not be issued until payment of the first interim invoice has been received, unless agreed with this Practice beforehand. Invoices are not to be assigned to a third party without prior agreement. Should the contract be cancelled after either preparatory or fieldwork has commenced then a claim will be made for work completed to that date.
- 3 The rates quoted, are net of Value Added Tax (VAT) which will be added to invoices at the standard prevailing rate, and are valid for a period of 12 weeks from the date of the quote. The Consultant shall issue accounts monthly in respect of that part of the Services carried out in the preceding period. The Client shall make payment of accounts without discount or retention within 30 days of submission. Disputes should be raised within 10 days. In the event of non-payment of the account(s) within the specified period the Consultant reserves the right to charge, from time to time, interest on the unpaid amount at the rate of 2% per calendar month above the Bank of England base rate (at time of original invoice date).
- 4 In the event of non-payment of the account(s), the Client undertakes to pay to the Consultant all costs and expenses, on an indemnity basis, incurred by the Consultant in: (i) the recovery from the Client of money or arrears (ii) the enforcement of any of the provisions of these conditions of contract (iii) the service of any notice relating to the breach by the Client of any of their obligations under this contract whether or not the same shall result in court proceedings (iv) the cost of any bank or other charges incurred by the Consultant if any cheque written by the Client is dishonoured or if any standing order payment is withdrawn by the Client's bankers (v) compensation for the breach of any terms of this agreement.
- 5 Unless expressly stipulated to the contrary, payment of the account(s) is not dependent upon the Client achieving regulatory approval for or discharge of a planning condition relating to the project, nor is it dependent upon the Client's securing of funding for the development where this may be conditional upon the prior granting of planning or building regulations approval, nor the Client's onward sale of the site to another party. In the case of provision of services to another consultant, payment of our account is not dependent upon the prior settlement of their own account by their Client.
- 6 No work will commence until an official written order or completed Quote Acceptance form has been received by post or email. Such order will be deemed to constitute acceptance of the quotation and these terms and conditions. Where the instruction to undertake the Services may have been issued by an intermediary on behalf of the Client, full Client details including confirmation of and contact details for the person responsible for authorising payment must be provided to the Consultant. In the event that the Client defaults or otherwise fails to pay the due account, the Consultant reserves the right to pursue and recover any unpaid amount from the instructing intermediary.
- 7 Neither party shall assign any obligation or benefit under this Agreement without prior written consent of the other Party. The Client shall not be entitled to assign the report(s) or any part of it without our prior written consent. Re-assignment of reports can be provided on request, subject to liaison with our Insurers and standard administration costs. Any assignment shall exclude the Contracts (Rights of Third Parties) Act 1999. Provision of a Collateral Warranty can only be considered if it is agreed at the pre-works stage, and fees for legal advice and warranty provision agreed before the works commence.
- 8 The Client guarantees that it has the right to have the Services performed and that he has obtained all the necessary certificates, licences, permits and consents required by Statute or any order or regulation made there under or by any regulation or by-law of any authority undertaker. The Client shall indemnify and hold harmless the Consultant from and against all consequences of a failure in this respect. The Client shall arrange such rights of access to property and use of Client's facilities as described in (or reasonably to be inferred from) this Agreement. The Client shall use reasonable endeavours to supply to the Consultant, promptly and free of charge: (a) any other necessary things in accordance with this Agreement; (b) any instructions, decisions, consents and approvals; and (c) any relevant data and information in the Client's possession; all of which the Consultant may reasonably require in order to carry out the Services. The Client will indemnify the Consultant in respect of any failure by the Client under this Clause.
- 9 In line with the Construction (Design & Management) Regulations 2015 and AGS guidance, neither the Consultant nor any sub-contractor shall be held responsible for any accidental damage or the consequences of any damage to buried services such as cables, pipes, sewers, etc., the positions and nature of which have not been clearly indicated to the Consultant in writing prior to the commencement of the work, unless the locating of same is expressly part of the Services. Where necessary it is assumed that the Client will permit the use of their toilet/welfare facilities by Consultant's staff and sub-contractors, including domestic properties. We will normally undertake the role of Contractor on a ground investigation project, but may occasionally 'inherit' the role of Principal Contractor. In either case that role is restricted to the ground investigation phase ONLY and not the subsequent build.
- 10 The Consultant shall not be held responsible for any loss, damage or injury arising from actions or omissions of the Client, his agents, servants and/or independent contractors. The Client shall indemnify the Consultant from any such acts or omissions.
- 11 Each Party shall retain the copyright of its documents. Information relating to the contract will only be disclosed to those employees who require it to carry out their job. If necessary this may include subcontractors. Any other third party enquiry about the purposes of these works will be referred back to the Client. Upon completion any technical information or ground investigation data obtained as part of your commission will thereafter be archived as 'in-house' data, and may be used (without specific reference to your site) on other projects in the future; this specifically excludes any personal data.
- 12 Copyright And Non-Disclosure Notice - The contents and layout of any report produced by the Consultant are subject to copyright owned by Wilson Associates save to the extent that copyright has been legally assigned by us to another party or is used by Wilson Associates under licence. To the extent that we own the copyright of a particular report, it may not be copied or used without our prior written agreement for any purpose other than the purpose indicated in that report. The methodology (if any) contained in that report is provided to you in confidence and must not be disclosed or copied to third parties without the prior written agreement of Wilson Associates. Disclosure of such information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests. Any third party who obtains access to that report by any means will, in any event, be subject to the Third Party Disclaimer set out below.
- 13 Third Party Disclaimer - Any disclosure of our report(s) to a third party is subject to this disclaimer. Reports are prepared by Wilson Associates at the instruction of, and for use by, our client named on the front of that report. It does not in any way constitute advice to any third party who is able to access it by any means. Wilson Associates excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of that report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability. Legal re-assignment to another party can be arranged - see Clause 7.
- 14 The Consultant's liability under this Agreement shall be limited to £500,000 (five hundred thousand pounds). The Consultant shall maintain professional indemnity insurance in this amount providing that such insurance cover is available at commercially reasonable rates.
- 15 To comply with the General Data Protection Regulation (GDPR) 2018, we will only request contact details sufficient to complete our project with you, name/job title, address/postcode/email. Any data collected will be used only by authorised personnel in the context of that project. We are committed to ensuring that your information is secure and in order to prevent unauthorised access or disclosure, we have put in place suitable physical, electronic and managerial procedures to safeguard and secure the information we collect. We will not share your information with third parties.